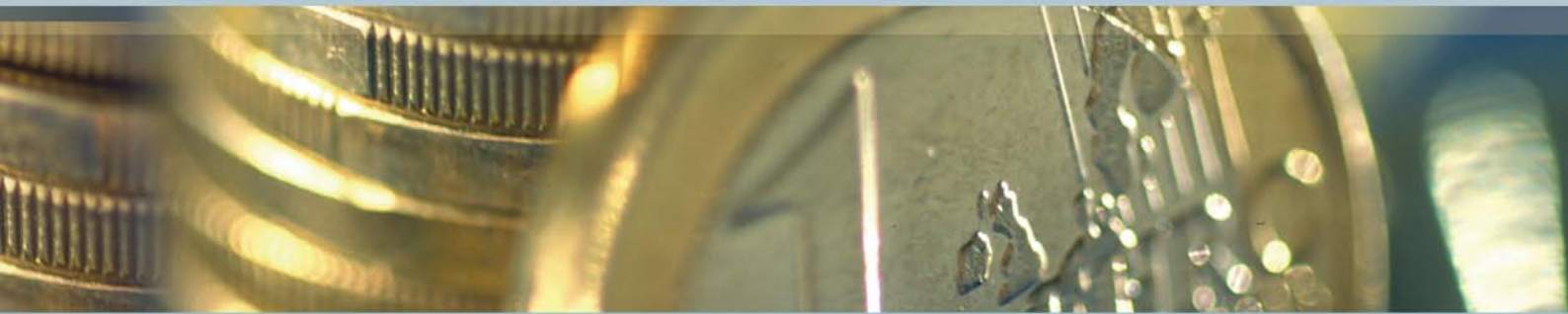


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# **PENSION SCHEMES AND PROJECTION MODELS IN EU-25 MEMBER STATES**

## **ABSTRACT**

This paper reviews the public pension schemes and the pension models used for the projections carried out by the Economic Policy Committee and the European Commission on age-related expenditure in 2005. The pension schemes are described as they were in force in 2005, including the effects of pension reforms enacted by mid-2005 even though the implementation of reforms would occur over a longer period of time. This reflects the practice applied in the projections as to what was included in the projections. While the pension expenditure projections covered apart from public pensions also statutory private funded pensions and in some countries occupational pensions, the paper focuses primarily on public pension schemes. These constitute the predominant part of pension expenditure in almost all Member States and they were the primary target of the exercise.

While a great deal of the projection exercise was done in a centralised way, notably population, labour force and macroeconomic projections, pension expenditure were projected by national authorities by using their national models in order to benefit of the country-specific knowledge on greatly differing pension systems and to improve the accuracy of the projections for pensions. This paper aims at contributing to the comparability of the pension projections across Member States and to make the projections transparent and better understandable through country-specific descriptions of the pension systems and the models used for the projection exercise.

**JEL classification:** H55, J18, J26

**Keywords:** Pension expenditure, pension projections, pension models, ageing,

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# TABLE OF CONTENT

## TABLE OF CONTENT

4

<b>PART I SUMMARY OF COUNTRY DESCRIPTIONS OF PENSION SCHEMES AND PROJECTION MODELS</b>	<b>11</b>
1. INTRODUCTION	11
2. SUMMARY OF PENSION SYSTEM DESCRIPTIONS	12
2.1.1 Public old-age pension schemes	12
2.1.2 Public early and deferred retirement schemes	13
2.1.3 Indexation of pensions	13
2.1.4 Taxation of pensions	14
2.1.5 Contributions to public pension schemes	15
2.1.6 Summary of pension model descriptions	16
2.1.7 Conclusions	17
<b>PART II COUNTRY CHAPTERS</b>	<b>42</b>
3. BELGIUM	42
3.1 <i>Introduction</i>	42
3.2 <i>Description of the Belgian pension system</i>	42
3.2.1 The general pension scheme for wage earners	43
3.2.2 The pension scheme for the self-employed	43
3.2.3 The pension scheme for civil servants	44
3.2.4 The early retirement scheme: “pre-pensions” (only for wage earners)	45
3.2.5 Disability	46
3.2.6 The assistance scheme: the guaranteed income for elderly persons (GIEP)	46
3.3 <i>Reforms</i>	47
3.3.1 The 1997 pension reform	47
3.3.2 Improving the employment probabilities for older workers	47
3.3.3 Civil servants: age bonuses	48
3.3.4 Minimum pension reforms of the general pension schemes	48
3.3.5 The guaranteed income for elderly persons (GIEP)	48
3.3.6 The most recent measures (October 2005) - not introduced in the projection	49
3.4 <i>Projection methodologies for pension expenditure</i>	50
3.4.1 A brief description of the Maltese model	50
3.4.2 The pension expenditure model	51
3.4.2.1 Number of pensioners, including early retirement and disability	51
3.4.2.2 Pension accrual and average pension	52
3.4.2.3 Average pre-pension and disability benefits	53
3.4.2.4 Sources of data in the MALTESE model	54
3.5 <i>AWG: Baseline results</i>	54
3.5.1 Pension expenditure	54
3.5.1.1 The components of the coverage ratio	56
3.5.1.2 Benefit ratio	58
3.5.2 The budgetary cost of ageing	59
3.6 <i>AWG sensitivity tests</i>	60
3.6.1 The scenarios behind the 7 AWG sensitivity tests	60
3.6.2 Results of the 7 AWG sensitivity tests	60
<i>Annex 1: Data sources of socioeconomic projection of the Maltese model</i>	62
<i>Annex 2: Integration of the socioeconomic AWG projection in the Belgian Maltese model</i>	63
Employment	63
Unemployment	63
Others assumptions	64
<i>Annex 3: Projection of the number of pensioners (including pre-pensioners and disabled persons)</i>	65
4. THE CZECH REPUBLIC	67
4.1 <i>Key characteristics of the pension system</i>	67
4.1.1 Main features of the pension system	67
4.1.2 Recent reforms	68
4.1.3 Basis for pension calculations	70
4.2 <i>Description of the pension model of the Czech Ministry of Finance</i>	71
4.2.1 The pension model	71
4.2.2 Sources of data	72
4.2.3 The structure of the model	72
5. DENMARK	82

5.1	<i>The Danish pension system</i>	82
5.1.1	Public pensions (first pillar pensions)	83
5.1.2	Occupational pensions (second pillar pensions)	86
5.1.3	Voluntary individual pensions (third pillar pensions)	88
5.1.4	Retirement age	89
5.1.5	Recent reforms	89
5.1.6	Coverage of the pension schemes in the projection	90
5.2	<i>Description of the Pension Projection Model and its Base Data</i>	91
5.2.1	General description of the model	91
5.2.2	Data	92
5.2.3	Assumption and methodologies applied	92
5.2.3.1	Incorporation of recent reforms	92
5.3	<i>Results</i>	93
	<i>References</i>	94
	<i>Annex 1: The Disability pension system</i>	95
6.	GERMANY	97
6.1	<i>Key characteristics of the pension system</i>	97
6.2	<i>Latest reforms</i>	98
6.3	<i>Description of the pension models</i>	99
6.3.1	Source of data	99
6.3.2	The demographic pension model	100
6.3.3	The financial pension model	101
6.3.4	Assumptions for the AWG projection	102
	<i>Annex 1: The Adjustment Formula</i>	103
7.	ESTONIA	105
7.1	<i>General overview</i>	105
7.2	<i>The pension model</i>	107
7.2.1	Name and organisation responsible	107
7.2.2	Type of model	107
7.2.3	General purpose and use of the model	107
7.3	<i>Basic data required to run the model</i>	107
7.3.1	Sources of data	107
7.3.2	Organisation of data	108
7.3.3	Coverage and possible exceptions	108
7.4	<i>Assumptions and methodology used in the calculation of main variables</i>	108
7.4.1	Underlying assumptions agreed with AWG	108
7.4.2	Additional assumptions and methodology	108
7.5	<i>Incorporation of future effects of enacted reforms</i>	108
7.5.1	Retirement decisions	108
7.5.2	Taking up of early retirements	108
7.5.3	Application of indexation rules and adjustments	108
7.6	<i>Description of the projection (main equations)</i>	109
8.	SPAIN	111
8.1	<i>Description of The Public Pension System</i>	111
8.1.1	The pension system	111
8.1.2	Eligibility requirements	111
8.1.3	Calculation method for pension benefits. Indexation. Taxation	112
8.1.4	Average retirement age and average replacement rate	113
8.1.5	Recent reforms on gradual and flexible retirement	113
8.2	<i>The Projection Model</i>	114
8.2.1	Coverage of the pension projections	114
8.2.2	Description of the model	116
8.3	<i>Results</i>	117
8.4	<i>Current Policy Scenario</i>	117
8.4.1	Demographic assumptions	117
8.4.2	Labour-market assumptions	118
8.4.3	Macroeconomic assumptions	119
8.5	<i>Presenting And Explaining The Results</i>	120
8.6	<i>Sensitivity Tests</i>	123
8.6.1	Comparing the sensitivity test results	124
8.6.2	Comparing The Results with the 2001 Projections	125
9.	FRANCE	126
9.1	<i>Key Characteristics of the French Pension Scheme</i>	126
9.1.1	Description of the key features	126

9.1.2	Recent reforms included in the projections and adherence to the common agreement	130
9.1.3	Extent of the coverage of the pensions projections and adherence to the agreed coverage and disaggregation	131
9.2	<i>The Pension Models Used for the EPC Projection</i>	131
9.2.1	Coordination with the national projections of the COR	131
9.2.2	First stage: the national projection based on the COR assumptions	132
9.2.2.1	Model used for the CNAVTS (salaried workers)	132
9.2.2.2	Projection of the Public sector schemes	133
9.2.2.3	Aggregation of all the pension schemes projections	133
9.2.3	Second stage: Taking account of the AWG hypotheses	133
9.2.3.1	Taking account of the AWG hypotheses	133
9.2.3.2	The model of the DREES	135
9.3	<i>Results of The Projection</i>	136
9.4	<i>Projection of the Assets of the Pension Funds</i>	137
9.4.1	Coverage	137
9.4.2	Projection method	138
9.4.2.1	From 2000 to 2020	138
9.4.2.2	From 2021 to 2050	139
9.4.3	Results	139
	<i>Annex 1 : Global diagram of the forecasting models available in France</i>	142
	<i>Annex 2 : Diagram of the DREES model</i>	143
	<i>Annex 3: Overview of the sensitivity tests</i>	144
10.	IRELAND	145
10.1	<i>Introduction</i>	145
10.2	<i>Definitions</i>	145
10.3	<i>Main Characteristics of the Irish Pension System</i>	145
10.3.1	Social Security Pensions	146
10.3.2	Public Service Pensions	147
10.3.3	National Pensions Reserve Fund (NPRF)	147
10.4	<i>Demographic and Macroeconomic Assumptions</i>	148
10.4.1	Demographic Assumptions	148
10.4.2	Macroeconomic Assumptions	149
10.5	<i>Pension Projections Methodology</i>	150
10.5.1	Social Security Pensions	151
10.5.2	Public Service Pensions	152
10.5.3	Assets of Pension Funds and Reserves	152
10.5.4	Additional Information	153
10.6	<i>Pension Projection Results</i>	153
10.7	<i>Sensitivity Tests</i>	155
10.7.1	Higher Life Expectancy	155
10.7.2	Higher Employment Rate	155
10.7.3	Higher Employment Rate amongst Older Workers	156
10.7.4	Higher / Lower Labour Productivity	156
10.7.5	Higher / Lower Interest Rates	156
10.8	<i>Conclusion</i>	157
	<i>Annex 1: Eligibility Requirements for First Pillar Pensions</i>	158
	<i>Annex 2: Main Features of Second Pillar Public Service Pension Schemes</i>	160
11.	ITALY	161
11.1	<i>Introduction</i>	161
11.2	<i>Description of the pension system</i>	161
11.2.1	An overview of the legal and institutional framework	161
11.2.2	The public pension system	162
11.2.2.1	Calculation rules	162
11.2.2.2	Eligibility requirements	163
11.2.2.3	Indexation, contribution rates and taxation of pension	164
11.2.3	Funded component of the pension system	165
11.3	<i>The projection model</i>	168
11.3.1	Updating and Institutional utilization	168
11.3.2	Coverage	168
11.3.3	The methodology	169
11.3.3.1	The general outline	169
11.3.3.2	The pension component of the model	171
11.3.4	Consistency with the EPC-AWG assumptions	173
11.4	<i>The EPC-AWG baseline scenario</i>	175
11.4.1	The results under the baseline scenario	175

11.4.2	The relevance of 2005-revision of the baseline scenario	177
11.4.3	The sensitivity analysis	178
	<i>Annex 1: The latest pension reform (Law 243/2004)</i>	186
	<i>Annex 2: Transformation coefficients: formula and assumptions</i>	187
	<i>Annex 3: The decomposition of pension projection results</i>	189
12.	CYPRUS	191
12.1	<i>Overview of the Cyprus Pension System</i>	191
12.1.1	The General Social Insurance Scheme	191
12.1.2	The Social Pension Scheme	193
12.1.3	Special Allowance to pensioners	193
12.1.4	The Government Employees Pension Scheme	193
12.1.5	Other Public Sector Employees Pension Schemes	193
12.1.6	Voluntary Provident Funds	194
12.2	<i>Accessibility to Pensions</i>	194
12.3	<i>Adequacy of Pensions</i>	195
12.4	<i>Pension System: Early Retirement and Labour force Participation</i>	195
12.5	<i>Pension Projections</i>	195
12.5.1	Basis of Projections	195
12.5.2	Assumptions	196
12.5.3	Results of Pension Projections Exercise	197
12.5.4	Pension Reforms and Simulations	198
13.	LATVIA	201
13.1	<i>Pension Reform In Latvia</i>	201
13.1.1	Old-age pension scheme	201
	The state old-age pension system comprises notional defined	201
13.1.2	Disability pensions (included in the projections)	202
13.1.3	Survivor's pensions (included in the projections)	203
13.1.4	Service pensions (during the transition period), included in the projections	203
13.1.5	The state mandatory funded pension scheme, included in projections	204
13.1.6	Voluntary private pension scheme, not included in projections	204
13.2	<i>Financing Of The Social Security System</i>	205
13.3	<i>Basis For Calculation Of The Pension(S), Including Information On Wages, Adjustments And Indexations Of Pension Schemes</i>	205
13.3.1	Old-age pension formula during the transition period	205
13.3.2	Disability pension formula	206
13.3.3	Survivors pension formula	206
13.4	<i>Projection Model</i>	207
13.4.1	The Latvian Social Insurance Budget Model by the Ministry of Welfare	207
13.4.2	Basic data required to run the model(s)	207
13.4.3	Assumptions and methodology used in the calculation of main variables	208
13.4.4	Incorporation of future effects of enacted reforms	209
13.4.5	Calculation of Old age pensions	209
13.5	<i>Results of Projections</i>	213
14.	LITHUANIA	215
14.1	<i>Key Features of the Pension System</i>	215
14.1.1	Pension benefits	215
14.1.1.1	The state social insurance pension	215
14.1.1.2	The state pensions	216
14.1.2	Financing of the pension system	216
14.1.2.1	The social insurance contributions	216
14.1.2.2	Financing of the state pensions	217
14.2	<i>Recent Reforms</i>	217
14.3	<i>The Basis for Calculations</i>	218
14.3.1	Projection Models	218
14.3.2	Basic Data and Assumptions used in the Model	219
14.3.2.1	Social insurance pension system	219
14.3.2.2	State pension system	220
14.4	<i>Methodology and Main Model Equations</i>	221
14.4.1	Social insurance pension system equations	221
14.4.2	The equations of the state pension system	222
14.5	<i>The Results</i>	222
15.	LUXEMBOURG	224
15.1	<i>Pension System Overview</i>	224
15.1.1	Key features	224

15.1.2	Eligibility conditions	224
15.1.3	Effective retirement ages	225
15.1.4	Main pension formulas	225
15.1.5	Indexation of pensions	226
15.1.6	Recent reforms included in the projections	226
15.1.7	Extent of the coverage of the pension schemes in the projections	226
15.1.8	Financing	226
15.2	<i>Description of the Pension Projection Model and Its Base Data</i>	227
15.2.1	General description of the model	227
15.2.2	Type and structure of the model	227
15.2.3	Data sources	228
15.2.4	Assumptions and methodologies applied	228
15.2.5	Adherence of underlying assumptions	228
15.3	<i>Results</i>	228
15.3.1	Brief overview of results	228
15.3.2	Explanation of driving forces for results	229
15.3.3	Changes in comparison with the 2001 projection	229
15.4	<i>Differences Between National Projections And AWG Projections</i>	230
16.	HUNGARY	231
16.1	<i>Overview of the Hungarian Pension System</i>	231
16.1.1	The structure of the pension system	231
16.1.2	Eligibility requirements	232
16.1.3	The method of benefit calculation	232
16.1.4	Indexation	232
16.1.5	Taxation	233
16.1.6	Calculations for the private mandatory pillar	233
16.2	<i>Description of Modelling Techniques and Use of Assumptions</i>	233
16.2.1	Underlying assumptions	233
16.2.2	Coverage of the projections	234
16.2.3	General characteristics of the model	235
16.2.3.1	Input data	235
16.2.3.2	Method of calculation	235
16.3	<i>Results of the Pension Projections</i>	237
17.	MALTA	239
17.1	<i>Pension System Overview</i>	239
17.2	<i>Description of the Pension Projection Model and its Base Data</i>	243
17.3	<i>Results</i>	246
17.4	<i>The 2006 Pension Reform</i>	246
18.	THE NETHERLANDS	249
18.1	<i>Structure of the Dutch pension system</i>	249
18.1.1	The old age pension system	249
18.1.2	First pillar: the state old age pension (AOW)	250
18.1.3	Second pillar: occupational pensions	250
18.1.4	Early retirement	251
18.1.5	The financial position of pension funds	251
18.1.6	Disability and survivors benefits	252
18.2	<i>The Role of the Government</i>	252
18.2.1	Tax legislation	253
18.2.2	Pension and Savings Fund Act (PSW)	253
18.2.3	Mandatory Participation in a Branch Pension Fund Act of 2000 (Wet Bpf 2000)	253
18.2.4	Mandatory Participation in a Pension Scheme for Professional Groups Act (Wet Bpr)	254
18.2.5	The new Pension Act	254
18.3	<i>Projecting Pensions into the Future</i>	255
18.3.1	The first pillar	255
18.3.2	The second pillar	255
18.3.3	The results	256
18.3.4	Disability and survivors benefits	257
19.	AUSTRIA	258
19.1	<i>Overview of the Pension System</i>	258
19.1.1	General Structure of the System	258
19.1.2	Recent Reforms	258
19.1.3	Second and third pension pillars (occupational and private voluntary pensions)	259
19.2	<i>Description of the Projection Model and its Base Data</i>	260
19.2.1	Official Long-Term Pension Projections in Austria	260
19.2.2	Description of the Applied Projection Models within the EU Framework	260



19.3	<i>Demographic and Macroeconomic Scenarios until 2050</i>	261
19.3.1	Demographics and labour force developments until 2050 (based on EUROSTAT)	261
19.3.2	Labour force and employment developments	262
19.3.3	Long run growth in Austria	263
19.4	<i>Public Pensions: Projection Results</i>	264
19.4.1	Overall results	264
19.4.2	Number of pensions and their future development	265
19.4.3	Average pensions and their future developments	266
19.4.4	Social security contributions and the overall pension deficit	267
19.4.5	Sensitivity analysis	268
20.	POLAND	270
20.1	<i>The Polish Pension System</i>	270
20.1.1	General Pension System	271
20.1.2	Farmers' Pension System	273
20.1.3	Security Provision Systems	274
20.2	<i>Assumptions</i>	274
20.2.1	Demographic assumptions of the AWG projection for Poland.	274
20.2.2	Macroeconomic assumptions of the AWG projection	276
20.3	<i>The results of the forecasts – baseline scenario</i>	278
20.3.1	Analytical tools	278
20.3.2	Results	279
20.3.3	Sensitivity tests.	283
20.4	<i>Summing up and Conclusions</i>	286
21.	PORTUGAL	287
21.1	<i>Introduction</i>	287
21.2	<i>Public Sector Workers' Pension Scheme</i>	288
21.2.1	The model and the underlying assumptions	288
21.2.2	Public sector employees (CGA) – projection results	292
21.3	<i>Old Age Pension System of The Social Security System for Private Sector Employees</i>	296
21.3.1	Overview	296
21.3.2	Recent trends and reforms	297
21.3.3	The projection model: ModpensPor	297
21.3.4	AWG Projections	300
21.4	<i>Summing up Public and Private Sectors' Pension Schemes</i>	303
22.	SLOVENIA	305
22.1	<i>Pension and Invalidation Insurance in Slovenia</i>	305
22.1.1	Benefits	306
22.1.2	Qualifying conditions for old-age pension	306
22.1.3	Qualifying conditions for invalidity pension	307
22.1.4	Pension base	307
22.1.5	Pension formula and pension amount	307
22.1.6	Indexation of pensions and other benefit	308
22.1.7	Financing of the compulsory pension insurance	309
22.2	<i>Model Description</i>	309
22.3	<i>The Model for The Projection of The Numbers of Pensioners and Contributors in The Full Employment Scenario</i>	310
22.4	<i>Description of the OLG-GE Model of the Slovenian Economy</i>	312
22.5	<i>Results of Projections</i>	314
	<i>Annex 1 : Socio-economic status of the population</i>	317
23.	SLOVAKIA	319
23.1	<i>Description of the Pension System</i>	319
23.1.1	Pension system until 2003 (before reform)	319
23.1.2	Pension reform in 2004 (PAYG reform)	321
23.1.3	Pension reform in 2005 (Introduction of Fully Funded Pillar)	323
23.1.4	The position of the voluntary pension schemes (not covered in the pension projection)	324
23.2	<i>Model Information</i>	326
23.2.1	General Information	326
23.2.2	Using PROST in the Slovak Republic	327
23.3	<i>Results of The Pension Projections</i>	328
	<i>Annex 1: Benefit formulas and the architecture of the new pension system</i>	329
24.	FINLAND	331
24.1	<i>The Finnish Pension System: An Overview</i>	331
24.2	<i>The Earnings-Related Pension Scheme</i>	332
24.2.1	The reformed earnings-related pension scheme	332

24.2.2	Pension accrual and pension benefits	333
24.2.3	Financing pensions	335
24.3	<i>The National Pension Scheme</i>	336
24.4	<i>The Models and Their Assumptions</i>	336
24.4.1	The model for earnings-related pensions	336
24.4.1.1	Structure	336
24.4.1.2	Data requirements and application of AWG and other assumptions	338
24.4.2	The national pensions model	339
24.5	<i>Results of the Pension Projections</i>	340
24.5.1	Population, employment and production	340
24.5.2	Pension expenditure projection: baseline projection	341
24.5.3	Sensitivity calculations	341
24.5.3.1	Employment	342
24.5.3.2	Productivity	342
24.5.3.3	Interest rate	342
	<i>Annex 1: The coverage and categories of pensions in the projection model</i>	343
25.	SWEDEN	344
25.1	<i>The Swedish Public Pension System</i>	344
25.1.1	The DC PAYG system	345
25.1.2	The funded premium pension system	345
25.1.3	Basic security and the guarantee pension	345
25.1.4	Tax status	346
25.1.5	Early retirement, disability and survivor's pension	346
25.1.6	The process behind the reformed Swedish pension system	347
25.2	<i>Occupational Pensions</i>	347
25.3	<i>Private Pensions</i>	348
25.4	<i>The Ministry of Finance Microsimulation Model SESIM</i>	348
25.4.1	Introduction	348
25.4.2	Overview	348
25.4.3	Data Issues	350
25.4.4	Assumptions and simulations	351
25.5	<i>Results from the Calculations</i>	351
25.5.1	The baseline scenario	351
25.5.2	Sensitivity test	356
	<i>Annex 1: Technical comments and clarifications to the calculations</i>	358
	<i>Annex 2: Results for the baseline scenario</i>	360
26.	THE UNITED KINGDOM	361
26.1	<i>Overview of the UK State Pension System and Public Service Pensions</i>	361
26.1.1	The Basic State Pension	361
26.1.2	Pension Credit	362
26.1.3	State Second Pensions, SERPS/S2P, including contracting out	364
26.1.4	Public service pensions	366
26.2	<i>Description of Modelling Techniques and Use of Assumptions</i>	366
26.2.1	Basic retirement pension	366
26.2.2	Pensions Credit	367
26.2.3	Additional pension (SERPS and State Second Pension (S2P))	368
26.2.4	Public service pensions	369
26.2.5	Overview of contributions	370
26.2.6	Contribution projections	371
	<b>LIST OF GRAPHS</b>	<b>372</b>
	<b>LIST OF TABLES</b>	<b>375</b>

## PART I SUMMARY OF COUNTRY DESCRIPTIONS OF PENSION SCHEMES AND PROJECTION MODELS

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### 1. Introduction

The Ageing Working Group of the Economic Policy Committee, mandated by the ECOFIN Council, produced a new set of projections for age-related expenditure for the period 2004-2050, covering pensions, health care, long-term care, education and unemployment transfers<sup>1</sup>.

The projection exercise was done in a close co-operation between the Commission services (Directorate General for Economic and Financial Affairs) and Member States. First, the common underlying assumptions were commonly agreed in the Ageing Working Group and endorsed by the Economic Policy Committee<sup>2</sup>. Second, population projections for all Member States were made by Eurostat, while labour force and GDP projections, based on the population projections, were run by Directorate General for Economic and Financial Affairs<sup>3</sup>. Third, also projections for expenditure items other than pensions were run in a centralised way by the Commission using base data provided by Member States. Fourth, pension expenditure projections were run by each Member States, using their own models for pension calculations and incorporating in the models the population, labour force and GDP projections provided by the Commission. This organisation was to ensure a high degree of comparability for the projections while at the same time allow to use the country-specific knowledge on greatly differing pension systems and to improve the accuracy of the projections for pensions. On the other hand, the division of labour between the Commission and Member States implied a certain risk for the consistency between the given underlying assumptions and their application to the modelling of retirement behaviour.

The purpose of this paper is to contribute further to the comparability of the pension projections across Member States and to make the projections better understandable through country-specific descriptions of the pension systems and the models used for the projection exercise<sup>4</sup>. Thus, this paper aims at increasing the transparency in the exercise where one part was done by the Commission and another part by Member States.

This paper covers only the pension systems and models used for pension expenditure projections of 2005, describing pension schemes as they were in force in 2005. While the pension expenditure projections covered apart from public pensions also statutory private funded pensions and in some countries occupational pensions, the paper focuses primarily on public pension schemes. These constitute the predominant part of pension expenditure in almost all Member States and they were the primary target of the exercise.

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<sup>1</sup> The Economic Policy Committee and the European Commission (2006), "The impact of ageing on public expenditure: projections for the EU-25 Member States on pensions, health care, long-term care, education and unemployment transfers (2004-2050)", European Economy, Special Report 1/2006.

<sup>2</sup> The Economic Policy Committee and the European Commission (2005), "The 2005 projections for age-related expenditure (2004-2050) for the EU-25 Member States: underlying assumptions and projection methodologies", European Economy, Special Report 4/2005.

<sup>3</sup> Carone, G., D. Costello, N. Diez Guardia, G. Mourre, B. Przywara and A. Salomäki (2005), "The economic impact of ageing populations in the EU25 Member States", European Economy, Economic Papers 236, [http://europa.eu.int/comm/economy\\_finance/publications/economic\\_papers/economicpapers236\\_en.htm](http://europa.eu.int/comm/economy_finance/publications/economic_papers/economicpapers236_en.htm)

<sup>4</sup> Aino Salomäki (2006), "Public pension expenditure in the EPC and the European Commission projections: an analysis of the projection results", European Economy, Economic Papers 268, December 2006.

## 2. Summary of pension system descriptions

The large majority of pension systems in the EU-25 Member States are public pension systems. Their main features are summarised in the following tables and presented in detail in the country-specific descriptions (Part II)<sup>5</sup>.

### 2.1.1 Public old-age pension schemes

Table 2 - 2 summarises the old-age pension benefit formulation in the social security pension schemes. In most Member States, public pension schemes provide both earnings-related pensions and a guaranteed minimum pension. Only in Denmark, Ireland, the Netherlands and, virtually, the United Kingdom, public schemes provide only flat-rate old-age pension benefits (though the State Second Pension in the UK provides a small earnings-related component to the public pensions). However, the accrual of earnings-related pensions can vary significantly between Member States due to factors such as the annual accrual rate of pension rights and the requirement of service years for a full pension. Moreover, the definition of the reference wage and the valorisation of past earnings also play a role in determining the level of the initial pension.

Regarding the type of benefit provided by public earnings-related schemes, most Member States provide defined-benefit pensions. This means that pension rights are defined in terms of earnings and service years, without a direct link to contributions and their real or notional accumulated capital. Only four Member States, namely Italy, Latvia, Poland and Sweden, apply a notional defined-contribution principle, according to which the notional accumulation of contributions (i.e. pension capital) is converted into an annuity at the time of retirement.

The generosity of the public schemes also varies due to the provisions for other pension arrangements. A part of the social security pension scheme has been switched to statutory private schemes in a number of countries. These arrangements are relatively recent innovations and, thus, they are not yet very apparent regarding the volume of pensions paid out but increase in importance over time. Such statutory shifts to private funded schemes are in place in Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia and Sweden. Moreover, occupational pension schemes based on large-scale agreements between social partners are important in Denmark, the Netherlands, Ireland, Sweden and the United Kingdom.

Furthermore, pension provisions may also differ within a country between groups of people due to sectoral pension schemes or over time due to reforms undertaken. While there has been a tendency to align pension provisions between sectors in France, Austria and Portugal in their most recent reforms, many countries such as Belgium, Spain, Cyprus, Ireland and the United Kingdom have different pension schemes for public and private sector employees. In particular, the tax-financing of the public sector employees' pension scheme in Cyprus and the United Kingdom and the pension benefit rules, including Ireland which provides earnings-related pensions to public sector employees, make the provisions more favourable than those to private sector employees.

Pension reforms undertaken to date are largely driven by the financial sustainability of the pension schemes and most of them will reduce the generosity of pension benefits to future generations. This is clearly seen in the projected decline in the benefit ratios. Reforms such as switches to notional defined-contribution principle, shifts to statutory private funded schemes and shifts towards price indexation instead of wage indexation will put the benefit ratio, an indicator of the pension generosity, on a declining trend in most Member States. However, on the other hand, the maturing of the pension system, like in Ireland and Cyprus, is projected to increase the generosity of pensions in the coming decades.

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<sup>5</sup> The pension system description and pension expenditure projections are missing for Greece.

## 2.1.2

### Public early and deferred retirement schemes

Table 2 - 3 makes an overview of the early and deferred retirement arrangements in the EU Member States, excluding disability pension schemes. In most countries, early retirement is arranged within the normal old-age pension scheme, while Ireland, Cyprus (for private sector employees), Malta and the United Kingdom do not have early retirement provisions and Denmark and the Netherlands have separated early retirement schemes. In addition, several countries provide more than one pathway to early retirement. In Belgium, Germany and Finland still in 2005, prolonged unemployment benefits or pensions provided an early exit from the labour market along the pension schemes. However, these arrangements are to be abolished in Finland and Germany within some years, while the eligibility conditions are tightened in Belgium.

Eligibility conditions to early retirement are changing in many countries due to reforms that have aimed at deferring retirement and prolonging working life. In particular, countries which have switched to notional defined-contribution schemes provide only an earlier retirement with actuarial reductions within the notional defined-contribution scheme (Poland no earlier retirement) and are phasing out old early retirement schemes. In addition, the Netherlands is switching its early retirement scheme into a voluntary funded flexible working arrangement scheme. Many other countries have undertaken parametric reforms which increase the eligibility age to early retirement, which require more contribution years to the eligibility and which have introduced more or less actuarial reductions in the benefit formula.

Early retirement provisions and conditions vary a lot both across countries and over coming years. While the former can have a significant effect on the total level of pension expenditure and its future development, the changes over time can have significant implications for future pension take-up. In fact, the impact of reforms on the employment rate of older workers was estimated in the context of labour force projections. In total, higher employment rates were projected to take place in 17 countries<sup>6</sup>. Correspondingly, the pension expenditure projections reflect later take-ups of pensions. However, only a few of the country descriptions report in detail how the increase in the employment rates of older workers was translated in a later take-up of pensions and how much such changes increased the effective retirement age.

In 2005, the lowest eligibility age for early retirement is 55 years, which exists in France, Cyprus (for public sector workers), the Czech Republic (for women), Lithuania (for women), Greece (women if insured before 1993) and Portugal, however with different other conditions. Possibilities to retire before the age 60 existed in Belgium, the Czech Republic (men), Lithuania (men), Germany (until 2008), Estonia (women), Italy (until 2008), Latvia (women), Luxembourg, Hungary (women) and Slovenia.

Possibilities to defer retirement beyond the normal retirement age exist in almost all countries. Only Ireland, Cyprus and Luxembourg do not have such provisions. Also in Malta, it is possible to defer retirement only from the normal retirement age of 60 for females and 61 for males to 65 without any incremental accrual of pension rights whilst receiving a public pension (subject to a ceiling on earnings equal to the national minimum wage). All other countries provide some increased pension accrual, which varies from 1.5% to 10.8% of wages/year.

## 2.1.3

### Indexation of pensions

Table 2 - 4 presents the indexation regimes of pension schemes in Member States. Some indexation of pensions is legally binding in all countries except in Ireland and Lithuania, where decisions on the annual adjustment of pensions are taken in the context of budget decisions, and in Greece regarding

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<sup>6</sup> See for details, European Economy, Special Report 5/2005, pp. 51-56.

the earnings-related pensions (while minimum pensions are legally indexed to wages). In the Czech Republic and Portugal, the law is binding for a minimum indexation of pensions to price inflation, while adjustment to real earnings increases is taken discretionally for all pensions. In several countries (Belgium, Finland, Sweden and the United Kingdom) minimum pensions (or state pensions in the UK) are legally indexed to prices but the actual indexation can often be higher by discretionary budgetary decisions. Moreover, regarding occupational pensions, usually there is no binding indexation legislation.

In many countries, indexation of pensions is different regarding minimum and earnings-related pensions. Some countries guarantee a lower indexation for minimum than earnings-related pensions while some others do the other way round. Belgium, Finland and Sweden guarantee a price indexation for minimum pensions while earnings-related pensions are indexed partially to a real wage increase (in Belgium only to government sector employees). In contrast, Cyprus, Greece and Portugal provide a wage indexation for minimum pensions while less for earnings-related pensions. Also flat-rate (public) pensions in Denmark and the Netherlands are legally indexed to wages while the indexation of occupational pensions varies and is not legally binding.

Regarding earnings-related pensions, the indexation varies from price to wage indexation, most countries having a mixed indexation. Only Luxembourg and Slovenia have a full indexation of pensions to wages (in Slovenia to net wages). Moreover, in Sweden, the wage indexation of pensions is front-loaded so that an additional 1.6 percentage point increase is given at the time of retirement, while later index adjustments are equal to the wage increase minus 1.6 percentage points. In Germany, pensions are primarily indexed to wages but the index is adjusted by the change in the contribution rate to statutory pension scheme, the change in the contribution rate to subsidised private schemes and the change in the pensioners/employees ratio (the sustainability factor).

Earnings-related pensions are indexed to prices (or close to prices) in five Member States, namely Spain, France, Italy, Austria and Poland. In the remaining countries (Belgium, Estonia, Cyprus, Latvia, Hungary, Malta, Portugal, Finland and Slovakia), public earnings-related pensions are indexed to hybrid indices, with varying weights between prices and wages or with different indexation to different brackets and thresholds of pensions.

Considering the evolution of average pensions in pension expenditure projections, it would be important to know whether and when the indexation rule of pensions has changed. This is due to the fact that a reduction in the indexation towards price indexation reduces the benefit ratio over the period when there are still in payment such pensions which have been granted under the more favourable indexation rule. This is the case, for instance, in France, Austria, Italy and Portugal, due to their recent reforms. However, such developments may matter for a number of other countries as well but the information on the changes in the indexation regimes is not complete.

#### **2.1.4 Taxation of pensions**

Taxation of pensions is in most EU Member States lighter than that of wages (Table 2 - 5). In a number of countries (Belgium, Cyprus, Lithuania, Hungary and Slovakia) public pensions are currently not taxed at all. Also due to the thresholds for a taxable pension, pensions are taxed only for a small part of pensioners in the Czech Republic, Estonia, Latvia, Slovenia and the United Kingdom. Furthermore, more favourable tax treatments, in general in the form of special deductions for pension income, exist in France and Finland (in the latter in particular for low-income pensioners), and a higher tax-free threshold for persons over 65 in Ireland. Pensioners are also often excluded from the payment of some social security contribution, in particular that for pension. In Denmark, Italy, Luxembourg, Malta, Austria, Poland and Portugal, Sweden and Spain (with the exception of disability pensions), pensions are taxed similarly to wages.

Taxation regimes of pensions are changing in Germany, Hungary and Latvia. In Germany, the 2004 reform changed the taxation of statutory pensions from a system where contributions were partially taxed whereas pension benefits were mostly exempted (the so-called TTE principle) to a system where contributions are fully exempted whereas benefits are completely subject to tax (the EET principle). In 2005, 50% of pensions were taxable and the taxable share of pensions is estimated to grow by 2 percentage points per year up to 2020 and thereafter by one percentage point per year so that all pensions will become taxable by 2040. In Hungary, pensions will become taxable in 2013, which will imply an increase in gross pensions in order to allow maintaining net pensions at the same level as the year before the forthcoming reform. In Latvia, pensions granted under the notional defined-contribution scheme since 1996, have been made taxable for the part exceeding a given threshold, while old pensions remain tax-free.

### **2.1.5 Contributions to public pension schemes**

Table 2 - 6 makes an overview of the financing of public pension schemes. In most Member States, there are specific pension contributions in place in order to earmark the financing of public pension schemes. Only in Denmark, public pensions are fully financed by general tax revenues. In all other countries, when there are social security or pension contributions in place, a difficulty regarding their comparison arises from the fact that the coverage of the contribution differs substantially across countries. In particular, an explicit contribution rate for pensions does not exist in Belgium, Spain, Ireland, Malta, Portugal, Slovenia and the United Kingdom but the contribution covers also benefits other than pensions (old-age, early retirement, disability and survivors). In Belgium, it covers also health care, unemployment and family benefits; in Malta health care and all short-term benefits; in Portugal sickness, unemployment, maternity and family benefits and professional deceases; in Ireland all social security benefits, including pensions; in the United Kingdom jobseeker's, maternity and guardian allowances and redundancy payments; in Spain sickness and maternity benefits and in Slovenia health care. Also in the remaining countries where the contribution is dedicated for pensions, there are differences regarding the coverage of disability pensions or benefits. Usually, it is covered by the pension scheme, sometimes with separate disability pension contributions (the Netherlands, Poland) but not in Sweden (covered by taxes), in Latvia (covered by the total social security contribution) and in France and Hungary (covered by health insurance).

The following table summarises the pension (or social security) contribution rates as per cent of wages according to their benefit coverage in 2005 and provides some indication of additional financing needed for pensions in 2004/2005. Considering the level of the contribution rate for pensions covered in the projections, i.e. old-age, early retirement, disability and survivors' pensions, it varies between 12 and 33 percent of wages, depending on the generosity of pensions provided by the contribution and the additional financing provided from general tax revenues. It also appears that the additional financing from general tax revenues for pensions (or social security as a whole) is significant in most countries. The information provided by Member States does not allow a full comparison of the magnitude of additional financing as the amounts have been indicated in different ways.

**Table 2 - 1 Contribution rates according to their benefit coverage in 2005**

	Old-age and early retirement (survivors)	Old-age, early retirement, disability, (survivors)	Coverage broader than in the previous column	Tax financing
BE			37.94%	1/3 of total soc. sec. financing
CZ		28%		
DK				Fully financed by taxes
DE		19.5%		27.5% of total pension expenditure
EE		22%		6% of soc.sec. pensions + special pensions
EL		20%		1% of GDP
ES			28.3%	Means-tested minimum pensions
FR	16.35%*			Means-tested minimum pensions
IE			12.5-14.75%	Non-contributory benefits by taxes
IT		32.7%		Social assistance pensions by taxes
CY		12.6%		35% of total pension expenditure
LV	20%			6.2% of GDP
LT		26%		Special pensions by general taxes
LU		24%		1/3 of contrib. from taxes + 2.5% of GDP
HU	26.5%			2.4% of GDP
MT			30%	
NL		26.2-33%		
AT		22.8%		2.6% of GDP
PL		32.52%		3.8% of GDP
PT			34.75%	Means-tested minimum pensions by taxes
SI			24.35%	
SK		24%		
FI		23.9-28.2%		1.7% of GDP
SE	20.2			Means-tested, disabil. and survivors pensions
UK			19.85	Means-tested pension credits

\* FR: additional contributions, varying 7.5-20% of wages, for supplementary statutory pension schemes.

### 2.1.6 Summary of pension model descriptions

The pension models used by Member States for the projection of pension expenditure are developed for country-specific purposes in most cases. Only three countries, Cyprus, Malta and Slovakia used the generic PROST model developed by the World Bank. Most of the models are based on a semi-aggregated simulation approach, only Sweden applies a dynamic microsimulation model, based on individual data.

Semi-aggregated simulation models are described as deterministic and they simulate the functioning of the pension system, i.e. the accrual of pension rights and the changes in the levels of pensions when in payment, within the given framework for demographic, labour force and macroeconomic developments which define the probabilities to move from one state to another (employed, unemployed, pensioner, dead) from year to year. The semi-aggregation means that the data are partially aggregated, usually the lowest level of aggregation is done for a group of pensioners (or active people) that have the same characteristics such as age, gender, income group, pension type and pension act/fund. Usually, models separate pensioners in stock and new pensioners, thus allowing the average initial pension for new pensioners differ from that for pensioners in stock (although this was not required in the reporting sheets). Monetary variables such as the amount of the pension or wage are handled as averages for each aggregated group of pensioners and wage earners. The technique of



averages simplifies the calculations and does not allow producing detailed distributional information. The base data on pensions are received from national social security or pension institutions.

Looking closer at the details of the pension model, there are a great number of variations from the general description. For instance, many countries do not have (or do not need to have) very sophisticated models for the calculation of some part of the pension scheme such as flat-rate pensions, which are calculated separately. Also, the institutional setting of the pension system has in some countries (France, Portugal, the Netherlands) led to build different models for pension schemes governed by different institutions, while some other countries have made effort to incorporate all pension funds/acts in the same model (e.g. Italy, Finland). The former approach is particularly complicated in France where separate models have been built up for 21 sector-specific pension schemes. In order to aggregate and adjust the results of these sector-specific models in the demographic and macroeconomic framework of the AWG, an additional partial equilibrium model was needed. Moreover, some features of the pension system, particularly those which require taking into consideration the interdependencies between economic developments and pension adjustments such as index adjustments in Germany, set additional requirements for the modelling. In Germany, a partial equilibrium model complements the demographic pension model for the calculation of financial developments regarding pension adjustments and contribution rates.

Apart from some differences in the general structure of the models, the models may include to varying degree country-specific features and refinements such as a diversification of mortality rates between high and low wage/pension levels or between those taking-up a disability pension instead of an old-age pension. Also, the modelling of the accrual of pension rights during paid leaves (unemployment, maternity, child caring, education etc.) requires due attention in many countries and substantially improve the accuracy of pension expenditure projections. An important modelling element is also how to translate in the probabilities the expected impact of enacted pension reforms such as a later take-up of pensions due to tightened eligibility rules or increased eligibility ages. Some countries have also made additional assumptions on the evolution of employment between the sub-populations belonging to different pension schemes, e.g. public and private sector employment. The country descriptions, however, are quite tersely-worded on such assumptions and their translation into the models.

### **2.1.7 Conclusions**

The country descriptions of pension systems and pension models, which form the core of this report, are necessary and useful tools for helping understand the projected developments in pension expenditure in each Member State as well as compare developments and understand differences between countries. While pension systems are described in great detail, more could be done in future exercises for standardising the descriptions and taking due care that information on central features of the pension system is provided by all countries. Regarding the descriptions of the pension models, more work is needed in order to make the modelling exercises transparent and understandable. More standardised and more accurate descriptions could further facilitate and improve comparisons across countries. Furthermore, for improving the transparency of the projections, it would be necessary to report more precisely on additional assumptions and estimates of the impacts of reforms that have been incorporated in the modelling. This work could further improve the quality of the projections and their comparison across countries.

**Table 2 - 2 Old-age pension benefit formulation in the social security (public) pension schemes in Member States in 2005 and according to reforms enacted by mid-2005**

	Type of the scheme	Pension base (reference wage) (thresholds, ceilings)	Indexation of past earnings (50:50=w:p)	Accrual of pensions	Max. accrual rate (gross replacement rate)	Number of years needed for a full pension	Stat. retirement age (M=men, W=women)	Other factors taken into account (early/deferred retirement; additional separate schemes; family conditions)
<b>BE</b>	Private sector: DB	Average of lifetime wages (up to ceiling), max 45 (women 44; 45 in 2009)	To prices+ partial adjustment to welfare	Service years/45 (women 44; 45 in 2009)	60% for a single person; 75% for a married couple with one dependant	45 (women 44; 45 in 2009)	M 65 W 63 (2009: 65 )	Minimum pension (9231 €/y for a single and 11535 €/y for a couple) obtained after 2/3 of a full-time career
	Public sector: DB	Average wages of the last five years	To prices + real wage increases in the corresp. civil servants wage bracket	Service years up to 45/60	100% of service years / 60 (=75%)	45	65	Minimum pension obtained after 20 years' service
<b>CZ</b>	DB	Earnings of 30 years (after 1986)	To average earnings	Flat-rate component (530€/y) + earnings-related component: 1.5%/year	No max	25 or 15 years of insurance + the age of 65	2005: M 61.7, W without children 60.3; 2013: M 63, W without children 63	Age bonuses for later retirement (max 30 years of contributions) and reductions for early retirement; For women with children the retirement age is lowered by one year/child, max 4 years; this will be retained.
<b>DK</b>	Flat-rate plus means-tested supplements to low income pensioners			Based on years lived in DK	Flat-rate (7660€/y); Max supplement (7710€/y)	40 years lived in DK	65	Supplemented by fully funded ATP (statutory) and occupational pension schemes. The take-up of pension can be deferred and the pension level is increased.
<b>DE</b>	DB	Pension points accrued during the whole work career (1 point=average wage/year)	Implicitly to wages (only pension point values are adjusted)	Based on pension points (depends on the wage level relative to average wage and career length)	No ceiling defined,( in general, max 2 pension points per year.)		2005: 65	3.6% reduction per year for early retirement, 6.0% bonus per year for deferred retirement. Additional pension points

	Type of the scheme	Pension base	Indexation of past earnings	Accrual of pensions	Max. accrual rate	Number of years	Stat. retirement age	Other factors taken into account
								granted for child raising and care of dependant persons
EE	DB	Length of career up to 1998 (flat-rate pension base/year), then contribution points according to earnings	(implicitly to wages)	Flat-rate component (660€/y) + career length/contribution (earnings)-related component		15	M 63 W 59,5 (63 by 2016)	National minimum pensions guaranteed to all residents. Supplemented by a statutory funded tier.
GR	DB	PR: Average of best 5 years' wages out of last 10 years PU: Earnings of the last month; contributions paid up to a ceiling of wages	To civil servants' wages	Pre-1993: Non-linear formula, number of dependants taken into acc. (appr. 2% /year) Post 1993: 1.714% of wage	80 / 60% + 20%	37	IKA: insured bef. 1.1.1993: M 65 W 60; after 1.1.1993: 65 for all	80% for those being in the LM pre-1993 60% for those entering the LM after 1993; in addition, 20% auxiliary pension
ES	Private sector: DB	Average of last 15 years' wages up to a ceiling, provided that the contributions have been paid	To prices (except 24 months just prior to retirement))	15 years of contributions: 50% of pension rights; 3p.p. for each additional year until 25 years; thereafter, 2 p.p. for each additional year up to 35 years	91	35	65	Means-tested non-contributory basic pension guaranteed to all residents. Minimum number of contrib. years for earnings-rel. pension is 15. Maximum pension 30228 €/y. Bonuses for later retirement and reductions for early retirement
	Public sector: Flat-rate	Length of service			Flat-rate (5 categories)		65	Minimum number of contrib. years is 15. Supplements up to age 70.
FR	Private sector: DB (mainly CNAVTS; several other sectoral schemes)	Average of the best 25 years (to those born after 1948); fewer years to older cohorts (10 years to those born in 1933)	To prices	1.33%/year	PR: 50	PR: 40 (41 in 2012)	60 + 40 years of contributions	Increases for children brought up; Supplemented by a mandatory partially funded scheme (second tier), private sector
	Public sector: DB	Last 6 months' wages		2%/year -> 1.875%/year	75	37.5 (40 by 2008 and 41 in 2012)		No supplement in public sector

	Type of the scheme	Pension base	Indexation of past earnings	Accrual of pensions	Max. accrual rate	Number of years	Stat. retirement age	Other factors taken into account
<b>IE</b>	Social welfare: Flat-rate	Earnings-related contributions, at the minimum for 260 weeks (5 years)	No formal agreements. Government decisions each year in the Budget.		Social welfare: Flat-rate		66 for non-contributory pension, 65 for contributory pension	Means-tested non-contributory basic pension guaranteed to all habitual residents. Social insurance pensions may include additional payments in respect of adult and child dependants. Supplemented by voluntary occupational pensions.
	Public sector: DB	Lifetime earnings	No indexation ?	1.25%/year + lump sum payments at the time of retirement (3.75% of each year's salary)	50	40	65, (60-65 optionally to those recruited before 2004)	Public servants recruited after April 1995 will receive an integrated Social Security and public occupational pension
<b>IT</b>	Old: DB	Private sector employees: average of last 5 years' wages, for contributions paid up to 1992. Average of last 10 years' wages for contributions paid after 1992, starting from 2002.	To prices	2% of reference wage (up to 38641€/y in 2005) per each year of contributions, above this a lower accrual	80%	40	M 65 W 60	Fully phased out 2030-35. A mixed scheme applied to those with less than 18 years of contribution in 1995.
	New: NDC	Lifetime contributions	To GDP	DC principle	None	None	M 65 W flexible between 60-65	Higher transformation coefficient for women with children
<b>CY</b>	Private sector: DB (Social Insurance scheme)	Lifetime earnings up to a ceiling	To wages in the lower band of wages (up to 6900€/y); To prices in the upper band of wages	Basic component (lower band): 60% of the basic insurable earnings (BIE) multiplied by insurance points, + earnings-related component (upper band): 1.5% of the wage (BIE) multiplied by insurance points	Basic pension: 60% of BIE; Earnings-related component: no max defined but max 5 insurance points/year	2005: 43 (contributed or credited periods) Years; 2011: 47	65	Higher rates of basic pension for beneficiaries with dependants (80% with one dependant, 90% with two and 100% with three +) The earnings-related scheme has started in 1980 and will mature around 2025. Social minimum pension available to those who have not participated in the insurance scheme.
	Public sector: DB	Final salary		Tax-financed	67%	33.3 years	60 (63 in 2008)	

	Type of the scheme	Pension base	Indexation of past earnings	Accrual of pensions	Max. accrual rate	Number of years	Stat. retirement age	Other factors taken into account
LV	Old: DB (for those retired before 1996)			Flat-rate pensions (540€/y) + small increase according to the length of service				
LV	New: NDC Introduced in 1996	Lifetime contributions	Prices + 50% of the real wage sum increase	DC principle	No max	No max	M 62 W 60,5 (62 as of 1.7.2008)	Minimum insurance record of 10 years required. State social security benefit granted to those not qualifying to the insurance scheme, with the 5 years higher eligible age. Supplemented by a funded tier (2001).
LT	DB	Average of the best 25 years' gross earnings since 1994, with the ceiling of 5 x average insured income.	Government decisions each year in the Budget (implicitly to wages)	Flat-rate component (full amount for 30 years' contributions, at the minimum 15 years' contributions required) + earnings-related component with 0.5%/year accrual rate subject to a ceiling.	No max	30	M 62,5 W 59 (60 in 2006)	Age bonuses for later retirement and reductions for early retirement Supplemented by a funded tier (2004)
LU	DB	Average lifetime wages + career length, with the minimum of 10 years	To prices plus the real wage growth	1.85% / year		40 (contributed or credited periods)	65	Bonuses after 38 years of contributions and having turned 55 years' age, until 65; Early retirement possible after 57 years of age and 40 years of contributions, or after 60 years of age and 40 years of service.
HU	DB	Lifetime net earnings since 1988 (earnings up to 690€/month are fully taken into account, earnings above this at a reduced rate).	Net wages	Accrual of pension points weighted by earnings brackets (appr; 2%/year).	No max	38 (40 as of 2009)	M 62 W 60 (62 in 2009)	Means-tested minimum old-age income guaranteed to all from social assistance. Bonuses for later retirement and reductions for early retirement; Supplemented by a funded tier but at the same time the public pension is reduced to 75%.

	Type of the scheme	Pension base	Indexation of past earnings	Accrual of pensions	Max. accrual rate	Number of years	Stat. retirement age	Other factors taken into account
	DB, when pensions made taxable	As of 2013, lifetime gross earnings.		As of 2013, 1.65% to those not joined the funded scheme and 1.22% to those joined the funded scheme.		40	62	
<b>MT</b>	DB	Average of the best consecutive 3 years out of last 10 years	To prices	Contributions for 30 years, subject to a ceiling. Minimum number of contribution years is 9.	67		M 61 W 60	Possible to continue working up to 65, even without paying contributions. Non-contributory minimum old-age pensions available to those not qualified to insurance scheme from the age of 60.
<b>NL</b>	Flat-rate			Based on years lived in NL	Flat-rate, 70% of net min. wage	50 lived in NL	65	100% net min. wage for couples. A separate early retirement scheme. Supplemented by occupational pensions
<b>AT</b>	DB	Average of best 15 years' wages, extended to 40 years' wages by 2028	Net wages	2%, to be lowered to 1.78 by 2009	80	45	M 65, W 60 (W 65: to be phased in by 2033)	Early/deferred retirement with reductions/increases of 4.2% / year
<b>PL</b>	Old: DB			Flat-rate component (24% of the average wage) + contribution-rel. component (1.3% of earnings/year)			M 65 W 60	To those born before 1.1.1949  Separate scheme for farmers
	New: NDC	Lifetime contributions + Calculation of initial capital, based on career length	Wage sum (contribution revenues)	DC principle				To those born 1.1.49-1.1.69 acquired pension rights converted into initial capital, those born after 1.1.69 fully in the new system; first pensions to be paid out in 2009 Supplemented by a funded tier

	Type of the scheme	Pension base	Indexation of past earnings	Accrual of pensions	Max. accrual rate	Number of years	Stat. retirement age	Other factors taken into account
<b>PT</b>	Private sector: DB	Average of best 10 years' wages out of last 15 years (old) Average of lifetime wages phased in 2002-	Wages	2%/year; Minimum number of years required 15	80	40	2005: 60,5 2015: 65	Guaranteed minimum pensions Reductions for early retirement
	Public sector: DB	Employed before 1993: Last wage		2.5% until 2012 2.25% as of 2013		36 until 2012 40 as of 2013		Merged to general scheme as of 2006
<b>SI</b>	DB	Average of best 15 consecutive years' wages in 2005; thereafter, number of years to be raised to 18 by 2008	Combination of pensions and net wages	2% /year until 1999; 1.5%/year as of 2000;	No max; 1.5%/year after 63m/ 61w	40 years at 63 for men; 38 years at 61 for women	M 58-65, W 55-62 depending on the qualifying period <sup>1)</sup>	Eligible age dependant on the number of years of contributions. Age bonuses for deferred retirement and reductions for early retirement (men 63, women 61 years)
<b>SK</b>	DB	As of June 2005: average of earnings earned since 1984;	Implicitly assumed to wages	Accrual of pension points (depending on career length and earnings brackets; higher for the lowest earnings), subject to a ceiling	No max; in general, 50% after 40 years.	No max; min. of 10 years for the eligibility	M 60 in 2004, M 62 by 2007 W 57 in 2004, W 62 in 2016	Age bonuses for later retirement and reductions for early retirement Supplemented by a fully funded tier (2005)
<b>FI</b>	DB	Average of lifetime wages	80:20 (wages:prices)	1.5% / year up the age 52 1.9%/year between 53-62, 4.5%/year between 63-68	No max	No max	Flexible between 63-68	Guaranteed minimum pensions The pension level at retirement will be adjusted by life expectancy coefficient as of 2009
<b>SE</b>	NDC	Lifetime contributions	Average wage growth	DC principle	No max	No max	Flexible, from 61 onwards	Guaranteed minimum pensions Supplemented by a funded tier

	Type of the scheme	Pension base	Indexation of past earnings	Accrual of pensions	Max. accrual rate	Number of years	Stat. retirement age	Other factors taken into account
UK	Flat-rate Basic pension and State Second pension since 2002 (earlier SERPS)	Men: 44 years' contributions Women: 39 years' contributions (44 in 2020)		Contributions scaled by wage brackets	Flat-rate  Earnings-related accrual scaled by wage brackets		M 65 W 60	Guaranteed minimum by the Pension Credit  Possibility to opt out to private schemes Supplemented by private voluntary occupational schemes
	Public sector employees scheme - DB							Tax-financed

<sup>1)</sup> Slovenia: Old-age retirement can be claimed at different ages depending on the number of contribution years as follows (age/contribution years): men 65/15 or 63/20 or 58/40; women 62/15 or 60/20 or 55/36 in 2005, by 2014 the conditions for women will be increased to 63/15 or 61/20 or 58/38. The concept of 'full pension age' has recently been introduced, which will reach 63 for men in 2009 and 61 for women in 2023; retirement at this age will additionally require a qualifying period of 20 years. Increased accrual for deferred retirement applies after the full retirement age and after the fulfilment of contribution requirements.



**Table 2 - 3 Main early and deferred retirement schemes in Member States in 2005 and according to reforms enacted by mid-2005**

<b>Country</b>	<b>Scheme</b>	<b>Eligible age for early retirement</b>	<b>Number of contrib. years required at early retirement</b>	<b>Benefit level (reduction from the normal old-age pension, %/ year)</b>	<b>Normal retirement age</b>	<b>Increased pension accrual after the normal retirement age</b>
Belgium	Early retirement	60	2003: 32 2005: 35	None but means-tested against earnings	2005: M 65, W 63 2006: W 64, 2009: W 65	For civil servants: from 60-62; 1.5%/year from 62-65, 2%/year
	Prolonged unemployment benefit	58 (2008: 60)	M 28 (2008:30, 2012: 35) W 2006:26	Unemployment benefit + supplements paid by the firms		
Czech Republic	Within the old-age pension scheme	M 57; W 51-55	25	3.6	2005: M 61.7; W without children 60.3 2013: 63 (remains 1 year/child lower for women with children)	6.0
Denmark	Voluntary early retirement pension	60 + member of unempl. insurance for 25 years	Voluntary early retir. contributions paid for 25 years	Pension equal to unemployment benefit	2005: 65 (2027: 67)	If early retirement is not taken up, tax-free bonuses are granted
Germany	Within the old-age pension scheme	M 60 up to 2007, thereafter 63 W 60 up to 2011, thereafter 63	35 35	3.6	2005: 65	6.0
	58er regulation (to be abolished in 2008)	58		Equal to unemployment benefit		
Estonia		M 60; W 56.5	15	4.8	M 63; W 59.5 2016: W 63	10.8
Greece		60 (W 55 if insured before 1993)	35	4.5	65 (W 60 if insured before -93)	3.0

Country	Scheme	Eligible age for early retirement	Number of contrib. years required at early retirement	Benefit level (reduction from the normal old-age pension, %/ year)	Normal retirement age	Increased pension accrual after the normal retirement age
Spain	Private sector	61 + unemployed	30	8.0 if 30 contribution years, reduced to 6.0 with 40 contribution years	65	2.0 + no contribution provided that the number of contribution years is 35.
	Public sector	60 for partial retirement 60	15 30			
France		55	35 <sup>1)</sup>	2006: 10.0 (private); 0.5 (public) 2015: 5.0 (both)	60 + 40 years of contributions	3.0 but only after 40 years of contributions
Ireland		Not possible			65 (contrib. pension) 66 (non-contributory pension)	Not possible
Italy	Seniority pension in (old) earnings-related scheme	Employees: 2005-07: M,W 57 2008: M 60 2010: M 61 2014 - : M 62 One year higher for the self-employed	35, with age requirement (see the previous column); Additionally, as of 2008: 40, without any age requirement	No reduction, pension granted according to accrued rights	M 65; W 60	
	NDC scheme	As of 2008: as above Up to 2007: M,W 57	As of 2008:as above; Up to 2007:with at least 5 years' contributions. Pension must be at least 1.2 x old-age allowance (up to 65 years old)	Actuarial reduction	M 65, W 60	Actuarial increase from 60 to 65
Cyprus	Private sector	63	The total number of insurance points in the lower band is at least 70% of total insurance period.	None	65	6.0%/year (0.5% for each month of deferral) until the age of 68
	Public sector	55		None. Pension granted according to the accrued rights	63	
Latvia	Old DB scheme (up to 1.7.2008)	M 60 W 58.5	30		M 62; 2005: W 60.5 2008: W 62	
	NDC			Actuarial reduction		Actuarial increase

Country	Scheme	Eligible age for early retirement	Number of contrib. years required at early retirement	Benefit level (reduction from the normal old-age pension, %/ year)	Normal retirement age	Increased pension accrual after the normal retirement age
Lithuania	Within the old-age scheme, introduced in 2004	long-term unemployed + max 5 years below the standard ret. age	30	4.8	M 62.5; 2004: W 59 2006: W 60	8.0
Luxemburg	Within the old-age scheme	57	40	None	40 years of contributions or credited periods	Bonuses after 38 years of contributions and having turned 55 years' age, until the age of 65
Hungary	Within the old-age scheme	M 60; W 57 2009: W 59	33 (37 in 2009)	1.2 – 10.8 depending on the missing years of contrib.	M 62; 2005: W 60 2009: W 62	6.0
Malta		Not possible			M 61; W 60	Possible up to 65; no increment
Netherlands <sup>2)</sup>	VUT – early retirement scheme				65	
Austria	Within the old-age pension scheme	M 62; W 60	37.5	4.2	M 65; W 60 (2034: W 65)	65-68: 4.2
Poland		Old scheme to be removed as of 2008		NDC: not possible	M 65; W 60	NDC: actuarial
Portugal	Within the old-age pension scheme	55	36 in 2005 40 as of 2013	4.5 but requiring a complete career length (contribution years)	2005: 60 2015: 65	10.0 up to the age 70
Slovenia		58	Early retirement applies to years before the 'full pension age' <sup>3)</sup>	1.2 – 3.6 depending the age	Depends on the number of contribution years <sup>3)</sup>	1 <sup>st</sup> year 5.1, 2 <sup>nd</sup> year 3.9, 3 <sup>rd</sup> year 2.7
Slovakia	Within the old-age pension scheme	Any age <sup>4)</sup>	10	6.0 (0.5% for every started 30-day period before the statutory retirement age)	2004: M 60; W 53-57 2006: M 62 2015: W 62	6.0 (0.5% for every started 30-day period after the statutory retirement age)
Finland <sup>5)</sup>	Early retirement	2005: 62		7.2	2005: 63-68	63-68: 4.5
	Unemployment pension scheme	60 until 2009 + 2 years unemployed		No reduction		Converted in normal old-age pension between the ages 63-65.

Country	Scheme	Eligible age for early retirement	Number of contrib. years required at early retirement	Benefit level (reduction from the normal old-age pension, %/ year)	Normal retirement age	Increased pension accrual after the normal retirement age
Sweden	Within the NDC scheme	61		Actuarial reduction	Flexible, 61+	Actuarial increase
United Kingdom		Not possible in the public scheme			M 65; W 60 W 65 in 2020	2004: 7.4 up to 70; 2005: 10.4 without any age limit

Sources: National Strategy Reports on Pensions 2005; European Commission and EPC (2006), 'The impact of ageing on public expenditure', *European Economy, Special Report 1/2006*; OECD and EU Commission project on *Modelling pension entitlements*, country descriptions (forthcoming)

- \*) The table refers to the main earnings-related scheme of the private sector employees. In many countries, there are differing conditions in schemes for public sector employees and the self-employed. Also, the conditions presented in the table are only the most important ones and may often be more detailed and vary according to how closely various requirements are met;
- 1) France: the size of the reduction depends on the age of the retiree and the number of missing years of contributions;
  - 2) Netherlands: A separate early retirement scheme (VUT) will be removed (agreed in 2004) and replaced with voluntary funded flexible working arrangement scheme; Deferred retirement is not possible in the social security scheme and varies between occupational schemes;
  - 3) Slovenia: Old-age retirement can be claimed at different ages depending on the number of contribution years as follows (age/contribution years): men 65/15 or 63/20 or 58/40; women 62/15 or 60/20 or 55/36 in 2005, by 2009 the conditions for women will be increased to 63/15 or 61/20 and by 2014 to 58/38. The concept of 'full pension age' has recently been introduced, which will reach 63 for men in 2009 and 61 for women in 2023; retirement at this age will additionally require a qualifying period of 20 years. Early retirement applies to years before the full pension age. Increased accrual for deferred retirement applies after the full retirement age and after the fulfilment of contribution requirements;
  - 4) Slovakia: In addition to 10 years of contributions, the level of pension has to be at least 1.2 x MSL (Minimum subsistence level), i.e. 32% of the average wage in 2005;
  - 5) Finland: the early retirement scheme applies only up to the age of 63. The unemployment pension scheme is being phased out by 2014 (no more available for persons born 1950 or later). The individual disability pension scheme was abolished in 2005.

**Table 2 - 4 Indexation regimes of the pension schemes in 2005 and according to reforms enacted by mid-2005**

<b>MS</b>	<b>Bindness by law</b>	<b>Indexation of pension benefits</b>	<b>Thresholds, ceilings, major recent changes in the indexation regimes, recent discretionary decisions</b>
<b>BE</b>	Yes + Discretion	Earnings-relate pensions are indexed to prices in the private sector scheme and to wages in civil servants' pensions by law Minimum guaranteed pensions are indexed to prices by law + discretionary targeted increases to welfare	
<b>CZ</b>	Yes for the minimum	Decision is made by the government, but the minimum amount is guaranteed by the law. The minimum is set by the law and usually has represented an inflation growth (measured by the aggregate consumer price index) plus at least a third of the growth in real average wage.	
<b>DK</b>	Yes	The public pensions (old-age, voluntary early retirement, disability and survivors' pensions) are indexed to average wage growth of the private sector.	The indexation is determined by the wage evolution two years earlier
<b>DE</b>	Yes	The indexation of the pension point value depends on the increase of gross wages, which is adjusted by the change in the contribution rate to statutory pension scheme and the change in the contribution rate to subsidised private schemes and the sustainability factor, which is based on the change of the pensioner/employment ratio.	The adjustment factors cannot make the adjustment negative.
<b>EE</b>	Yes	State pension insurance: Indexation depends with equal weights (50%:50%) on the increase of social tax revenues (wage sum) and the increase of consumer price index.	Additionally, discretionary increases in pension levels in recent years.
<b>GR</b>	Yes for the minimum	Minimum pensions are indexed to wages, earnings-related pensions discretionary.	
<b>ES</b>	Yes	All pension benefits are indexed to expected inflation. If actual inflation is above the expected one, the difference is paid to all pensioners.	
<b>FR</b>	Yes	Private sector pensions are indexed to price inflation since 1993; the indexation of public sector pensions was aligned with that of private sector in 2003.	Public sector pensions indexed close to wages until 2002.
<b>IE</b>	No	There is no formal indexing arrangement for the social welfare pensions system. Instead, pensions are increased each year by Government decisions, taking account of budgetary considerations.	
<b>IT</b>	Yes	Pensions are indexed to prices.	
<b>CY</b>	Yes	The basic part of the pension is indexed to wages and the supplementary earnings-related part to prices.	
<b>LV</b>	Yes	Annual adjustments are differentiated according to the amount of pension. Small pensions are indexed fully to CPI plus to 50% of the real growth of contribution wage sum. The medium pensions are indexed with CPI. The same rules for indexation are applied for all state pensions.	
<b>LT</b>	No	Currently, no automatic indexation but pensions are increased each year by Government decisions in the context of discretionary budgetary decisions.	
<b>LU</b>	Yes	Pensions are automatically adjusted to price evolution each time prices increase by more than 2.5%. In addition, pensions are adjusted every two years to the real wage evolution. Whereas price indexation is automatic, the decision on indexing pensions to wage evolution is the responsibility of	

<b>MS</b>	<b>Bindness by law</b>	<b>Indexation of pension benefits</b>	<b>Thresholds, ceilings, major recent changes in the indexation regimes, recent discretionary decisions</b>
		government and has to be approved by the parliament.	
<b>HU</b>	Yes	Pensions (both the PAYG and funded part of the social security pensions) granted before 1 January are indexed by an index with weights of 50:50 to net wages and consumer prices.	
<b>MT</b>	Yes	Indexation close to prices dominates because the ceiling of the pensionable income is adjusted by the cost-of-living (price) index. However, the minimum and maximum thresholds for the earnings-related pensions are indexed by 2/3 of the cost-of-living index and the earnings-related pensions between these thresholds by 2:3 of wage increases in the respective occupation of the pensioner.	
<b>NL</b>	Yes for public flat-rate pensions, Discretion reg. occup. pensions	Public flat-rate pensions are linked to the minimum wage (70% of the legal minimum wage). Most occupational pension funds aim at wage or price indexation. It is, however, not guaranteed but conditional on the financial position of the fund (coverage ratio). Private pensions are indexed to wages	
<b>AT</b>	Yes	Pension benefits are adjusted yearly by consumer price inflation as of 2006.	Pensions indexed to net wages until 2005.
<b>PL</b>	Yes	Pensions (minimum pensions, the general old-age and farmers' pension schemes) are indexed to prices.	
<b>PT</b>	Yes	Pensions are indexed to prices plus to a real increase of 0.1 p.p. annually; minimum pensions are indexed to wages.	
<b>SI</b>	Yes	The pensions are indexed with the rate of gross wage growth of all employed persons as of 2006. The indexation takes place twice a year, in February and November.	Until 2005, indexation to net wages was with a weight less than 100%.
<b>SK</b>	Yes	Pensions are indexed 50:50 to wages and prices.	
<b>FI</b>	Yes + Discretion reg. minimum pensions	<i>Earnings-related pensions</i> are indexed to an index with weights of 20:80 to wages and prices. Minimum guaranteed pensions are indexed to prices; discretionary increases by Budget laws.	The latest discretionary increase to minimum pensions in 2005.
<b>SE</b>	Yes + Discretion reg. minimum pensions	Minimum social security pensions are indexed to prices ; earnings-related pensions (both PAYG and funded part) are indexed to average wage growth. (However, the indexation is front-loaded so that 1.6 percentage point increase is given at the time of retirement, while later index adjustments are equal to the average wage growth minus 1.6 percentage points).	
<b>UK</b>	Yes + Discretion reg. occupat. pensions	State pensions (basic and second pension) are indexed to prices. Occupational and private pensions in defined-benefit schemes are normally indexed by inflation or 2.5%, whichever is the lower. In a defined contribution scheme the accumulated fund continues to be managed with investment returns accumulating until the 'end' of the scheme.	Discretionary increases to basic pensions.

**Table 2 - 5 Taxation regimes of the pension schemes in 2005**

<b>MS</b>	<b>Taxation regimes</b>	<b>Observations (share of pensioners/ pensions effectively taxed, taxation of pensions relative to that off wages)</b>
<b>BE</b>	Not taxed	
<b>CZ</b>	Social benefits are not subject to personal income taxation except for pensions from the pension insurance scheme provided that the amount of pensions exceeds CZK 162,000 per year.	Currently, out of 3.2 million pensions paid out, approximately only 3.2 thousand pensions exceed the threshold for taxation of pensions.
<b>DK</b>	Pension payments from all pillars are subject to personal income tax.	
<b>DE</b>	Old pensions are practically not taxed; the 2004 reform changed the taxation regime for statutory pensions from a system where contributions were partially taxed and pension benefits were mostly exempted to a system where contributions are fully exempted and pensions fully subject to tax.	The taxable share of pensions is 50% in 2005 and increases by two percentage points per year for new pensioners until 2020, and after that by one percentage point per year, so that all pensions will be taxable from 2040 onwards.
<b>EE</b>	Pensions higher than the threshold set for the taxation are subject to income taxation.	In practice, the threshold is set at such a level that, virtually, pensions are not taxed.
<b>GR</b>		
<b>ES</b>	All pension benefits are taxed as labour income in general. Only certain disability pension benefits are tax-exempted..	The average effective tax rate for pension income was about 5% in 2003.
<b>FR</b>	Subject to income tax but with favourable rules. Average tax rate applicable to pensioners was 3.8%.	
<b>IE</b>	Those aged 65 and over are treated more favourably under the Irish income tax code than the taxpayers in general. Tax is due on private and public sector occupational pensions as they become payable, with the exception of lump sum payments.	
<b>IT</b>	All pensions are taxed as labour-income, allowing for deductions that are phased out along increasing income level. Pension income below 7,500 Euro per year is tax-exempt ('no tax' area).	
<b>CY</b>	Not taxed	
<b>LV</b>	Pensions granted before 1996 are not subject to personal income taxation. Pensions granted from 1996 onwards are subject to taxation for the part exceeding 110 lats/month (165€).	
<b>LT</b>	Not taxed	
<b>LU</b>	Taxation of pensions is similar with that of wages.	
<b>HU</b>	Currently, pensions are not taxed. Taxation of pensions will be introduced in 2013.	
<b>MT</b>	Subject to personal income taxation.	
<b>NL</b>	Public pensions and pension savings in the second pillar are taxed as personal income. However, pensioners do not pay the statutory pension contribution for public pensions (17.9%).	
<b>AT</b>	Pension benefits are subject to personal income taxation	
<b>PL</b>	Subject to personal income taxation.	
<b>PT</b>	Subject to personal income taxation.	
<b>SI</b>	Not taxed (except for a small part of higher pensions).	
<b>SK</b>	Not taxed	
<b>FI</b>	Minimum and earnings-related pensions are subject to income tax but a specific pension income deduction applies which makes all pensions up to the level of minimum pensions tax-free. Earned income tax credit is not granted for pension income, which makes the taxation of middle-income pensioners heavier than that of wages. Private voluntary pensions are subject to capital income taxation with the flat-rate of 28% (in 2005)	
<b>SE</b>	All pensions are subject to personal income tax.	
<b>UK</b>	Basic state pensions are not taxed. Also State Second Pensions mostly are below the threshold for the taxation.	

**Table 2 - 6 Contribution rates of public pension schemes in 2005**

	<b>Contribution rate, % of wages<sup>1</sup></b>	<b>Observations<sup>2</sup></b>
<b>BE</b>	37.94% (social security) Employer: 24.87% Employee: 13.07% “Wage moderation” contribution: 7,48% Small additional social security contributions depend notably on the firm size; different measures lead to a marked reduction in the effective rates compared to the abovementioned rates.	The contribution rate covers all branches of social security, including health care, unemployment, disability, family allowances, and the general pension scheme for wage-earners and self employed. The contributions account for approximately two-third of the total social security revenues; specific social security taxes and transfers from the state budget account for the rest. Means-tested minimum pensions are financed by taxes. In order to finance the future increase in pension expenditure, the Belgian authorities plan to accumulate budgetary resources in a public “ageing fund” using the decrease in interest payments.
<b>CZ</b>	28.00% Employer: 21.50% Employee: 6.50%	The contribution rate covers both earning-related and flat-rate social security pensions. In 2004, the social security pension system was in balance for the first time since 1996.
<b>DK</b>		Public pensions are financed by taxes, with the exception of the voluntary early retirement scheme, to which there is a small own contribution. (Also the statutory supplementary schemes (ATP) are subsidised from tax revenues.)
<b>DE</b>	19.5% in 2004- 2006 Employer: 9.75% Employee: 9.75%	Subsidies from the Federal budget account for 27.5% of pension expenditure in 2004. In addition, social assistance pensions are financed by taxes. A target has been set that the contribution rate should not exceed 20% until 2020 and 22% until 2030.
<b>EE</b>	22% Employer: 16% to the I pillar scheme 4% to the III pillar scheme (or 20% to I pillar if the person has not joined the III pillar scheme) Employee: 2% to the III pillar scheme, only to those who have joined	Pension insurance contributions covered 94% of social security pensions in 2004. Special pensions to some groups of government officials (policemen, parliamentarians, judges) are financed from the government budget.
<b>GR</b>	20% (if insured before 31.12.92) Employer: 13.33% Employee: 6.67% 30% (if insured <i>betw. 1.1.93-31.12.2002</i> ) Employer: 13.33% Employee: 6.67% State: 10.00% After 1.1.2003 Employer: 13.33% Employee: 6.67% State: 1% of GDP in 2003-2008 on aver. 1% of GDP in 2009-2032	Tax subsidies to the financing of contribution-based pensions would have to rise from the current 4.8% of GDP to 15.5% in 2050. In addition, pensions of uninsured persons over 65 and civil servants are financed by taxes.  The current contribution rate is applied equally to all employees and covers only pension benefits.
<b>ES</b>	28.3% (social security, except health care and unemployment benefits) Employer: 23.6% Employee: 4.7%	The contribution rate covers contributory benefits for old-age, disability and survivors' pensions and sickness and maternity benefits. The social security sector is expected to produce a surplus until 2020 (taking into account disposals of the Social Security Reserve fund from 2015), thereafter a deficit. Means-tested minimum pensions are financed by taxes.
<b>FR</b>	Basic scheme: Employer: 9.8% (below ceiling) Employer: 1.6% (above the ceiling) Employee: 6.55% (below the ceiling) Mandatory supplementary scheme: Rate varies between 7.5% - 20% (incl. employer and employee contributions), Depending on wage level and employee status	The contribution rate covers old-age and survivors' pensions; disability pensions are covered by health insurance contributions. The contribution rate will be raised by 0.2 percentage points in 2006. Further, employment measures are expected to reduce unemployment, which would allow to transfer unemployment contributions to pension financing.
<b>IE</b>	12.5 – 14.75% (total social security, excluding the health levy) Employer: 8.5 – 10.75% Employee: 4%; self-employed: 3%	The contribution rate covers all social insurance benefits, including contributory (flat-rate) pensions, but not health care. In recent years, the Social Insurance Fund has been in surplus. Means-tested social assistance pensions are financed by taxes. In the future, due to the extension of the contributory scheme, there will be a shift from tax funding to contributions.



	<b>Contribution rate, % of wages<sup>1</sup></b>	<b>Observations<sup>2</sup></b>
<b>IT</b>	32.7% Employer: 23.81% Employee: 8.89% The self-employed: Farmers: 20% Shopkeepers: 19% as of 2013 Artisans: 19% as of 2014	Contribution rate covers old age, survivors' and disability pensions of the social security scheme. Social assistance pensions and additional amounts due to social assistance purposes are financed by taxes (2.3% of GDP in 2003).
<b>CY</b>	Employed persons: 12.6% of insurable earnings, shared equally between the employer and the employee.  Self-employed persons: 11.6% of insurable earnings.  Central government contribution: 4% of insurable earnings, paid additionally for both the employed and self-employed.	The social security contribution covers pensions, sickness, maternity, unemployment and work injury. The financing of pensions required 14.2 percentage points contribution in total in 2005.  In addition, social (minimum flat-rate) pensions (8.5% of total pension expenditure) and civil servants' earnings-related pensions (27% of total pension expenditure) are financed from the state budget.
<b>LV</b>	25.26 % of the wage within the total social insurance contribution rate of 33.09% (of which the rate for employers is 24.09% and employees 9%) is needed to finance the old-age, survivors' and service pensions in 2004. However, the contribution for the calculation of the NDC pension is fixed at 20% (not separated between employer and employee) of which 2% goes to the funded scheme up to 2006, increased gradually to 10% by 2010, to persons participating in the funded scheme.	The total social insurance contribution covers old-age, survivors', service (during the transition period) and disability pensions, work injury, maternity, sickness and unemployment benefits and funeral benefits. The NDC pension contribution covers old-age pensions (including minimum pension and actuarial early retirement) and it is the basis for the calculation of survivors' pensions.
<b>LT</b>	26% Employer: 23.5% Employee: 2.5% In 2004, the funded scheme (2 <sup>nd</sup> tier of the I pillar) was introduced with a switch of the contribution rate at 2.5% (employee's part) to a private fund for those who have joined the scheme. This rate will be increased to 5.5% (2.5% by the employee and 3.0% by the employer) by 2007.	The pension contribution rate is further broken down by type of pension: (basic) old-age pension (10.5%), supplementary old-age pension (10.6%), disability and survivors' pensions (4.9%) in 2005; In 2004, the State Social Insurance Fund turned to be in surplus. 50% of the amount of contributions to the funded scheme was subsidised from the State budget, equal to 0.1% of GDP. State pensions to servicemen, policemen, meritorious persons, scientists, judges, casualties as well as social assistance pensions are financed from the state budget.
<b>LU</b>	24% Employer: 8% Employee: 8% State: 8%	One third of the contribution rate is financed by taxes. The guaranteed minimum income for old people and public sector employees' pensions are financed by taxes. Currently, the contribution rate allows accumulating the pension fund over its statutory requirement. The future development of the contribution rate depends heavily on the growth rate. Further, public sector pensions are financed from the State budget, 2.5% of GDP in 2004.
<b>HU</b>	26.5% Employer: 18% Employee: 8.5% (fully to the PAYG scheme, if not joined the 2 <sup>nd</sup> tier of the I pillar; 0.5% to the PAYG scheme and 8.0% to the funded scheme when joined	Disability pensions and survivors' benefits (13% of all pension expenditure) are financed by health insurance contributions and transfers from the government budget. Social insurance fund required a subsidy of 23.6 of its total expenditure from the State budget (1.8% of GDP) in 2004. Also, supplementary means-tested allowances guaranteeing the minimum old-age income are financed by taxes (0.6% of GDP).
<b>MT</b>	30% Employer: 10% Employee: 10% State (tax revenues): 10% (State contribution is equal to 50% of the weekly rates payable by the employee and the his/her employer) Contribution is capped to a wage ceiling. (with a substantial variation acc. to age and wage level of the employee) (Self-employed: 15% + state: 7.5%)	Covers all social insurance, including all pensions, health care and all short-term benefits.

	<b>Contribution rate, % of wages<sup>1</sup></b>	<b>Observations<sup>2</sup></b>
<b>NL</b>	17.9% (old-age pension) 1.25% (survivors' scheme) Employee: 19.15%	A target has been set to ensure that the old-age pension contribution rate will not be raised above 18.25%. The contribution rate of 17.9% is expected to produce a surplus until 2010. Thereafter, the deficit is covered from the reserve fund and taxes. In addition, a contribution rate of 1.25% is paid for the survivors' scheme and a rate of between 7.09-13.93% for disability benefit schemes. All contribution rates are capped by a wage ceiling.
<b>AT</b>	22.8% Employer: 12.55% Employee: 10.25% ; different rates in the civil service schemes without any ceilings	The contribution rate was harmonised for all groups in 2004; however, the rates paid by the self-employed (17.5%) and farmers (15%) are lower but subsidised up to 22.8% from general tax revenues. Furthermore, contributions are paid from tax revenues for periods of child care, military/civilian service, sickness benefits, maternity allowances and long-term care. There is a deficit guarantee for the statutory pension insurance to be covered from the Federal budget. In 2004, the government financing of the pension system accounted for 2.6% of GDP.
<b>PL</b>	Total pension contribution: 32.52% of gross wage, of which: 19.52% (old-age pension) 13.00% (disability & survivors pensions) Paid by: employer: 16.26%, of which 9.56% (old-age) 6.50% (disability and survivors) employee: 16.26%, of which 9.56% (old-age) 6.50% (disability and survivors) (In addition: 0.97-3.86% (work injury; paid by employer) and 2.45% (sickness and maternity; paid by employee))	The earnings-related old-age pension constitutes of a notional defined-contribution scheme (12.22%) and a pre-funded defined-contribution scheme (7.3%); these rates are to be kept constant in the future. The outflow of the funded contributions creates a financing gap in the PAYG Social Insurance scheme – in 2004 it was 1.2% of GDP, while the total subsidy for the financing of pensions amounted to 3.8% of GDP. Disability and survivors' pensions are financed from separate contribution (13.0%). Farmers' old-age and disability pensions are financed up to 90% of the pension payments from state budget subsidies (1.7% of GDP in 2004). Furthermore, minimum pension guarantee (topping-up a small pension from earnings related pension system) as well as contributions during selected career breaks (maternity and parental leave, periods out of work due to the care of a disabled child, unemployment benefit period) are financed by taxes (or other public sources).
<b>PT</b>	34.75% (contributory cash benefits) Employer: 23.75% Employee: 11%	The contribution rate covers all contributory benefits (pensions, sickness, unemployment, maternity, professional deceases, family benefits). Means-tested universal non-contributory social pension and other benefits are financed by taxes (3.3% of GDP in 2000). The social security sector currently produces a surplus of 1.7% of GDP, projected to turn into a deficit of 1.5% of GDP by 2050.
<b>SI</b>	24.35% Employer: 8.85% Employee: 15.50%	The contribution rate covers old-age, survivors' pensions, disability pensions, disability allowance and compensations due to disability, assistance and attendance allowances, and health insurance contributions for retired persons. The public pension scheme is subsidised by state budget for the difference between contributions collected and the actual payment of the pensions concerned. It is currently in surplus (0.1% of GDP in 2005) but, without reforms, would fall into a deficit about 2010, increasing to 10% of GDP in 2050 under current policies and activity rates.
<b>SK</b>	24% in 2005; Employer: 17%, of which 14% to old-age scheme 3% to disability scheme Employee: 7%; of which 4.0% to old-age scheme 3.0% to disability scheme	In addition, employers pay a contribution of 4.75% of wages into the Reserve Solidarity Fund. A mandatory funded pension scheme was introduced in 2005. For those, who join the scheme, half of the old-age pension contribution (9%) is passed on to personal accounts of private funds. This introduction of the mandatory funded pension scheme is estimated to result in a deficit in the financing of the social security pensions by 1.2% of GDP as of 2006.
<b>FI</b>	Earnings-related pensions in 2005: Employer: 16.8% (private sector) 18.9% (state sector) 23.4% (municipalities) Employee: 4.8% National basic pensions: Employer: 2.3% (private sector)	The earnings-related pension contribution for the private sector (21.6%) is estimated to rise by about 7 percentage points (taking account of the 2005 reforms). Means-tested (against pension income) national basic pensions and the pensions of sea-farers, self-employed persons and farmers are partially financed by taxes; the subsidy totalling to 1.7% of GDP in 2004.
<b>SE</b>	18.5% (old-age pension) Employer: 10.21% Employee: 7% Note that the contributions add up to 17.21% only because the contribution paid by the employee (7%) is deducted from the income of which contributions are defined. 1.7% (survivors' scheme)	The earnings-related pension system is a notional defined-contribution system (16%) and a pre-funded defined-contribution system (2.5%); these rates are to be kept constant in the future. Income guarantee pensions (means-tested against public pensions), disability and survivors' pensions and contributions during career breaks are financed by taxes.

	<b>Contribution rate, % of wages<sup>1</sup></b>	<b>Observations<sup>2</sup></b>
<b>UK</b>	19.85% (social security except health); in 2005 Employer: 10.9% in 2005 Employee: 8.95% in 2005 (Class 1 contribution rates; for those not contracted out, earnings between the primary threshold and the upper earnings limit for employees)	The contribution rate covers the basic state pension and the additional earnings-related pension (SERPS/State Second Pension) as well as disability and widow's benefits, contributory jobseeker's allowance, maternity and guardian allowances, redundancy payments. Means-tested Minimum Income Guarantee/Pension Credit benefits and civil servants' pensions are financed by taxes. The contribution rates to private pension schemes vary considerably: in 2004, in open funds 9-17% and in closed funds 7-21% of wages.
1	Source: National Strategy Reports 2005; European Commission, MISSOC and Ageing Working Group update in 2005. The rates apply to the general, first-pillar social protection schemes. In many Member States, there are floors or ceilings for earnings which are subject to contributions. Rates may also be different for the self-employed.	
2	The observations are based on the information given in the 2005 national strategy reports and by the Ageing Working Group.	

**Table 2 - 7 Pension expenditure projection models in the Member States**

<b>Country</b>	<b>Name and owner organisation of the model</b>	<b>Type of the model</b>	<b>Base data on pensions</b>	<b>Modelling issues</b>	<b>Other observations</b>
<b>BE</b>	The Maltese System (Model for analysis of long term evolution of social expenditure) Federal Planning Bureau	Deterministic macrosimulation model. Detailed sub-models for each social security scheme as for demographic and socio-demographic projections	National account data and administrative data on pensioners, broken down by income groups, age and gender and pension types	Separating pensioners in stock and entry pensioners; the latter based on entry probabilities. Important thresholds: minimum pensions, wage ceilings	Occupational pensions not included in the model. Model covers the whole social security system
<b>CZ</b>	Pension model Ministry of Finance	Semi-aggregated simulation model; GAMS application	Pension data of 2003 by age cohorts and sexes and pension types; data on inflows and outflows of pensioners; average pension and average newly granted pension	The model differentiates calculations between old-age, full disability, partial disability, widow's and orphan's pensions; differentiates also between pensions in the stock and the inflow and level of new pensions.	All pension benefits under social security system modelled.
<b>DK</b>	All public pensions covered Ministry of Finance		Public pension expenditure with the breakdown to public old-age (flat-rate), means-tested supplements and civil servants' pensions according to 2004, pensioners in each scheme broken down by age, gender and ethnic origin. National account statistics.	Assumes a constant share of population by gender, age and origin on public pensions with corrections for reforms (e.g. a lower statutory retirement age and a reduced take-up of disability and early retirement pensions) and changes in the labour force participation rates.	
<b>DE</b>	Pension projection model Ministry of Labour and Social Affairs	Two sub-models: (1) the demographic pension model (cohort model) and (2) the financial pension model (a partial equilibrium model)	Pension data of 2004 by age cohort and sex and pension type; data on inflows and outflows of pensioners.	Cohort model used for calculating the demographic impact on pension expenditure and the equilibrium model for calculating the financial development regarding pension adjustment and contribution rates.	Occupational pensions not modelled
<b>EE</b>	Pension model Ministry of Finance	Partial equilibrium model.	Administrative pension data by age cohorts, gender and pension types from the National Pension Insurance Fund	Assumes that the current retirement pattern continues except with corrections for increased employment in older age cohorts and increased retirement age of women.	Additional assumptions: -wage structure by age and gender (to calculate the earnings-related pension expenditure) -structure of different pensioners -structure of wages of switchers to the II pillar

Country	Name and owner organisation of the model	Type of the model	Base data on pensions	Modelling issues	Other observations
<b>GR</b>	Projection Models for different funds National Actuarial Authority		In most part, the data used were submitted by the pension funds (IKA etc.) directly to the National Actuarial Authority		Separate models for different funds require also that the total population is divided into sub-populations of the funds IKA is the largest social insurance organization in the country, covering approximately half of the labour force and pensioners The technical approach is focussed on modelling employees' and employers' contributions and the provision of pensions. The outcome of the projection produces a cash-flow pattern.
<b>ES</b>	Four projection models for a) social security old-age and early pensions; b) social security disability pensions; c) social security survivors' pensions; d) public sector (CPE) pensions	Deterministic, partial equilibrium model	Social security administration data and Ministry of Economy and Finance data	The models differentiate the calculation of the number of pensioners and the average pensions for the new pensioners, pensioners in stock and pensioners leaving the scheme.	The whole social security pension system is covered by the model (not the non-contributory scheme); Occupational and private pensions not modelled.
<b>FR</b>	Ministry of Health and Solidarity associated by Ministry of Finance and the French pension policy council (COR)	1) Dynamic microsimulation models for the sector-specific pension schemes (21), 2) Partial equilibrium model (DREES) to aggregate the sector-specific projections and to adjust the results to the AWG macroeconomic and demographic framework	Data from various pension insurance institutions	No separation between pension types (all pensions are assumed to be old-age and early pensions)	Disability pensions (under sickness insurance) are not modelled. Occupational pensions not modelled.
<b>IE</b>	Model for social insurance and assistance pensions Ministry of Social and Family affairs A separate model for public sector employees' pensions Ministry of Finance	Partial equilibrium model	Social insurance and social assistance data	Assumed that the coverage of the social insurance scheme increases to 97% of the relevant male population and 76% of the relevant female population by 2050.	Private sector occupational pensions not modelled

Country	Name and owner organisation of the model	Type of the model	Base data on pensions	Modelling issues	Other observations
<b>IT</b>	RGS pension model, Ministry of Economy and Finance, Department of General Accounts	Macrosimulation model based on a dynamic, multi-state approach involving a large number of 'state' variables	Social security system database; Social Security Institute for private sector workers (INPS), covering 73% of the public pension system. Social Security Institute for public sector (INPDAP), covering 24% of the public pension system.	Numbers enrolled in the pension system are projected according to the level of disaggregation provided by the 'state' variables (age, sex, type of contributor, years of contributions, pension fund and regime, pension type). 'Monetary' variables (pension amount, wages) are projected in terms of their mean value associated to each "state" within the system.	Due attention paid to consistency between the pension component of the model and the demographic and labour force components.
<b>CY</b>	PROST (the World Bank model)	Semi-aggregated simulation model		Model covers the contributory (insurance) scheme.	
<b>LV</b>	Social Insurance Budget Model Ministry of Welfare Social security schemes (public and private tiers)  Complementary calculations on special service pensions (artists, workers in international affairs etc.)	Semi-aggregated simulation model	Pension data (number of pensioners by age and sex, pension profiles) from the State Social Insurance Agency		
<b>LT</b>	The State Social Insurance pension system together with the I and II tier of the I pillar: PRISM Ministry of Social Security and Labour  Social security schemes (public and private tiers)	Pension Reform Illustration and Simulation Model, semi-aggregated	Pension data classified by age, sex and type of benefit from state social insurance institutions		The program methodology based on the 'average person' parameter modelling. The number of the recipients of the State pensions and the projections of the pension size were estimated by using the model which was created specially for this purpose and based on Excel program
<b>LU</b>	General Inspection Authority of Social security (IGSS)	Sequential approach based on the modules of (1) the numbers of contributors and pensioners, (2) wage levels, (3) career profiles and (4) average pensions derived	Pension data from the National Social Insurance Institution Basic dimensions of the model are age, sex, and country of origin. Additional dimensions allow		Cross-border workers calculated on the basis of exogenous assumptions.

Country	Name and owner organisation of the model	Type of the model	Base data on pensions	Modelling issues	Other observations
		from earlier modules	differentiate between employment statuses (blue collar, white collar, civil servants) and the pension type (old-age, early old-age, disability, survivor).		
<b>HU</b>	Ministry of Finance  Social security pensions (public and private tiers)	Deterministic semi-aggregated simulation model	Basic unit of calculation: group of pensioners classified by age, sex, type of benefit and source of financing from the National Pension Insurance Institution. Newly granted pensioners and average pensions calculated separately.	Age-specific exit probabilities and average benefit levels are calculated from developments observed in the past and corrected in line with movements in labour supply and effects of legislative changes.	
<b>MT</b>	PROST (the World Bank model); used by the Economic Policy Division of the Ministry of finance	Semi-aggregated simulation model	Base year 2002. Pensioner data broken down by age, sex, income group and pension type from the sources of the Social Security Department.	Model covers the contributory (insurance) scheme.	All input variables as provided in the AWG assumptions were not incorporated in the model with the same detail level as all of these variables are not required as inputs in PROST.
<b>NL</b>	Separate models for social security schemes (MOSI), occupational pensions (EXPLOT) and occupational early retirement pensions (PVK) Central Planning Bureau	GAMMA - OLG-General Equilibrium model		The three pillars that form the pension system are treated separately in the model. Modelling of occupational pensions (700 funds) simplified to a single average pension fund.	
<b>AT</b>	Two independent models: Private sector and public sector  Bundesministerium fur Finanzen	Partial equilibrium, deterministic model		Interdependencies between the two models regarding employment and wage developments ensured.	As an impact of pension reforms, the share of early pensions is calculated to decrease from 32 to 20% by 2050.
<b>PL</b>	FUS04 model Social Insurance Institution (ZUS)	Multiple decrement cohort-component actuarial model	Basic unit of calculation: group of pensioners classified by age and sex	The division between agricultural and non-agricultural populations done by means of Polish population projections; Farmers and security provision pensions calculated by POLmodel (model for social policy budgets)	Separate models for 1) (ZUS) the general scheme (old-age and disability pensions) 2) Pre-retirement pensions 3) (KRUS) farmers pensions 4) Security provision pensions (armed forces, police, etc.)

Country	Name and owner organisation of the model	Type of the model	Base data on pensions	Modelling issues	Other observations
<b>PT</b>	ModpensPor Model for private sector social security schemes Ministry of Labour and Social Solidarity; Civil servants pension schemes calculated separately by Ministry of Finance	Partial equilibrium model (ModpensPor) Runs aggregate projections on variables such as contributions, unemployment benefits, sick leave benefits and maternity benefits, as well as micro-level projections (based on individual profiles) on pensions and family benefits.	Base year 2004 Data aggregated by age and gender; New pensioners and the stock of living pensioners dealt with separately.	Assumptions made on the take-up of disability pensions and on the evolution of public sector employees.	
<b>SI</b>	Institute for Economic Research, Ministry of Finance	Generational accounting model and dynamic overlapping-generations general equilibrium model	Administrative data of the Pension Insurance Institute	Overlapping Generations: 5 year intervals, 1, 2, 5 or 10 different household groups. Sectoral disaggregation: 2 – 30 sectors. Social security module, Government, taxes.	For the AWG pension projection exercise both models were developed; however data delivered to AWG are issued from generationl accounting model.
<b>SK</b>	PROST (the World Bank model) used by the Ministry of Finance	Semi-aggregated simulation model	Age and sex-specific data (contributors, beneficiaries, coverage rates) from Social Insurance Agency and the Ministry of Finance; Age-specific earnings profiles from the Statistical Office.	- Number of pensions as a percent of population - linked with participation rates and unemployment rates - New pension defined by average replacement rate; existing pensions based on pension distribution.	The switching pattern from the social security (PAYG) pension scheme into a private funded scheme based on the estimates of the Ministry of Finance.
<b>FI</b>	Model for earning-related social security pensions; Finnish Centre for Pensions. Model for national (minimum) pensions; Social Insurance Institution	Deterministic state model, based on the averages in each state by age and gender in each pension act	Administrative data of the Finnish Centre for Pensions' databases, covering also longitudinal data on careers, wages, pension accruals etc.	Mortality rates diversified for those taking up disability pension and those with high income. A gradual increase in the effective retirement age is incorporated in the model.	
<b>SE</b>	SESIM Ministry of Finance	Dynamic microsimulation model	The start year is 1999, pension rights tracked back to 1960; individual longitudinal data from administrative registers.		The base population used in SESIM is formed by a random draw of 104 000 individuals from LINDA (longitudinal database of administrative data). To this sample 8 000 individuals have been added from the National



Country	Name and owner organisation of the model	Type of the model	Base data on pensions	Modelling issues	Other observations
					Social Insurance Board register for pensions rights (oversees residents with Swedish pension rights).
<b>UK</b>	Government Actuary's Department (GAD) responsible for the pension projections relating to the National Insurance Fund. In 2004 HM Treasury commissioned GAD to produce public service pension projections. Department for Work and Pensions (DWP) produces calculations for the Pension Credits	Separate models for different pension schemes (Basic state pensions, state second pension, public sector employees, disability benefits)  Pensions Credit - static microsimulation model			Occupational schemes: no  Regarding public sector employees schemes, calculations have been made for three largest schemes and the results scaled up to total levels. Number of scheme members assumed to remain constant beyond 2008.

## PART II Country chapters

### 3. Belgium

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#### 3.1 Introduction

In the context of the projection exercise carried out by the AWG, which aims at estimating the evolution of welfare expenditure up until 2050, the EU Member States have been asked to hand in their own projections for pension expenditures, sticking to a common methodological framework in macroeconomic and demographic terms. This fiche contains a detailed account of the work done in Belgium for that purpose.

The structure of this fiche is as follows:

- section 3.2 describes, from an institutional point of view, the Belgian pension system. It presents the different pension schemes and the way pensions are calculated in each of these schemes;
- section 3.3 comments on the recent reforms<sup>7</sup> that have affected the schemes;
- section 3.4 presents the methods used to calculate pensions, i.e. including early retirement pensions and disability benefits), Belgium uses a national methodology based on the Maltese<sup>8</sup> model
- section 3.5 elaborates upon the baseline results obtained for pensions and gives the explanatory factors;
- finally, section 3.6 describes the different sensitivity tests that have been worked out within this exercise.

#### 3.2 Description of the Belgian pension system

In Belgium, the pension system is based on statutory social security (public) schemes (first pillar). Public pension expenditure accounted for 9.2% of GDP in 2004. Occupational pension schemes (second pillar) are less common, and their pension expenditure only accounted for some 1.3% of GDP in the same year. Voluntary individual pension schemes (third pillar) are of minor importance.

In view of their secondary importance, and considering the lack of sufficient statistical data, pension outlays pertaining to the second and third pillars were not included in the projection exercise, which thus only takes the first pillar into account. Besides pensions in the strict sense, i.e. old age pensions and survivors pensions provided in the legal pension schemes, the notion of ‘pension’ used in this exercise also covers two other categories of welfare expenditure, namely outlays for early retirement and for disability insurance.

Only the statutory pension scheme, or first pillar, is described in this chapter. In Belgium, there are three main pension schemes: the general scheme for wage earners, the scheme for self-employed workers and the one for civil servants. The way pensions are calculated is different in each scheme. Besides those three schemes, the first pillar also contains pension expenditures by several state-owned companies as well as the outlays by the assistance scheme (guaranteed income for elderly persons).

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<sup>7</sup> Only reforms prior to mid-2005 are taken into account. The most recent measures (Autumn 2005) are not (see 5.3.6.)

<sup>8</sup> Model for Analysis of Long-Term Evolution of Social Expenditure.

### 3.2.1 The general pension scheme for wage earners

The general pension scheme for wage earners makes a distinction between old age pensions and the survivors pension. Both old age and survivors pensions are automatically adjusted to the price index. Selective and discretionary adjustments to living standards are also possible.

#### The old age pension

Legal retirement age for wage earners is 65 for men. Currently, it is 63 for women but after a transition period (up to 2009, cf. section 3.3.1.), women are to retire at the age of 65. In addition, retirement age remains flexible<sup>9</sup> from the age of 60 for men and women, provided that a 35-year career condition is satisfied.

Pension, for an 'n' year career, is calculated as follows:

$$P = 75\% \text{ or } 60\% \sum_{t=1}^n \frac{1}{45} \times \text{wage in } t \text{ up to the wage ceiling} \times \frac{\text{price index } n}{\text{price index } t}$$

Pension is calculated on the basis of the wage really earned during the career up to a wage ceiling. This wage is adjusted to current prices by the CPI. The sum of the revalued wages over the career, weighted by 1/45th, (the theoretical career is supposed to be 45 years), defines the reference wage. Periods of unemployment, early retirement, disability, etc. are valued at the last earned wage. The pension is computed as 75% of the reference wage for the head of a household with a dependent spouse and 60% for a single person.

A guaranteed minimum amount has been set for the pensions acquired over a full career or a career which at least equals two thirds of a full career in the wage earner scheme. This amount applies if it is more favourable than the minimum claim per career year (cf. section 3.3.1).

#### Survivors pension

Widows or widowers receiving a so-called "survivors pension" become entitled to this pension after the death of the spouse who was either wage earner or receiving a replacement income (pension included) in the wage earners scheme. They can draw a survivors pension concurrently with their own pension. Moreover, there survivor pension is compatible with a professional activity, provided that the resulting income does not exceed the limits allowed. These limits depend on the nature of the activity (wage earner, self-employed, ...) and the family situation (having children or not). The person entitled to a survivors pension should have reached the age of 45 and should have been married to the deceased person for at least one year. A survivor pension is calculated as 80% of the deceased person's retirement pension, computed at the family rate (which means 80% of 75%, or 60% of the reference wage), or, if he was still working, at 80% of the retirement pension he/she would have had, should he/she have worked until the age of 65.

The guaranteed minimum amount for retirement pensions also applies to the survivors pensions.

### 3.2.2 The pension scheme for the self-employed

The general pension scheme for self-employed workers makes a distinction between the retirement or old age pension and the survivors pension. Both pensions are automatically adjusted to the CPI and a (selective) adaptation to living standards is also possible.

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<sup>9</sup> Except for wage earners in early retirement- cf. infra section 3.2.4.

## Old age pension

Legal retirement age in the pension scheme for self-employed workers is 65 for men. At this moment, the retirement age for women is 63 but after the transition period (see chapter 3.1.1.), they will also have to wait until the age of 65. Anyone who retires before the age of 65, loses 5% per year of early retirement.

Pension is calculated as follows:

$$P = 75\% \text{ or } 60\% \times \frac{\text{career length}}{45} \times \text{income} \times \text{correction coefficient}$$

In calculating the average pension of the self-employed, the working years before 1984 are valued at a fixed income. For the working years as from 1984, during which a self-employed professional activity was exercised, pension is calculated on the basis of the business income used to compute the social security contributions and income tax. The pension amount is calculated at 75% of the reference wage for the head of a household with a dependent spouse and at 60% for a single person.

With a full career as a self-employed person the retirement pension should not be lower than a certain annual minimum amount, which is granted in proportion to the career fraction and for at least 2/3 of a full career as self-employed or wage earner.

## Survivors pension

The person entitled to a survivors pension should at least have reached the age of 45 and should have been married to the deceased person during at least one year. The survivors pension is compatible with an own retirement pension or a professional activity, provided that the pension or the income from the professional activity do not exceed fixed limits. If the deceased spouse was already benefiting from a retirement pension, the survivors pension is equalized to that retirement pension at the amount for single persons (60% of the reference wage), without considering the reduction due to the early retirement. If the deceased was still working, the surviving spouse gets the theoretical retirement pension at the amount for single persons. This means that the denominator of the fraction, expressing the career, does not equal 43 or 45, but rather the number of years between his/her 20th birthday and his/her death, without exceeding 43 or 45.

The minimum amount of the survivors pension is the same as the amount of the minimum retirement pension.

### 3.2.3 The pension scheme for civil servants

The public pension scheme encompasses the old age pension, the survivors pension, and the disability pension. Civil servants' pensions are automatically adjusted to the CPI and the real wage increases of the working civil servants.

## Old age pension

The legal retirement age for civil servants is 65 (there are some exceptions, in particular for the armed forces) for men and women. Nevertheless, it is possible to retire as from the age of 60. To benefit from a civil servants' pension, a career length of at least 5 years is required, but only after a career of 20 years is one entitled to a minimum pension, which varies according to the family situation.

The pension is calculated as follows:

$$P = \text{reference wage} \times \frac{\text{considered service years}}{60 \text{ (tantième)}}$$

The retirement pension is calculated in proportion to the reference wage, i.e. the average wage of the last five years, on the basis of the wage brackets. The basic denominator is 60 (tantième) but some have a preferential denominator (55 in teaching and 30 years for magistrates and academic services). With a maximum career length of 45 years, the tantième of 60 leads to a maximum replacement rate of 75% of the reference wage.

### **Survivors pension**

A survivors pension in the public sector starts when a (ex-)civil servant deceases. The surviving spouse is entitled to a survivors pension regardless his/her age, as long as he/she is not entering into a new marriage. A divorced spouse is also entitled to a survivors pension if he/she has reached the age of 45 (some exceptions) and has not yet contracted a new marriage. Survivors can cumulate (up to a ceiling) a survivors pension with their own pension. Moreover, the pension is compatible with a professional activity, provided that the income from that activity does not exceed a certain limit. Until the age of 65 the limit for someone only enjoying a survivors pension, is higher. The survivors pension is calculated as follows:

$$P = 60\% \times \text{reference wage} \times \frac{\text{considered service years}}{\text{reference period}}$$

The reference wage and the equivalent service years are determined in the same way as in the case of the retirement pension. The reference period consists of the number of months between the first day of the month after the 20th birthday of the deceased spouse and the last day of the month of his/her death, with a maximum of 480 months (40 years).

Here, a guaranteed minimum pension also applies, which is only granted to the surviving spouse (not to orphans or divorced spouses).

### **Disability**

Civil servants, who are declared permanently unfit to continue their career, can be retired regardless their age or seniority. Their pension is calculated in the same way as the normal retirement pension (see above section 3.2.3. "Old-age pension").

### **3.2.4 The early retirement scheme: "pre-pensions" (only for wage earners)**

Until 2005<sup>10</sup>, a full conventional pre-pension<sup>11</sup> could be granted as from the age of 58 (with a twenty five year career as a wage earner) or earlier for employees working in financially distressed or restructuring companies. In agreement with the employer, a part-time conventional pre-pension<sup>12</sup> is also possible as from the age of 58 without concluding a special Collective Labour Agreement (CLA), implementing CLA no. 55. A deviation from the age limit (55 instead of 58) is possible on the basis of a CLA at sectoral or enterprise level, both for half-time and full-time early retirement. Moreover, on the basis of a CLA for financially distressed or restructuring enterprises, full-time early retirement is possible from the age of 52 on condition that 20 years of career or 10 years in the same sector are fulfilled.

Full pre-pension consists of:

- an unemployment benefit, paid by the public authorities (National Employment Office), which amounts to 60% of the last gross wage earned, limited by a ceiling<sup>13</sup>, however;

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<sup>10</sup> From 2006 onwards, the age to go into early retirement will be raised (measure taken in October 2005): see section 3.3.6..

<sup>11</sup> On the basis of the Collective Labour Agreement (CLA) no. 17 of 19/12/1974.

<sup>12</sup> On the basis of the Collective Labour Agreement (CLA) no. 55 of 13/07/1993.

<sup>13</sup> The wage ceiling used for calculating the unemployment benefit is different from the wage ceiling used for pension calculation.

- an extra allowance, which is to be paid by the employer, corresponding to half the difference between the net reference wage<sup>14</sup> and the unemployment benefit.

A part-time pre-pensioner has three sources of income:

- a wage from his part-time employment,
- unemployment benefits within the framework of his part-time pre-pension (a fixed amount per day: 13,23 euros on the 1st August 2005)
- an extra allowance paid by the employer.

These amounts are automatically adjusted to the CPI and an adaptation to living standards is also possible.

### **3.2.5 Disability**

If someone has been disabled to work for more than one year (for which he/she actually gets a primary disability benefit from the 2nd until the 12th month) a disability benefit is paid.

There are two schemes for the disability benefits: one for wage earners and one for self-employed workers.

#### **The disability scheme for wage earners**

In the wage earner scheme, the disability benefits are calculated at 65% of the limited lost remuneration<sup>15</sup> for beneficiaries with family burden, 50% for single persons, and 40% for cohabitants. The benefits are automatically adjusted to the CPI and an adaptation to the standard of living is provided.

#### **The disability scheme for self-employed workers**

In the self-employed workers' scheme, the disability benefits are fixed but differ according to the question whether the beneficiary has family burden or not: as from 1 August 2005, a person with family burden receives 31.98 euros per day whereas a person without family burden gets 23.98 euros per day, if the business activity is continued. If the self-employed worker has to stop his business, these amounts increase to 35.07 and 26.30 euros per day respectively.

The usual CPI and living standard adjustments apply.

### **3.2.6 The assistance scheme: the guaranteed income for elderly persons (GIEP<sup>16</sup>)**

The elderly people whose career in the legal scheme is not long enough and who do not meet the necessary conditions to be eligible for a minimum pension can receive the so-called guaranteed income for elderly persons (GIEP). Before granting the GIEP, the financial means of the person are checked. The test includes an 'immunization'<sup>17</sup>. The GIEP is currently granted to men and women aged 63 or more. The age condition will be progressively raised to 65 by 2009. At present, the eligibility is individual and cohabitants and single persons are distinguished on the basis of their place of residence (shared or not). The cohabitants (married or not) can apply individually for the "basic pension". Single persons can benefit from an increased pension, 1.5 times higher than the basic pension, to compensate proportionally higher fixed costs. On 1 August 2005, the monthly basic pensions amounted to 447.06 euros for single persons and to 670.59 euros for cohabitants.

The GIEP scheme has been reformed in June 2001 (see section 3.3.5.)

<sup>14</sup> The net reference wage equals the gross wage for the reference month (in fact the last month of employment) reduced by the personal social security contributions and the income tax.

<sup>15</sup> This ceiling differs from the one used in the pension and early retirement schemes.

<sup>16</sup> GIEP in French is GRAPA or "La garantie de revenu aux personnes âgées"; in Dutch: "IGO" or "Inkomensgarantie voor ouderen".

<sup>17</sup> This means a fixed amount is deducted from the disposable income. As a consequence, only part of the income exceeding the 'immunized' amount is deducted from the basis amount of the GIEP.

## **3.3 Reforms**

### **3.3.1 The 1997 pension reform**

The Framework Act of July 26, 1996 on the pension schemes for wage earners and self-employed workers has come into force on 1 July 1997. Its implementation will continue over a decade and thus have an effect on the evolution of pension expenditure in the projection period 2005-2050.

#### **The general schemes for wage earners and the self-employed**

The 1997 reform aimed mainly at gradually increasing the retirement age of women to match the retirement age of men. The cornerstones of the reform were the following:

- legal retirement age for women is gradually brought from 60 to 65 by 2009. At the same time, the career, giving access to a full pension, is increased from 40 to 45 years while the women's age limit for getting access to the other forms of replacement income is raised to the legal retirement age;
- early retirement (from the age of 60) is submitted to a career condition, gradually raised from 20 years in 1997 to 35 years from 2005 on;
- a "minimum claim per year of career" is introduced. This "minimum claim" will be linked to the evolution of the minimum wage;
- every two years the wage ceiling will be raised, considering the growth of real wages; apart from the automatic indexation, the possibility of selectively awarding a welfare adjustment to certain categories of pensioners is provided.

The reform of the pension scheme for self-employed workers is similar to the reform of the wage earners pension scheme, regarding the rise in the retirement age and the calculation fraction for women, and the introduction of a career condition for men and women in case of early retirement between 60 and 65.

#### **The socio-economic consequences of this pension reform**

The result of raising the legal retirement age for women and of the introduction of a career condition to go into retirement between the age of 60 and 64 is to delay the retirement of many women.

For the national projection (non AWG hypothesis), the impact of the decision by women to stay in employment or in inactivity (unemployment, pre-pension, disability or housewife) was evaluated on the basis of a sample. This estimation is confirmed by the first observed effects of the pension reform on the attitude of women towards the various options that are open to them. Following this methodology, the female employment rate of the 60-64 age group reaches 29% in 2050, which is slightly higher than the one proposed by the AWG.

### **3.3.2 Improving the employment probabilities for older workers**

Since 1999, the following measures have been taken by the Belgian authorities, in order to keep older workers at work:

- the supplement on unemployment benefits awarded to the unemployed aged 50 and over has been reduced for certain categories of unemployed older than 50;
- part-time working schemes for older workers have been promoted;
- part-time career interruption (1/2, 1/3, 1/4 or 1/5) from the age of 50 with a doubling of the complementary interruption benefit has been introduced;
- legal prohibition of fixing an age limit in staff selection and recruitment;
- the age of access to the status of 'non-job-seeking unemployed' has been gradually brought from 50 to 58 between June 2002 and June 2004;

- every dismissed worker, aged at least 45, is entitled to accompanying measures (outplacement) which have to be taken by his/her last employer;
- recruiting job seekers aged 45 or older who have been unemployed for more than 6 months reduces employer contributions and gives rise to an allowance paid by the National employment office (ONEM);
- workers from the age of 50 can seek advice from the ‘Advisory Cell for Vocational Consolidation’ and benefit from individual subsidized reductions in working time (1/2 or 1/5 time credit, end-of-career jobs in the non-market sector) paired with a redefinition of their job content (‘coaching’ of young workers);
- in order to tackle the ‘unemployment trap’ for people aged 50 or older, workers who left the job market early can keep part of their allowance (the seniority bonus) when they get back to work. Besides, their pension benefit will be calculated on the basis of the income that allows them to get the highest possible amount.
- for workers aged 55 or more, the employer can resort to the “Promotion Fund for Working Conditions”;
- an additional cut in employer contributions is granted to employers recruiting people aged 58 or older.

### 3.3.3 Civil servants: age bonuses

Act of 12 August 2000: introduction of age bonuses for those retiring after the age of 60, the main purpose of which is to induce civil servants to work longer. The age bonus is granted to every civil servant having reached the age of 60 for each full month of work after 1 January 2001: 0.125%/month (1.5%/year) between 60 and 62 and 0.167%/month (2%/year) between 62 and 65.

### 3.3.4 Minimum pension reforms of the general pension schemes

The minimum old age pension and the minimum survivors pension were raised in the general schemes for wage earners (Royal Decree of 14 February 2003) and for the self-employed (Programme Act of 24 December 2002) as follows:

	<b>Minimum annual amount as of 1 April 2003</b>	
	Wage earners	Self-employed
pension for a household	11 535.12 EUR	9 397.77 EUR
pension for a single person	9 231.00 EUR	6 981.78 EUR
survivors pension	9 085.86 EUR	6 981.78 EUR

Additionally, a legal increase of the minimum pensions has been provided in the form of four successive increases of 30 euros on 1 September 2004, 1 December 2005, 2006 and 2007.

### 3.3.5 The guaranteed income for elderly persons (GIEP)

The scheme of guaranteed income for elderly persons (GIEP) was reformed on 1 June 2001. Before June 2001, women could be granted the guaranteed income as from the age of 62 while men had to wait until they were 65. In the new scheme, both men and women can receive the guaranteed income as from the age of 63 (65 as from 2009 at the end of the transition period). Before 2001, the amount of the allowance depended mainly on the marital status (married or not). Since 2001, the allowance has been individualized and cohabitants are distinguished from single persons on the basis of their place of residence (shared or not). The pension’s amount, which had been kept constant since 1976, has been raised significantly. The basic amount of the guaranteed income has also been increased. Moreover, the new legislation ensures the pension will be adjusted every two years, besides indexation.



The reference amount of the guaranteed income was first increased by 3.4% on April 1, 2003, and again by 120 euros starting on September 1, 2004. This increase will be reiterated on 1 December 2005, 2006 and 2007 (or about 2.5% each time).

### **3.3.6 The most recent measures (October 2005) - not introduced in the projection**

In October 2005, the Belgian federal government announced new measures within the framework of the Solidarity Contract between Generations. These measures, which notably affect social expenses, are briefly described below. It should be noted that they are not integrated in the results of the AWG projection.

- Rise in the conventional pre-pension age: the limit is brought from 58 to 60 years as from 2008. The current 25-year career condition is also raised to 30 years in 2008 and to 35 years in 2012 for men. For women, it is brought to 26 years in 2008 and afterwards increased with 2 years every four years in order to reach progressively the career condition for men. Exemptions (age limit at 58) are still possible (heavy jobs, night work).
- In the pension scheme for wage earners, the wage ceiling is split in two as from 2007: the first ceiling will be applied to the wages and to the allowances received for illness and disability periods. The second ceiling will be applied to other allowances received in case of unemployment, pre-pension and full-time and part-time career breaks. Only the first ceiling will be adapted every two years according to the Law on Pension Reform passed in 1996. When the difference between the two ceilings reaches a certain level, the second ceiling is adapted.
- As from 2007, the wage earners who retire at the age of 62 or who have a full career of 44 years are granted a bonus.
- Adjustment of the “penalty” in the schemes for wage earners and for self-employed workers. Currently, when a self-employed worker retires between the age of 60 and 64, he/she loses 5% per year of early retirement. From now on, he or she will lose 25% when retiring at the age of 60, 18% at the age 61 (instead of 20%), 12% at 62 (instead of 15%), 7% at 63 (instead of 10%) and 3% at 64 (instead of 5%). The worker having a 44-year career is not penalized.
- From 2008 onwards, the government should provide for a budget covering the annual growth of 1.25% of the wage ceilings, a welfare adjustment of 0.5% and a real growth of 1% of the fixed allowances.
- Easing of the conditions that allow pensioners to work after the legal retirement age but tightening of the conditions for working during early retirement.
- A person receiving a survivors pension is allowed to work but under certain income conditions: a limit is set to the total income (increased for every dependent child). Currently, the income from work is not allowed to exceed the limit, regardless of the amount of the survivors pension.
- Measures are also taken to promote youth employment and to retain more older workers in employment (new HRM’s practices, incentives for training, new approach to restructuring of companies).

## 3.4 Projection methodologies for pension expenditure

For Belgium, the Maltese model, developed at the Federal Planning Bureau, produces projections of pension expenditure (national methodology<sup>18</sup>). As part of other (non AWG) projection activities, this model also provides projections for other social expenditures as well as for the total Belgian government budget.

Reform decisions prior to January 2005 are incorporated in the projection (described in section 3.3.).

### 3.4.1 A brief description of the Maltese model

Starting from a demographic projection, the model generates the evolution of expenditures in the different social security schemes, given socio-demographic and macroeconomic scenarios. The expenditure items included in the model are: pensions (for wage-earners, self-employed and civil servants, public enterprises schemes and assistance schemes), health care expenditure (acute care, long-term care), disability allowances, pre-pension schemes for wage earners, unemployment benefits, family and maternity allowances, other social expenditure and education expenditure. The system is made of one central model and several interconnected models with specific purposes. The modelling effort consists in identifying the behaviour and the eligibility requirements for entry into the various socio-demographic schemes and the main parameters of the legislation that influence the computation of the benefits for each category of beneficiaries.

The projection proceeds in four steps:

- The first step is the projection of the population by age and gender given the hypotheses about fertility rates, life expectancy and migration flows.
- Given the behavioural hypotheses, legal parameters of eligibility and the macroeconomic framework, the population is, in a second step, split into different socio-demographic groups: school population, labour force (working and unemployed), elderly long-term unemployed, full-time career break, disabled persons, pensioners, early retirement (pre-pension), and other non-participating population (see appendix 1). The socio-demographic projection results from the participation and retirement behaviours of the different generations in the different age and gender classes. These are based on assumptions regarding participation rates<sup>19</sup> and on present retirement behaviour, taking into account the effects of the multiple reforms (see section 3.3.). The socio-demographic projection leads to a coherent projection of the number of beneficiaries in the different social security schemes.
- In a third step, the benefits in the various schemes are projected on the basis of the number of beneficiaries and of the different institutional arrangements (wage ceilings, welfare adjustment,...). Average benefits are calculated by branch and, in most cases, by gender and age groups, except for health care expenditures (which depend on private consumption in health care by age group and gender and on GDP growth).
- Finally, the social security expenditures are included in a projection of the public budget. This consolidation of the social security sector with the rest of public finance is necessary because of several links between the social security budget and other aspects of the budget. First, social expenditures are not only financed by contributions, but also by social security taxes and transfers from the federal budget. Second, the civil servants' pensions are financed by the federal budget. Finally, the Ageing Fund is supposed to be alimented with funds that are obtained from the continuing reduction of the public debt. As for projections with “no change in policy” scenarios, average tax and contribution rates are assumed to be constant over time, as are the calculation rules

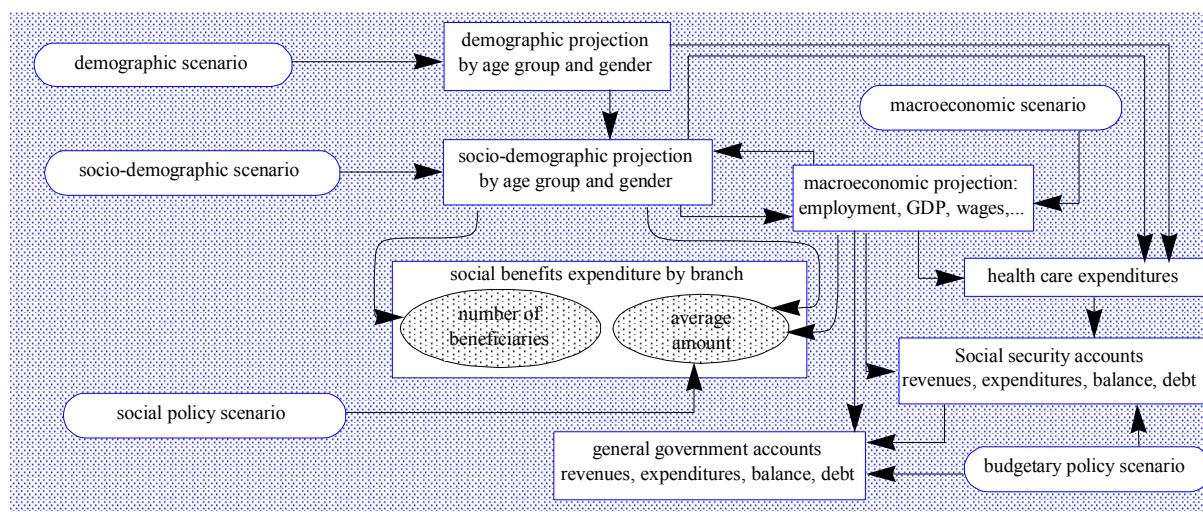
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<sup>18</sup> Pension expenditure is projected using the Maltese model but based on the AWG assumptions.

<sup>19</sup> Defined by the AWG

of the social benefits. The evolution of all revenues and primary expenditures leads to the calculation of public debt and interest payments.

**Graph 3 - 1 Maltese system interdependencies**



### 3.4.2 The pension expenditure model

Pension expenditures are determined by the number of pensioners of each category multiplied by the corresponding average amount. In the Belgian national model, the projection of the number of pensioners is carried out at a disaggregated level per regime, gender and age or age group. The general principles of the calculations are presented below.

#### 3.4.2.1 *Number of pensioners, including early retirement and disability*

The fundamental principle of this model is to let the existing number of pensioners get old and to add new pensioners based on recent entry behaviour (entry probabilities calculated on the basis of the latest observations) - see appendix 3 for more detail.

#### **Entries in the old age pension scheme**

Entries in the old age pension scheme are defined for each type of scheme. Entries in the 60 to 65 years category are calculated following the access probabilities to old age pension as based on the different socio-economic groups within a scheme. These probabilities are generally constant in the projection. However, they are adjusted in order to respect a general constraint. This constraint rests on the cumulated entry rate (between 60 and 65 years) of a generation in the old age pension system. This rate remains constant in the projection. In other words, the ratio between the number of beneficiaries of an old age pension at age 65 and the number of persons pertaining to one of the three schemes at age 59, i.e. 6 years before, is constant (with a correction for the evolution of mortality).

#### **Entries in the survivors pension scheme**

Before the age of 60, the evolution of the number of women in the survivors pension scheme depends, on the one hand, on the evolution of the number of deceased married men who were at work or benefited from a social transfer within the scheme, and, on the other hand, on the evolution of the female participation rate.

From the age of 60 onwards, the number of new female pensioners in the survivors scheme is determined by the number of deceased (married) male pensioners in the scheme in question.

### **Entries in early retirement**

Entries in the pre-pension system are calculated on the basis of an entry probability by age and sex based on the number of wage earners. In a context of increasing activity and employment, this probability, starting from the latest observed value (2003), progressively tends to its 2001 value, when entries in prepension were at a low level due to the favourable economic situation.

### **Entries in disability**

The general methodology implies that the disability rates (the shares of disabled persons per sex and age category in the demographic population) are calculated using the principle of cohorts. The entry probabilities in the disability benefit system are calculated from the potential active population<sup>20</sup>. The number of disabled persons by age category and sex are computed by applying these rates to the demographic projection. The distribution of the number of disabled persons over the wage earner scheme and the self-employed scheme is carried out proportionally to the number of workers in the concerned scheme.

However, the methodology is different for the higher age groups (from age 40-44) because of the demographic constraint and of the AWG activity projection. The disability rate of an age category is based on the disability rate of the lower age category during the previous year and on the evolution of expected retirements in the age group.

#### **3.4.2.2**

#### ***Pension accrual and average pension***

The average pension amount in the different pension schemes<sup>21</sup> is estimated by producing as accurately as possible the main legislative parameters for the successive cohorts of persons entitled to a pension. These parameters relate to the wage limits and the minimum pensions, their evolution in real terms (apart from the price indexation, which is intrinsic to the Belgian social security system), and the legal replacement rates applied to the reference wage.

For each pension scheme (employees, self-employed, civil servants) an average pension amount is estimated for each type of career, characterized by the legal replacement rates and the specific history of their career profile. The general average pension amount per scheme is weighted by its share in the total number of pensioners of each type.

The evolution of these shares depends on the macroeconomic projection: for instance, the increase in the female participation rate results in a growing number of women having built up full pension rights. This leads to an increasing substitution of pensioners, benefiting from a family pension, by pensioners getting a pension for 'singles', which is calculated at a lower legal replacement rate<sup>22</sup>.

Furthermore, the projection of the unemployment rate, the early retirement rate, etc. affects the development of a full-time career. The hypothesis concerning productivity growth also affects the evolution of the average pension amounts through the wages. This effect occurs faster in the case of public pensioners, because their basic wage is calculated on the basis of the income over the five last years of their career. For employees and self-employed persons this wage evolution only appears in the long term as their pension is calculated on the basis of the average income over their whole career, which, at the start of the projection period, is almost completely situated in the past.

The income distribution is supposed to remain constant in the projection. It is used, i.a., to compute the percentages of recipients with incomes in excess of the wage ceiling and below the minimum pension.

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<sup>20</sup> Working and unemployed people, people in early retirement and full-time career break

<sup>21</sup> For the employee's scheme, see M.J. FESTJENS, "*De pensioenhervorming*", Federal Planning Bureau, Planning Paper 82, November 1997. For the self-employed person's scheme, see B. SCHOLTUS, "*MoSES (Model of The Self-Employed pension Scheme): une modélisation du régime de pensions des travailleurs indépendants*" Federal Planning Bureau, Working Paper forthcoming. For the civil servant's scheme, see "*Jaarlijks Verslag*" (Annual Report), Study Committee on Ageing, May 2005, chapter III.

<sup>22</sup> The distinction between 'family pension' and 'pension for singles' does not exist in the civil servant's scheme.

### 3.4.2.3

### *Average pre-pension and disability benefits*

In general terms, the average amount of the benefits reflects the existing legislation, as before. In the wage earners scheme, the average pre-pension (only the part paid by the National Employment Office) and disability benefits are calculated per gender and age group, taking into account the respective ceilings. Disability allowances in the independent workers regime are taken as fixed.

Table 3 - 1 presents the social policy hypotheses used: growth of wage ceilings, welfare adjustments, indexation to wages for the public servants' pensions and real growth of lump-sum benefits.

Table 3 - 1 Social policy hypotheses			
	2004-2007	2008-2010	from 2010
Wage ceiling			difference of 0.5% with productivity growth
Welfare adjustment		projection with a "no change in policy": only the decided measures till januari 2005 are introduced	difference of 1.25% with productivity growth
Indexation to wages (only the civil servants pensions)			difference of 0.5% with productivity growth
Lump-sum benefits			difference of 0.75% with productivity growth

#### **Wage ceiling**

The Pension Reform Act of 1996 provides the rules to adapt the wage ceiling in the general pension scheme for wage earners, based on wage margins determined in the Employment and Competitiveness Act. The increase of the wage ceiling is decreased with 0.5% relative to the general wage evolution, under the assumption that 0.5% of this wage drift is due to a shift toward higher qualified employment. A similar hypothesis holds for the other social security incomes.

#### **Welfare adjustment**

The annual welfare adjustments have been disconnected from wage growth by 1.25%. Even though there was less generosity in the past, this hypothesis fits in the context of similar measurements taken by the government (in 2004) and in the "Generation Pact", recently approved (autumn 2005).

#### **Indexation to wages for the civil servants pensions**

Pensions are adjusted annually to reflect changes in standards of living. These adjustments are based on the principle of the "delayed wage". The indexation to wages implies that wage increases for active civil servants are mirrored in the pensions of the retired civil servants. Historically, average pension increases have been 0.5% lower than the corresponding growth in remunerations. Obviously, the wage drift (due to a shift toward higher qualified employment) of active and retired civil servants could differ in the same period. Evidently, the impact of wage drift only shows up in pensions after many years. Additionally, there is a tendency for wage increases to take forms (bonuses, the introduction of new wage scales, etc.) which bypass, at least partially, the indexation to wages mechanism.

#### **Welfare adjustment for lump-sum benefits**

Lump-sum benefits are, by definition, independent of the evolution of wage ceilings. Disconnection from the evolution of wages by 1.25% (as is the case for replacement incomes) would imply a serious relative decline of this category of social benefits. Conversely, if the lump-sum benefits would mimic the wage ceilings of the other benefits (i.e. 0.5% less than the increase in general wage levels), there would be an unfair advantage over replacement incomes (disconnected from wage growth by 1.25%). In order to obtain a reasonable growth rate, it was decided to adjust lump-sum benefits with an intermediate value of 0.75% less than general wage increases.

### 3.4.2.4

### *Sources of data in the Maltese model*

Table 3 - 2 presents the data sources used in Maltese for the number of beneficiaries and the pension expenditures.

The number of beneficiaries is taken from administrative sources and almost all the expenses originate from the Belgian national accounts. Only a very few number of small public enterprises expenses is not clearly identified in the national accounts and had to be estimated. These expenditures were assumed to be part of the transfer to enterprises in the national accounts.

<b>Table 3 - 2 Sources of the pensions data (beneficiaries and expenses)</b>	
<b>Beneficiaries</b>	<b>Belgian sources of data</b>
Early retirement (wage earner scheme)	National Employment Office
Disabled population :	
- wage earner scheme	National Institute for Disability and Sickness Insurance
- self-employed scheme	National Institute for Disability and Sickness Insurance
<hr/>	
Pension :	
- wage earner scheme by category	National Office for Pensions
details about the career	Sample from the National Office for Pensions
- self-employed scheme by category	National Office for Pensions
details about the career	National Institute for the Social Security of the Self-Employed
- civil servants scheme by category	Pension Administration Office
details about the career	Pension Administration Office
- public enterprises	Pension cadaster and various
Guaranteed income for elderly people	National Office for Pensions
<hr/>	
<b>Expenses</b>	
Pensions (wage earner, self-employed, civil servants, assistance, most of the public enterprises)	National Accounts
Early retirement Disability	
Pensions of a very few number of small public enterprises	Estimated but part of the transfer to enterprises in the national accounts

From a general point of view, the model is fully consistent with the Belgian national accounts and covers all expenses of the global public finance account.

## **3.5 AWG: Baseline results**

### **3.5.1 Pension expenditure**

Pension expenditures covered by the Maltese model include all expenditure for retirement and survivors' pensions, as well as the State contribution to early retirement pensions and disability allowances. As a reminder, it only concerns expenditures for the first pillar (public pensions).

Table 3 - 3 shows the evolution of these pension expenditures as a percentage of GDP, with a more detailed breakdown than the one provided in the final AWG report.

**Table 3 - 3 Pension expenditure in % of GDP**

	2004	2015	2030	2050	2050-2004
Old age security pensions (survivors pensions included)	9.2	9.8	13.5	14.5	5.3
- wage earner scheme	5.2	5.7	8.1	8.7	3.5
- self-employed scheme	0.7	0.8	1.1	1.1	0.3
- civil servants scheme (including disability and public enterprises)	3.2	3.3	4.2	4.6	1.4
- assistance scheme	0.1	0.1	0.1	0.1	0.0
Early retirement due to labour market conditions (wage earner scheme)	0.4	0.5	0.5	0.4	0.0
Disability (wage earner and self-employed schemes)	0.8	0.8	0.7	0.7	-0.1
Total	10.4	11.1	14.7	15.5	5.1
Pensions: Annual Report Study Committee on Ageing may 2005	10.5	10.9	13.5	14.5	3.9

Overall pension expenditures increase by 4.3 percentage points of GDP between 2004 and 2030, of which 3.7 percentage points occur between 2015 and 2030, when demographic pressure is strongest. Between 2030 and 2050, pension expenditures increase by no more than 1 percentage point. These increases derive principally from pension expenditures for the wage earner and the public sector scheme. It should be noted that the three main pension schemes (wage earners, self-employed and public sector) represent about 90% of overall pension expenditures.

#### **Comparison of the current projection with previous (2001) results**

##### *Definition of pension expenditures in the two projections*

The 2001 and 2004 projections both included retirement and survivors pensions for the wage earner scheme, the self-employed, the public sector, public enterprises and assistance schemes as well as pre-pension expenditure. However, in the 2001 projection, unemployment and disability benefits were taken into account for the over 55s, whereas currently the whole of disability expenditure (for all age groups) is counted except expenditure relating to the unemployed over 55 years old.

##### *Comparison of levels of pension expenditures for the starting year*

For Belgium, the 2004 projection begins at a level of pension expenditure of 10.4% of GDP for 2004, i.e. 0.9 of a percentage point of GDP higher than since the projection made in 2001 (9.5% of GDP). The difference noted in definitions of pension expenditure (unemployment and disability, see above) is in no way responsible for this divergence. The difference is observed in the level of expenditure for pensions for other regimes. There are three possible reasons: the growth in GDP in real terms observed between 2000 and 2005 (average annual growth rate of 1.5%) is much weaker than projected in the 2001 exercise (average annual growth rate of 2.7%), the source of statistics on pension expenditure for the public sector has been modified and involves a minor upwards revision (0.2 of a percentage point of GDP), and finally the Belgian state took financial responsibility for pension expenditure for a public enterprise (Belgacom), which accounts for another 0.1 of a percentage point of GDP.

##### *Comparison of the evolution of pension expenditures between the two exercises*

The 2001 projection assumed an increase in pension expenditure of the order of 3.8 percentage points of GDP between 2005 and 2050, while the current projection records an increase of 5 percentage points of GDP over the same period. There are two principal reasons for this rather marked increase. On the one hand, population forecasts were revised and involve an increase in life expectancy and in the old age dependency ratio. On the other hand, the long-term increase in welfare adjustment is higher in the new projection (about 0.5% per year - cf. [Table 3 - 1](#) - compared to zero growth from 2020 in the former projection).

The evolution of the proportion of pension expenditures in GDP can be broken down according to four explanatory factors: the dependency ratio, the pension eligibility ratio (or coverage ratio), the employment rate and the replacement rate (or the benefit ratio).

The dependency ratio is the relationship between the population aged 65 years or more and the population between 15 and 64 years. The coverage or eligibility ratio is the relationship between the number of pensioners and the population aged 55 years or more. The employment ratio is expressed as the inverse of the employment rate: it is derived from the population from 15 to 64 years divided by

total employment. Regarding the benefit ratio, it represents the relationship between the average pension and labour productivity.

In other words, pension expenditure as a percentage of GDP can be broken down as follows:

$$\frac{\text{pension expenditure}}{\text{GDP}} = \frac{\text{population} > 55}{\text{population} 1564} \times \frac{\text{number of pensioners}}{\text{population} > 55} \times \frac{\text{population} 1564}{\text{working people}} \times \frac{\text{average pension}}{\text{GDP}} \times \frac{\text{GDP}}{\text{working people}}$$

**Table 3 - 4 Explanatory factors of pension expenditure in average annual growth rates - computed by the AWG**

	2005-2050	2005-2015	2015-2030	2030-2050
Dependency ratio	1.31	1.03	2.33	0.69
Coverage ratio	0.04	0.23	0.01	-0.04
Employment rate (-)	-0.18	-0.58	-0.12	-0.02
Benefit ratio	-0.19	0.00	-0.18	-0.30
Old age, survivors and pre-pensions / GDP	0.98	0.62	2.07	0.31

It seems clear that the growth in pension expenditures as a share of GDP is led by the dependency ratio: this ratio will grow by 1.3% per year between 2005 and 2050, as will pension expenditures. Over this period, this increase in the eligibility ratio will be compensated by the increase in the employment rate and the decline in the replacement rate.

Nevertheless, the analysis can sometimes differ according to the various sub-periods studied. During the first 10 years of the projection, pension expenditures as a percentage of GDP increases by 0.6% per year because of the considerable contribution of the dependency ratio (1% per year) and the impact of the coverage ratio (0.5% per year). The contribution of these two factors is partially compensated by the growth in the employment rate (+ 0.58% per year).

The following period, from 2015 to 2030, sees the strongest growth in pension expenditure as a share of GDP with more than 2% per year. This growth is led by the dependency ratio with 2.3% per year. The growth in the employment rate settles down and the decline in the replacement rate is the principal element restraining the growth of pension expenditure in the GDP.

Finally, the last period from 2030 to 2050 sees a drop in the growth of pension expenditure as a % of GDP (0.3% per year), following a significant slowdown in the growth of the dependency ratio as well as a decline in the eligibility ratio. This slowdown is reinforced by a drop in the replacement rate. The employment rate is more or less stable over this period.

These evolutions in the dependency ratio and the employment rate depend on the demographic and socio-economic assumptions and considered scenarios, which have been described in detail in annex 2. The evolution of the eligibility ratio and benefit ratio will now be explained in more detail.

### 3.5.1.1

#### *The components of the coverage ratio*

As a reminder, the coverage or eligibility ratio is calculated as the proportion of the number of pensioners (excluding the disabled) in the population over 55 years old.

Table 3 - 5 shows the evolution of the population aged over 55 years and the population of pensioners either by type of pension or by age-group, in thousands of units. It can be observed that about 70% of the total number of pensioners (excluding the disabled) is made up of the number of pensioners from the wage earner scheme, against 12% of self-employed pensioners and 17% from the public sector. However, except during the period 2005-2015 (negative contribution to the coverage ratio), the number of pensioners increases more quickly than the population aged over 55 years, especially in the wage earner scheme.



**Table 3 - 5 Population aged 55 and older and number of pensioners by scheme or by age group (in thousands)**

	2005	2015	2030	2050
Population aged 55 and older	2966.3	3451.1	4122.6	4269.6
Number of pensioners (without disabled persons)	2297.9	2646.3	3544.6	3859.6
Decomposition by scheme				
of which number of pensioners (retirement and survivors):	2186.4	2495.2	3387.3	3723.1
- wage earner scheme	459.1	1671.7	2321.7	2577.4
- self-employed scheme	269.8	301.7	414.3	463.5
- civil servants scheme	408.2	473.0	599.2	628.9
- assistance scheme	49.3	48.8	52.1	53.2
of which number of early retirement	111.5	151.1	157.3	136.5
Decomposition by age group				
- less than 54 years	54.7	37.7	26.1	17.7
- between 55 and 59 years	88.4	87.2	70.0	58.4
- between 60 and 64 years	280.6	335.9	376.0	336.6
- 65 years and older	1874.2	2185.5	3072.5	3447.0
for information:				
- number of disabled persons	218.3	223.7	203.0	190.5
- total number of pensioners including disabled persons	2516.2	870.0	3747.6	4050.1

Table 3 - 6 illustrates the pension eligibility ratio (the relationship between the number of pensioners and the corresponding demographic population) from various pension systems as well as by age group.

An increase in the overall eligibility ratio is observed in the long term, principally owing to the wage earner scheme. Nevertheless a slight drop is projected between 2005 and 2015 because of the pension reform that came into effect on 1 July 1997 (see chapter 3.1) and for which the transition period will end in 2009. Notably, the reform delays the take-up of pensions for many women aged between 60 and 64 years (reduction in the eligibility rate between 60 and 64 years).

**Table 3 - 6 Coverage rate by scheme or by age group**

	2005	2015	2030	2050
Coverage rate (without disabled persons) (a)	77.5	76.7	86.0	90.4
Decomposition by scheme (b):				
retirement and survivors:	73.7	72.3	82.2	87.2
- wage earner scheme	49.2	48.4	56.3	60.4
- self-employed scheme	9.1	8.7	10.1	10.9
- civil servants scheme	13.8	13.7	14.5	14.7
- assistance scheme	1.7	1.4	1.3	1.2
early retirement	3.8	4.4	3.8	3.2
Decomposition by age group:				
- less than 54 years (c)	7.7	4.7	4.0	2.7
- between 55 and 59 years	13.3	11.7	10.3	8.8
- between 60 and 64 years	56.0	50.4	52.6	52.2
- 65 years and older	104.1	107.2	112.7	116.5

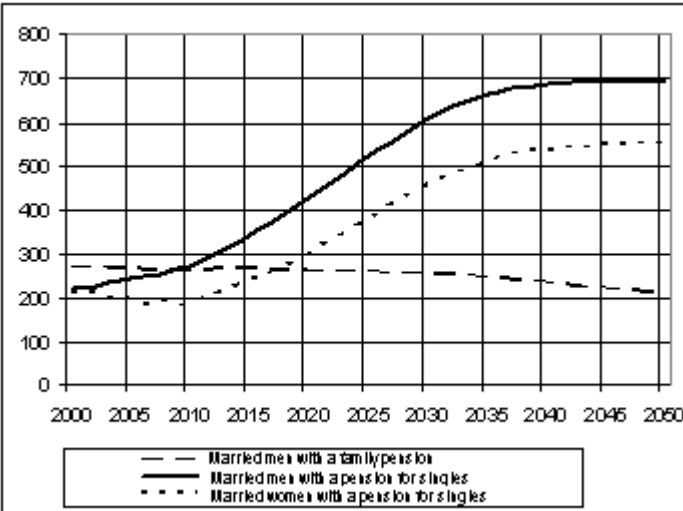
a. in % of population aged 55 years and older

b. in % of population aged 55 years and older

c. in % of population aged between 50 and 54 years

The increase in the eligibility rate is principally due to the growing economic activity of women. As a consequence, the model of a married couple with only one income has been increasingly replaced by a couple with two incomes. When the spouses take up their pension (in the wage earners and self-employed pension scheme, see chapter 2.1. and 2.2.), they either choose to each take up their own retirement pension at the single person's rate of 60%, or they take the family pension (75%) if the woman did not work or did not work for long enough to be better off with two single pensions. In the future, women will have longer and better-paid careers and they will therefore take up increasingly often their own retirement pension at the single person's rate of 60%. The graph below illustrates this split of the family pension to two pensions at the single person's rate. The consequence of this split is that the number of pensioners will increase strongly, without, however, doubling pension expenditure as women still do not have the same careers as men.

**Graph 3 - 2 Number of pensioners from the wage earner scheme by category of pension**

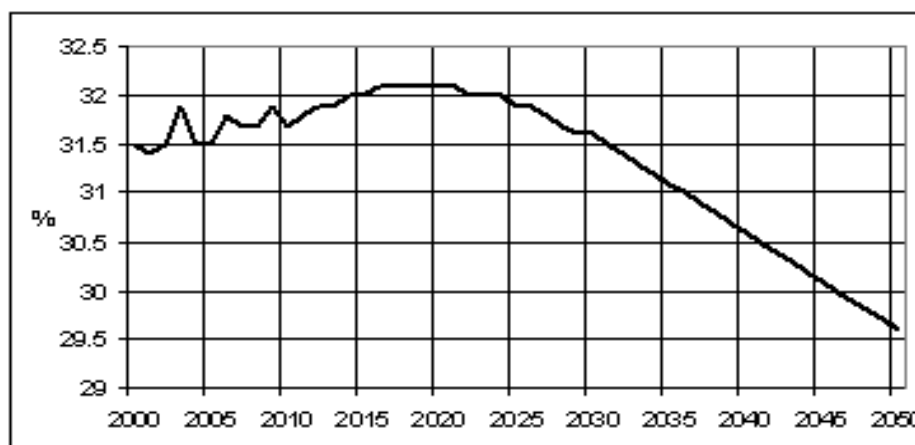


**3.5.1.2 Benefit ratio**

The benefit ratio represents the average pension as it relates to the average gross wage.

After a positive contribution for the first ten years of the projection, the benefit ratio has a negative long term influence on the growth of pension expenditures. In order to better explain this evolution, it is interesting to study more closely the evolution of the benefit ratio in the wage earner scheme, for which pension expenditure is the greatest.

**Graph 3 - 3 Benefit ratio in the wage earner scheme**



Fluctuations of the benefit ratio in the first decade are due to consecutive selective welfare adjustments. After 2010 the benefit ratio goes up, following the introduction (by hypothesis) of a general welfare adjustment (disconnected from wage growth by 1.25%). Once “cruising speed” is attained, the benefit ratio decreases due to the following factors:

- The existence of a wage ceiling in the pension calculation (see section 5.2.1.). Between 1982 and 1998, this wage ceiling was only adapted to the CPI (no change in real terms). Since 1999 and during the period of the projection, it has been linked again to the increase in conventional wages. In the beginning of the projection period, this adaptation of the wage ceiling will hardly influence the average pension amount because the fixed wage ceiling of the past will be included in the pension amount of new generations of pensioners.
- Adaptation of the wage ceiling is disconnected from wage growth by 0.5% to take into account the wage-drift (see Table 5-1 in section 5.4.2.4.). Because of the slower evolution of the adaptation of the wage ceiling compared to wage growth, a growing part of wage earners (from 18% to 35% of men and from 7% to 17% of women between 2005 and 2050) will attain the wage ceiling, by which their pension will be levelled off.
- A welfare adjustment of pensions below the increase in wages during the projection (disconnected from wage growth by 1.25%; see Table 5-1, section 5.4.2.4.). This implies that pensions only partially follow wage growth. Furthermore, the increasing part of the oldest pensioners entails an even stronger reduction in the average pension compared to the average wage. In effect the benefit ratio reduces as a person ages because of the partial welfare adjustment.
- Moreover, with the split of the family pension, the total amount of the pensions in a household with two incomes is not much higher than one family pension but it entails a reduction in the average pension per pensioner.

### **3.5.2 The budgetary cost of ageing**

This section summarizes the evolution of all social expenditures taken into account in the AWG projection including both the expenditures estimated by national models (pension expenditures) and those estimated by the AWG (health expenditure, unemployment and education).

It should be noted that there are other types of social expenditures, some of which clearly related to age, which have not been taken into account in the AWG projection: for Belgium, they include family and disability allowances, benefits for maternity, occupational disease, work injuries, subsistence protection, etc.

The evolution of these other social expenditures is taken into account in the national official evaluations of the cost of ageing.

**Table 3 - 7 The budgetary cost of ageing in percent of GDP**

	2005	2010	2030	2050	2050-2005
Pensions	10.4	10.5	14.7	15.5	5.1
- early retirement	0.4	0.5	0.5	0.4	-0.0
- disability	0.8	0.8	0.7	0.7	-0.1
Acute health care	6.2 <sup>a</sup>	6.4	7.1	7.6	1.4 <sup>b</sup>
Long term care	0.9 <sup>c</sup>	0.9	1.3	1.8	0.9 <sup>d</sup>
Unemployment	2.23	2.03	1.77	1.76	-0.47
Education	5.56	5.24	5.00	4.95	-0.61
Total	26.49	26.37	31.07	32.71	6.22

a. 2004

b. 2050-2004

c. 2004

d. 2050-2004

### 3.6 AWG sensitivity tests

A number of sensitivity analyses, or sensitivity tests, were requested by the AWG. These sensitivity tests imply changing only one parameter at a time with respect to the baseline, in order to evaluate the effect of this change on pension expenditures (including disability and pre-pension benefits). The nature of the parameter is either demographic, macroeconomic or socioeconomic.

#### 3.6.1 The scenarios behind the 7 AWG sensitivity tests

The demographic sensitivity test includes an increase in life expectancy at birth of 1.5 years for men and of 1.14 years for women by 2050.

The macroeconomic sensitivity tests reflect changes in labour productivity and in the long term interest rate. With respect to labour productivity, its rate of growth has lowered/increased gradually over the period 2005-2015, so as to reach 0.25 percentage points below/above its baseline growth rate. This rate is kept constant up to 2050. The interest rate level in the sensitivity tests is either 4% or 2%, thus providing an upper or lower bound to the baseline interest rate of 3%.

The AWG requested two sensitivity scenarios for employment rate increase. In the first scenario, the overall employment rate rises while labour supply remains unchanged. The rise in the employment rate is brought about exclusively by a fall in the unemployment rate. The employment rate rises progressively as of 2005 and attains in 2015 at 1 percentage point above its baseline level. In the second scenario, the employment rate of the 55 to 64 years age group rises by 5 percentage-points with respect to its baseline level (through a matching rise in the labour force). This rise occurs gradually, over the 2005-2015 period.

#### 3.6.2 Results of the 7 AWG sensitivity tests

Table 3 - 8 shows how pension expenditures, expressed in percent of GDP, changes between 2004 and 2050, for each sensitivity test and pension type.

Table 3 - 9 provides results for overall pension expenditures in percent of GDP and for all sensitivity tests, over various sub-periods.

**Table 3 - 8 Effect on pensions in percent of GDP, between 2004 and 2050, by sensitivity test and by pension type**

	baseline	higher life expectancy	higher labour prod.	lower labour prod.	higher interest rate	lower interest rate	higher employment rate	higher employment rate of older workers
Old age security pensions (survivors pensions included)	5.3	5.9	4.9	5.7	5.3	5.3	5.1	5.1
- wage earner scheme	3.5	3.9	3.2	3.9	3.5	3.5	3.5	3.4
- self employed scheme	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3
- civil servants scheme (incl. disability and public enterprises)	1.4	1.6	1.4	1.4	1.4	1.4	1.4	1.4
- assistance scheme	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
Early retirement due to market labor reason (wage earner scheme)	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1
Disability (wage earner and self employed schemes)	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2
Total	5.1	5.7	4.7	5.5	5.1	5.1	4.9	4.8

**Table 3 - 9 Effect on pension expenditures in percent of GDP for all sensitivity tests, in selected subperiods**

	2050-2004	2015-2004	2030-2015	2050-2030
Baseline	5.1	0.6	3.6	0.9
Sensitivity analyses:				
- higher life expectancy	5.7	0.7	3.7	1.3
- higher labour productivity	4.7	0.6	3.4	0.7
- lower labour productivity	5.5	0.7	3.7	1.1
- higher interest rate	5.1	0.6	3.6	0.9
- lower interest rate	5.1	0.6	3.6	0.9
- higher employment rate	4.9	0.5	3.5	0.9
- higher employment of older workers	4.8	0.5	3.4	0.9

The main effect of the higher life expectancy sensitivity test is to increase the number of persons aged 65 or older and thus also the total number of pensioners which explains the rise in pension expenditure.

The increases (reductions) in productivity growth have direct effects on the growth rate of wages and GDP throughout the projection period. With unchanged numbers of beneficiaries and higher (lower) wages, pension expenditure relative to GDP declines (increases) in comparison with the baseline.

The two interest rate sensitivity tests only affect the capital estimates for the Ageing Fund, not the projected pension expenditure. A rise (fall) in the interest rate increases (diminishes) the capital income that accrues to the Ageing Fund and increases (decreases) the total capitalisation of the Fund.

The two sensitivity tests in which the employment rate is raised have negative effects on the rise in pension expenditure between 2004 and 2050, even through this effect is relatively limited.

## Annex 1: Data sources of socioeconomic projection of the Maltese model

The 5 major socio-economic groups that are identified in the Maltese model are the school population, the potentially active population (further subdivided into employment by professional status, unemployment, early retirement and full-time career break), the disabled population, the pensioners and the other inactive people not directly in receipt of any social security benefit (in short, “other inactive”; calculated as a balance, given the demographic population).

Data for the different relevant socio-economic groups come from administrative records issued from the various competent social security organisations (see Table 3 - 10). In contrast to this approach, groups may alternatively be based on a single source (like the Eurostat Labour Force Survey, LFS in short) that allows classifying people uniquely according to principal group. However, all types of social security beneficiaries and socio-economic categories are not readily discernible in these survey data.

All the data are collected by gender and age groups of 5 years, sometimes even per age year.

**Table 3 - 10 Maltese model: sources of data of the whole socio-economic projection**

Socio-economic groups	Sources of data	Remarks
School population	Labour Force Survey, NIS of Belgium	
Potentially active population, of which		
- full-time career breaks	National Employment Office	
- early retirement	National Employment Office	
- older unemployed exempt from job search requirements	National Employment Office	Beware: the definitions differ from those used in the LFS and by the AWG
- unemployed people seeking work	National Employment Office	Beware: the definitions differ from those used in the LFS and by the AWG
- employment: wage earners	National Accounts and Crossroads Bank for Social Security for the breakup by sex and age groups	Beware: the definitions differ from those used in the LFS and by the AWG
- employment: self-employed persons	National Accounts and Crossroads Bank for Social Security for the breakup by sex and age groups	Beware: the definitions differ from those used in the LFS and by the AWG
- civil servants (with a distinction between statutory and non statutory)	National Accounts and Crossroads Bank for Social Security for the breakup by sex and age groups	
<hr/>		
Disabled population :		
- wage earner scheme	National Institute for Disability and Sickness Insurance	
- self-employed scheme	National Institute for Disability and Sickness Insurance	
<hr/>		
Pension beneficiaries:		
- wage earner scheme by category	National Office for Pensions	
details about the career	sample from the National Office for Pensions	
- self-employed scheme by category	National Office for Pensions	
details about the career	National Institute for the Social Security of the Self-Employed	
- civil servants scheme by category	Pension Administration Office	
details about the career	Pension Administration Office	
<hr/>		
Guaranteed income for elder people	National Office for Pensions	
<hr/>		
Other inactive	calculated as a balance, given the demographic projection	

## Annex 2: Integration of the socioeconomic AWG projection in the Belgian Maltese model

The employment and unemployment evolutions proposed by the AWG have been taken into consideration.

Nevertheless, the FPB model uses an administrative concept of employment and unemployment, and this administrative concept is also taken into consideration for defining the other socioeconomic categories of the model. These concepts are different from the (un)employment concepts used by the AWG projection, namely the concepts of the Labour Force Survey (hereafter named survey or AWG concept).

### Employment

As far as employment is concerned, the evolution of the employment rate is forecast according to sex and age categories following the evolutions of employment rates proposed by the AWG, that is to say:

$$TEADM_{c,s,t} = TEADM_{c,s,t-1} + (TEWGA_{c,s,t} - TEWGA_{c,s,t-1})$$

where:

TEADM stands for the employment rate as an administrative concept;

TEWGA stands for the employment rate as an AWG concept;

c stands for the age category (15-19 to 55-59 and 65-71 years<sup>23</sup>);

s stands for sex.

### Unemployment

As far as unemployment is concerned, the same principle has been applied, but the exercise has been limited to inferior and mid-range age categories (up to the category 35-39 years old), that is to say:

$$TUPADM_{c,s,t} = TUPADM_{c,s,t-1} + (TUPWGA_{c,s,t} - TUPWGA_{c,s,t-1})$$

where:

TUPADM stands for the unemployment rate (in percentage of the population) as an administrative concept;

TUPWGA stands for the unemployment rate (in percentage of the population) as an AWG concept;

c stands for age categories from 15-19 to 35-39 years.

The activity evolution proposed by the AWG are such that, once applied to superior age categories, the methodology mentioned above leads to contradictions in the distribution of participation rates by age category or to demographic impossibilities. The desirable distribution of participation rates by age category is the same as the AWG distribution, namely converging participation rates for the age categories between 35-39 and 45-49 years to the highest level of the distribution by age, and, afterwards, a decreasing participation rate according to age. The demographic impossibilities mean that the sum of the participation rate, early retirement rate (pension rate) and disability rate exceeds 100%.

Therefore, as from the 40-44 age category, two unemployment notions are defined: the AWG unemployment and the residual unemployment (by sex and age category), which is the difference observed in 2003 between the AWG unemployment rate and the administrative unemployment rate:

$$TUPRES_{c,s,2003} = TUPADM_{c,s,2003} - TUPWGA_{c,s,2003}$$

where:

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<sup>23</sup> For the 60-64 age group, it is mainly the attitude towards early retirement that drives the evolution of employment (see below).

TUPRES stands for the residual unemployment rate (as a percentage of the population); c stands for the age category, from 40-44 to 55-59 years<sup>24</sup>.

In projection, the AWG unemployment rate follows the imposed profile. The residual unemployment rate is calibrated so as to match the desired distribution of participation rates and the demographic constraint, considering the socio-economic projection of the other “inactive” socio-economic groups (mainly the disabled and the early retired or prepensioners, see below).

In the context of increasing participation rates considered by the AWG, the AWG unemployment and the administrative unemployment do not have a parallel evolution in the higher age categories.

### **Others assumptions**

In addition to the hypotheses mentioned above, the socio-economic projection is also based on the following hypotheses:

#### **Distribution of the employment by scheme**

Self-employment follows the evolution of the active population (same growth rate), as does the number of civil servants (excluding employment in teaching sector). Employment in the teaching sector follows the evolution of the school population. The wage earner employment is calculated as a balance.

#### **Distribution of the employment by sex inside each scheme**

The number of females employed in each scheme is determined following the same methodology as for global employment by scheme: the evolution of self-employment and administration runs parallel to the female active population, employment in the teaching sector follows the evolution of the school population and the figure for wage earner employment is the balance. Male employment by scheme is also obtained as a balance.

#### **Employment per scheme for the 55-59 age category and employment per scheme at 59**

The evolution of employment per scheme for the 55-59 age group follows the same logic as the evolution of the total employment (or the evolution of the female employment).

At 59, the self-employment rate and the employment rate among civil servants follow the evolution of the employment rate of the 55-59 age category in each of those schemes. The total employment figure (by sex) at 59 years is drawn from the projection of the AWG, whereas that for wage earner employment at 59 is calculated as a balance.

#### **Older unemployed exempt from job search requirements**

For people aged 58 years and above, we suppose that the share of the older unemployed in administrative unemployment remains constant. Between 50 and 57 years, their share decreases gradually, following the first observed impacts of the reform of this system. For its residual component (exceeding the unemployment as understood in the Labour Force Survey), the administrative unemployment decreases in parallel with the activity increase scenario proposed by the AWG.

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<sup>24</sup> For the 60-64 age category, the evolution of unemployment is determined by the logic of early retirements.



## Annex 3: Projection of the number of pensioners (including pre-pensioners and disabled persons)

### a. Number of pensioners

The fundamental principle of this model is to let the existing number of pensioners get old and to check for the entries of new pensioners based on recent entry behaviour (entry probabilities calculated on the basis of the latest observations).

The numbers of pensioners in the legal old age and survivors pension schemes are calculated as follows:

$$P_{s,r,c,i,t} = P_{s,r,c,i-1,t-1} - PD_{s,r,c,i-1,t-1} + NP_{s,r,c,i,t} +/- FP_{s,r,c,i,t}$$

where:

- P is the number of pensioners;
- PD is the number of deceased pensioners;
- NP stands for pension entries;
- FP is the flow of pensioners going to (-) or coming from (+) another category;
- i is the age;
- r is the scheme;
- c is the type of pension;
- s stands for sex.

### Entries in the old age pension scheme

The legal retirement age in Belgium is 65 years. Nevertheless, it is possible, under certain conditions, to retire early as from the age of 60. Entries in the old age pension scheme are defined for each type of scheme.

Entries from 60 to 65 years are calculated following the access probabilities to old age pension coming from the different socio-economic groups within a scheme, i.e. :

$$NP_{s,r,RET,i,t} = \sum_{cs \in r} TEP_{s,cs,RET,,i-1,t-1} \cdot CS_{s,i,t} \cdot (1 - V_{s,i-1,t-1})$$

where:

- $NP_{RET}$  stands for entries in the old age pension scheme;
- $TEP_{cs,RET}$  stands for the probability of access to old age pension based on socio-economic group 'cs';
- CS (cs) is the number (or index) of a socio-economic group;
- V stands for the survival rate;
- i is the age (from 60 to 65);

Those probabilities are generally constant in projection. However they are adjusted in order to respect a global constraint. This constraint rests on the cumulated entry rate (between 60 and 65 years) of a generation in the old age pension system. This rate remains constant in projection. In other words, the ratio between the number of beneficiaries of an old age pension at 65 years and the number of persons pertaining to one of the three schemes at 59 years, i.e. 6 years before, is constant (with a correction for the evolution of mortality).

### Entries in the survivors pension scheme

Before the age of 60, the evolution of the number of women in the survivors pension scheme depends, on the one hand, on the evolution of the number of deceased married men who were in work or benefited from a social transfer within the scheme, and, on the other hand, on the evolution of the female participation rate.

From the age of 60 onwards, the number of new female pensioners in the survivors scheme is determined by the number of deceased (married) male pensioners in the scheme in question.

### **b. Number of early retirees: pre-pensioners**

The number of pre-pensioners from the age of 50 is determined as follows:

$$\text{PREP}_{s,i,t} = \text{PREP}_{s,i-1,t-1} \cdot (1 - V_{s,i-1,t-1}) + \text{NPREP}_{i,t}$$

where:

PREP is the number of pre-pensioners ;  
 NPREP stands for entries in the pre-pension system;  
 i stands for age, i.e. from 50 to 64 years;  
 s stands for sex.

Entries in the pre-pension system are calculated on the basis of an entry probability by age and by sex based on the number of wage earners. In a context of increasing activity and employment, this probability, starting from the latest observed value (2003), progressively tends to its 2001 value, i.e. at a time when entries in pre-pension were at a low level due to the favourable economic situation:

$$\text{NPREP}_{s,i,t} = \text{ESAL}_{s,i-1,t-1} \cdot [\text{TEPREP}_{s,i,2001} + (\text{TEPREP}_{s,i,2003} - \text{TEPREP}_{s,i,2001}) \cdot 0,95^{t-2003}]$$

where:

ESAL stands for the number of wage earners;  
 TEPREP is the prepension entry rate, namely  $\text{NPREP}_{i,t} / \text{ESAL}_{i-1,t-1}$ .

### **c. Number of disabled**

The general methodology implies that the shares of disabled persons per sex and age category in the demographic population (disability rates) are calculated using the principle of cohorts. In those cases, the entry probabilities in the disability benefit system are calculated from the potential active population. The number of disabled persons by age category and sex are then calculated by applying those rates to the demographic projection. The distribution of the number of disabled persons over the wage earner scheme and the self-employed scheme is carried out proportionally to the number of workers in the concerned scheme.

However, the methodology is different for the higher age groups (from 40-44 years) because of the demographic constraint and of the AWG activity projection. The disability rate of an age category is based on the disability rate of the lower age category during the previous year, increased by the difference between the disability rates of those two age categories that progress in parallel with the early retirement rate (residual unemployment and, possibly, prepension):

$$\text{TINV}_{c,t} = \text{TINV}_{c-1,t-1} + (\text{TINV}_{c,t-1} - \text{TINV}_{c-1,t-1}) \cdot (\text{TRET}_{c,t} / \text{TRET}_{c,t-1})$$

where:

TINV is the disability rate in the wage earner scheme (in % of the total number of wage earners) ;  
 TRET is the early retirement rate (residual unemployment and, possibly, prepension) in the wage earner scheme (in % of the total number of wage earners);  
 c is the age category (from 40-44 years).

## 4. The Czech Republic

Ales Krejdl, Ministry of Finance

### 4.1 Key characteristics of the pension system

#### 4.1.1 Main features of the pension system

The pension system consists of two pillars – a mandatory PAYG state system with defined benefits and voluntary fully funded private system with defined contributions. There is no occupational pension scheme (usually referred to as the second pillar) in the Czech pension system.

##### Mandatory PAYG state system

The first pillar is a mandatory basic pension insurance scheme, based on the pay-as-you-go financing and defined benefits (DB). It covers all economically active persons and it does not contain any special pension scheme for any economic sector. The only exceptions are so-called armed forces (e.g. soldiers, policemen, custom officers, fire-fighters), whose pension insurance is administered by the particular ministries in charge. All others are administered by Czech Social Security Administration.

The basic pension insurance covers the whole population regardless of the actual economic activity of a person. A wide range of so-called non-contributory periods allows gaining pension entitlement at the time of person's non-activity at the labour market (one does not have any income from which the contribution is derived). So the system does not exclude those, whose career has been interrupted for many reasons. There are following non-contributory periods:

Study period– high school or college/university studies from 18 years of age. A person can have up to 6 years of this non-contributory period at the most.

- Unemployment period while a person is in the evidence of the employment office and while he/she is eligible for unemployment benefits plus 3 years without eligibility for unemployment benefits at the most.
- Childcare period is accepted up to a child's age of 4 years. This period is acceptable for both parents, but not at the same time.
- Period of care for a disabled and care of old relatives aged 80 and higher.
- Military service.

Besides the solidarity of economically active persons with non-active ones, there is another type of solidarity within a generation – income solidarity. This solidarity is achieved through the formulae used to calculate pension benefits. It leads to higher replacement rates for lower-income persons compared to those with higher income. It prevents certain population groups from falling into poverty.

Main and the only source of income of the state pension system are pension insurance contributions. Currently the contribution rate amounts to 28 % of the gross income.<sup>25</sup> This contribution rate is aggregate<sup>26</sup> and is not distributed among particular subsystems of pension insurance.

Self-employed pay the same contribution rate. However, their calculation base represents 50 % of the difference between incomes and expenses, but the base must amount to at least a half of the average gross monthly wage in the national economy.<sup>27</sup>

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<sup>25</sup> Contributions are partly paid by employee (6,5 %) and partly by employer (21,5 %).

<sup>26</sup> There are no special rates for different pension benefits.

<sup>27</sup> The calculation base has been gradually rising from 35 % of the difference between incomes and expenses in 2003 up to 50 %, which will be reached by 2006.

The state pension system covers three main benefits – old-age pension, disability pension and survivor’s pensions:

(1) To be entitled to an **old age pension** a person has to reach an insurance period of at least 25 years and a retirement age specified by a law; or at least 15 years of insurance and the age of 65. Non-contributory periods are also included in the insurance period. Additional working activity, while receiving the old age pension after the statutory retirement age, is allowed under a condition that working contract lasts one year at the most<sup>28</sup>.

A person can retire up to 3 years prior the statutory retirement age if he/she has at least 25 years of insurance period; but he/she obtains permanently reduced early old age pension. Retirement in ages higher than the statutory retirement age is awarded by additional bonuses.

(2) **Disability pensions** occur in two forms. (i) Full disability – when a person has experienced a decline in his/her working capacity of at least 66 %; (ii) partial disability – a decline of at least 33 %. The required insurance period is at least 5 years<sup>29</sup> (it is derived from the ten year period prior to the occurrence of disability).

Disability pension usually belongs to a person until he/she reaches entitlement for the old age pension.<sup>30</sup> Subsequently a person is transferred from the disability pension scheme to the old age pension scheme.

(3) **Survivor’s pensions** are paid out to a widow/widower or an orphan (dependent child) if a deceased person has met conditions for eligibility for the old age or disability pension or he/she died due to job-relating injury. After one year of receiving the survivor’s pension, the widow/widower must meet other conditions stipulated by the law, otherwise the entitlement lapses (the entitlement continues when the widow/widower cares for a dependent child or disabled child, parents or relatives aged 80 and higher; or when a widow/widower is disabled or he/she has reached the age 58). The entitlement is also renewed when at least one of these conditions is met within 5 year from the last entitlement termination. Orphan’s entitlement to survivor’s pension lasts until he/she is dependant but not beyond the age of 26.

#### Voluntary fully funded private system

This pillar (known as the third pillar) is voluntary, supplementary, fully funded and state-subsidized pension scheme based on defined contribution (DC). It also includes life insurance as a product of commercial insurance companies. The insurance can be contracted by any Czech or other EU citizen aged 18 and over, who participates in the state pension system or the public health insurance scheme in the Czech Republic. Besides the state subsidy any employer can support his employees with additional contribution to employee’s fund. Both, employer’s and employee’s contributions are subject to additional tax allowances.

### 4.1.2 Recent reforms

Since 1989 onwards the pension system has undergone many reforms, many of which were taken soon after the political changes. For example:

- All economically active persons started to acquire future pension entitlements due to removing the discrimination of self-employed persons. The pension system became uniform in the sense of entitlements.
- Administration of the pension insurance and the sickness insurance merged in the Czech Social Security Administration.
- Rules for pension indexation were introduced.
- Pension contributions were established. These contributions became revenue of the state budget.

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<sup>28</sup> After that year the contract can be renewed, but again for one year only.

<sup>29</sup> Applies for persons above the age 28. Younger people are required to reach shorter insurance period.

<sup>30</sup> Respectively, until he/she reaches the retirement age qualified by the law.

- In 1994 the Act on the State-subsidized Supplementary Pension Insurance Schemes<sup>31</sup> was passed introducing the two-pillar pension system.
- In 1995 the new act on Pension insurance<sup>32</sup>, with effect from the year 1996, was approved. It brought several important measures: gradual rise in retirement age; wage development was taken into the consideration in the assessment of the pension level; equal treatment of men and women in pension entitlements, especially in survivor's pensions.

After 1995 some more measures were taken to stabilize the current pension system:

- Revenues and expenditure of the state pension system were detached from the state budget, however only in accounting sense – revenues and expenditure are still a part of the state budget but possible excess of revenues over expenditures cannot be used to finance other spending. The accounting separation has allowed monitoring the balance of the pension system and using the possible assets to increase benefits or to cover pension deficits only.
- Solidarity with non-active people was decreased by restrictions in the crediting of non-contributory periods.
- The third pillar was encouraged by an amendment of State-subsidized Supplementary Pension Insurance Act, strengthening the safety (more stringent conditions set for the pension plans) and encouraging private deposits (introducing tax allowances for participants, an increase in the state contribution).
- It has been decided on gradual increase of the minimum calculation base for pension contributions paid by self-employed persons.
- Indexation became regular, taking place in January every year. Its rules became also stricter. Decision about the indexation is based upon final statistics and not upon estimates of key indicators only (as was the case before). It is allowed to make an exceptional indexation (not at regular date) in case of substantial price increase.<sup>33</sup>

Recent measures – since 2003

- Increase in retirement age has been prolonged so that the age limit will reach 63 years for men and childless women. The age limit remains differentiated for women according to number of their children<sup>34</sup> (see following graph).
- Conditions for the early retirement became stricter. There used to be two types of early retirement schemes: (i) Early retirement for labour market reasons with a temporarily reduced old age pension – a person receives the reduced pension until he/she reaches the retirement age, then he/she receives the regular pension. This scheme was cancelled; (ii) early retirement with a permanently reduced old age pension – a person receives reduced pension all the time. This option was preserved.
- An additional working activity, while receiving the old age pension, was made easier by abolishing some conditions that had to be met (e.g. formerly a retired person could work only for two years from his/her retirement in case that his/her income did not exceed an income limit set by the law). Now the only condition is, that a working contract can last one year at the most.<sup>4</sup>

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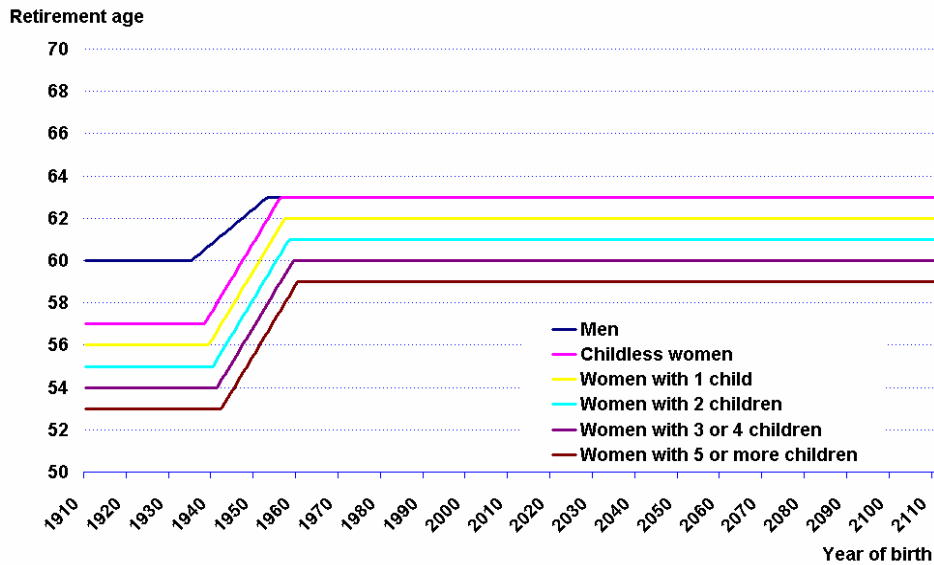
<sup>31</sup> Act No. 42/1994, on State-subsidized Supplementary Pension Insurance Schemes.

<sup>32</sup> Act No. 155/1995, on Pension Insurance.

<sup>33</sup> If the aggregate consumer price index rises by at least 5 % since the last indexation took place.

<sup>34</sup> The retirement age is different for men and women and for both is rising gradually – 2 months per year for men and 4 months per year for women – up to the age of 63 for men and childless women and up to 59-62 for women (it differs according to number of children: 1, 2, 3 or 4 and 5 and more).

Graph 4 - 1 Retirement age by the year of birth



#### 4.1.3 Basis for pension calculations

The basic act that determines calculation of pension benefits is the Pension Insurance Act (No. 155/1995). Pensions<sup>35</sup> consist of two main parts:

- **Flat rate component** is the same for all pensions regardless of the insurance period acquired and earnings achieved.
- **Earnings related component** derived from the insurance period and earnings achieved. It is calculated as a percentage of personal calculation base, which takes into consideration person's income up to 30 years<sup>36</sup> prior his/her retirement.

Pensions from the state pension system are neither income tested nor means tested, except for the early old age pensions and partial disability pensions.

Minimum amount of a pension is set by both the flat rate component (which is the same for everyone) and the minimum earnings related component. Another instrument that also prevents people from the poverty is the institute of the subsistence level.<sup>37</sup> Both these instruments are set by the government and are revaluated on irregular basis.

Pension indexation proceeds on a regular basis (every January) as mentioned above. Indexation decision is made by the government, but the minimum amount is guaranteed by the law. The minimum set by the law represents an inflation growth (measured by the aggregate consumer price index) plus at least a third of the growth in real average wage.<sup>38</sup>

The basic elements for calculation of the pension (for persons that reach the entitlement for a relevant pension) are the following:

<sup>35</sup> Concerning old age pension, disability pensions and also survivor's pensions.

<sup>36</sup> But it goes back to the year 1986 at the most. So the period used for calculation the assessment base is lengthening. The 30-year period will be achieved in 2015.

<sup>37</sup> A person whose income is lower than the subsistence level has a claim for social support benefits.

<sup>38</sup> Using statistics of the Czech Statistical Office.

### Old age pension

**Flat rate component** is currently CZK 1400 per month and is the same for all pensioners.

**Earnings related component** amounts to 1.5 % of person's calculation base for every completed year of acquired insurance period. Minimal earnings related component is now CZK 770 per month; maximal amount is not determined.

When a person retires later, he is awarded by a bonus: 1.5 % of person's calculation base for every additional completed 90 calendar days.

Early retirements<sup>39</sup> are subject to penalization, which is 0.9 % of person's calculation base for every period of 90 calendar days before the statutory retirement age. But resulting earnings related component must not be lower than CZK 770.

### Disability pensions

**Flat rate component** is the same as in case of the old age pension.

**Earnings related component** is calculated similarly as in case of old age pension.

It amounts to 1.5 % for fully disabled and 0.75 % for partially disabled persons of their calculation base for every completed year of acquired insurance period.

The only difference is in the acquired insurance period, because some people may become disabled before he/she reaches the necessary insurance period. For this purpose it is presumed, that a disabled person has already reached the retirement age. Then total insurance period = insurance period really acquired until he/she became disabled + insurance period he/she would acquire if he/she worked since the disability occurred until the retirement age.<sup>40</sup>

If a person becomes disabled before his/her age of 18, earnings related component amounts to 45 % of calculation base.<sup>16</sup>

### Survivor's pensions

1) Widow's/widower's pension

**Flat rate component** is the same as in case of the old age pension.

**Earnings related component** amounts to 50 % of earnings related component of a spouse's old age or full disability pension at the time he/she died; or of the spouse's partial disability pension if he/she did not acquired necessary insurance period for full disability pension or did not met conditions for the old age pension.

2) Orphan's pension

**Flat rate component** is the same as in case of the old age pension.

**Earnings related component** calculation is the same as in case of the widow's/widower's pension, but the rate is 40 % only (instead of 50 %).

3) Widow's/widower's/orphan's pension in concurrence with old-age/disability pension.

**Flat rate component** is the same as in case of an old age pension (however, the recipient receives flat rate component for one of the both pensions only).

**Earnings related component** consists of full earnings related component of the higher pension (be it old-age/disability pension or survivor's pension) and 50 % of earnings related component of the lower pension.

## **4.2 Description of the pension model of the Czech Ministry of Finance**

### **4.2.1 The pension model**

The pension model has been built in the Ministry of Finance, which maintains, updates and uses the model. The model is a semi-aggregated simulation model written and run under the GAMS application.

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<sup>39</sup> A person can retire 3 years prior the retirement age at the most.

<sup>40</sup> For this period of inactivity is used a general calculation base, which is determined by the government upon an average gross income.

It enables to make long-term projections and simulate the impact of changes in all the relevant parameters of the current system. Outputs of the model were used in convergence programmes and several reports.

#### **4.2.2 Sources of data**

Most data come from the Czech Social Security Administration, which is in charge of collecting social security contributions and disbursing all pension benefits. The model makes use of the information on:

- the number of pensions disaggregated by type of pension, age and gender
- the number of new pensions (by type of pension, age and sex),
- average pension (by type of pension, age and sex)
- average newly granted pension (by type of pension, age and sex)
- matrix of the number of new pensions (by type of pension) for a given combination of assessment basis (average earnings during the assessment period) and contribution period.

Apart from the above mentioned data running the model requires a population projection (disaggregated by single age and sex), assumption on the growth rate of an average wage, evolution of the parameters of the pension formulae and indexation rule.

#### **4.2.3 The structure of the model**

The model makes distinction among various pension benefits (old-age, disability and survivors'), sexes (males, females) and generations (the year of birth).

In accordance with the Czech legislation the model explicitly differentiates several types of pensions:

- Old-age pensions (including early retirement old-age pensions that can be granted up to three years prior to statutory retirement age)
- Full disability pensions (working capacity reduced by more than 66 % percent)
- Partial disability pensions (working capacity reduced by more than 33 % percent)
- Widow's/widower's pensions solo
- Widow's/widower's pensions in concurrence with other pensions (disability, old-age)
- Orphan's pensions

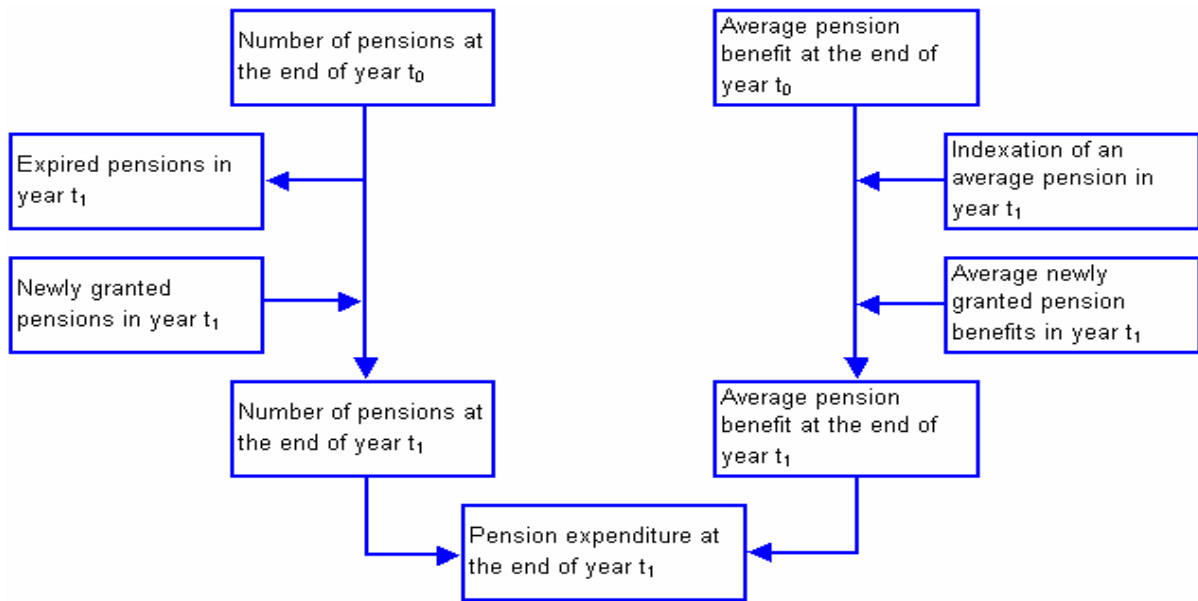
The distinction between males and females is important since males and females differ in their earnings profiles, length of their career and contribution periods. These differences result in different level of pension benefits. It is also important to apply cohort approach since the cohorts (generations) are not homogenous. Generations (identified by the year of birth) differ in some important characteristics, e.g. mortality rates (impacts for instance the number of survivors' pensions or the average lengths of receiving an old-age pension), disability rates (impacts the number of disability pensions) and affiliation with a generation is also decisive for determination of the statutory retirement age.

The model works with the number of pensions, not with the number of pensioners. The number of pensioners is somewhat lower than the number of pensions since some pensioners may be entitled to receive more (two) pension benefits. According to the Czech pension legislation recipients of disability or old-age pensions may under given conditions receive widow's /widower's pension at the same time. Thus, the number of pensioners can be obtained by subtracting the number of widow's /widower's pensions in concurrence with other pensions from the total number of pensions.

The model consists of three main building blocks. The first block calculates the number of pensions and flow of new pensions. The second one computes the level of new pension benefits. The third block combines the information on the stock and flow of pensions with the projection of new pension benefits, which gives the evolution of an average pension benefit and spending on all pension benefits in the projection horizon.



Graph 4 - 2 Simplified diagram of the model structure



### Block 1 – number of pensions

The number of pensions is calculated on the basis of the cohort methodology. The computation rests on the idea, that there is a certain probability that an individual of given age and sex and from given cohort retires, becomes disabled or becomes orphan/widow/widower. The approach can be illustrated on the example of (full) disability pensions.

The conditional probability ( $P$ ) of becoming disabled for a person of age  $a$  and sex  $s$  can be expressed on the basis of disability rates ( $DR$ ) as<sup>41</sup>:

$$P_t^{a,s} = \frac{DR_{t+1}^{a+1,s} - DR_t^{a,s}}{1 - DR_t^{a,s}} \quad (1)$$

Denoting a particular generation by a superscript  $g$  (where  $g = t - a$ ), the equation (1) can be rewritten as:

$$P_t^{g,s} = \frac{DR_{t+1}^{g,s} - DR_t^{g,s}}{1 - DR_t^{g,s}} \quad (1a)$$

The disability pensioner can change its status since he/she can stop receiving disability pension due to renewed working capacity or becoming entitled to old-age pension. After the statutory retirement age the recipient of disability pension can ask the Czech Social Security Administration to calculate his/her old-age pension and he/she will get the higher pension. As a result disability pensions almost disappear behind the statutory retirement age. The conditional probability that a person ceased to be disabled can be expressed as follows:

$$P_t^{a,s} = 1 - \frac{DR_{t+1}^{a+1,s}}{DR_t^{a,s}} \quad (2)$$

or

<sup>41</sup> Assuming an upper limit on disability rate equal to 1.0.

$$P_t^{g,s} = 1 - \frac{DR_{t+1}^{g,s}}{DR_t^{g,s}} \quad (2a)$$

The probabilities were calculated for full and partial disability pensions and old-age pensions in the years 2001-2003. Disability rate can then be projected on the basis of a three-year average exit/entry probability as:

$$DR_{t+1}^{g,s} = DR_t^{g,s} \cdot (1 - P_t^{g,s}) + P_t^{g,s} \quad (3)$$

Or in accordance with (2a):

$$DR_{t+1}^{g,s} = DR_t^{g,s} \cdot (1 - P_t^{g,s}) \quad (4)$$

In the case of old-age pensions the probabilities were also calculated on the basis of equations (1) and (2). However, the obtained probabilities were adjusted in order to reproduce the average new pension benefit in the year 2003. An average new pension benefit is weighted average of all new pensions granted in different ages (in the model up to three years prior to retirement age and up to three years after the retirement age) with weights given by the number of newly provided pensions. Application of non-adjusted probabilities would somewhat overestimate the average new pension benefit compared to 2003 data.

The number of disability pensions (*DPen*) in year *t* is determined as a product of the cohort size (*Pop*) and the sex and cohort specific disability rate (*DR*):

$$DPen_t = \sum_{g,s} DR_t^{g,s} \cdot Pop_t^{g,s} \quad (5)$$

The same approach has been applied to determine the number of partial disability pensions and old-age pensions.

Under the current legislation the statutory retirement age is gradually increased from the present 61 years for men and 57 for women with two children to 63 for men and 61 for the women with two children. Thus the model must take account of the rise in retirement age. It is done by splitting the probability profile for the given generation (*g*) in a convenient point (depending on the type of pension) and shifting it outwards by the difference between the statutory retirement age (*RA*) valid for the given generation *g* and the statutory retirement age for the generation reaching the statutory age in the base year (in 2003 generation of men born in 1942 has retirement age equal to 61 years, i.e.  $2003 = 1942 + 61$ , whereas the generation of women born in 1946 reached the statutory retirement age,  $2003 = 1946 + 57$ ).

$$P_{g+a+(RA^{g,m}-RA^{1942,m})}^{g,m} = P_{1942+a}^{1942,m} \quad (6a)$$

$$P_{g+a+(RA^{g,m}-RA^{1946,m})}^{g,f} = P_{1946+a}^{1946,f} \quad (6b)$$

Somewhat different approach from the one outlined in equations 1 to 5 has been used to calculate the number of survivors' pensions. The probability of receiving widow's/widower's pension (*P*) depends on the marital status, probability of spouse to die in a give year and compound probability of the couple to die within the same year. This can be formally expressed as:

$$P_t^{g,f} = (\varepsilon_t^{g,m} - \varepsilon_t^{g,m} \cdot \varepsilon_t^{g,f}) \cdot \frac{MPop_t^{g,f}}{Pop_t^{g,f}} \quad (7)$$

Superscript *f* and *m* denotes female and male population respectively,  $\varepsilon$  stands for mortality rate and *MPop* is the number of married population. The same relation holds for male. Since married couples are not necessarily of the same age,  $\varepsilon$  of the other sex should be viewed as an average mortality rate of the other sex around the given age  $a (= t - g)$ .

The number of widow's pensions ( $WPen$ ) can be derived from equation (7) and the assumption on the ratio of married population in a given starting age ( $a_0 = t_0 - g$ ). Before the age  $a_0$  an assumption was made (on the basis of fairly stable mortality rates) that the profile of widow's/widower's pension is the same as in the base year. The ratio of widow's pensions after age  $a_0$  (55 for women and 58 for men<sup>42</sup>) is calculated as follows:

$$\frac{WPen_t^{g,f}}{Pop_t^{g,f}} = \frac{WPen_{t-1}^{g,f}}{Pop_{t-1}^{g,f}} + \varepsilon_t^{g,m} \cdot \left( \frac{MPop_{t_0}^{g,f}}{Pop_{t_0}^{g,f}} - \frac{WPen_{t-1}^{g,f}}{Pop_{t-1}^{g,f}} \right) \quad (8)$$

The equation 8 is used to calculate the total number of widow's/widower's pension. It is further split into the solo pensions ( $WsPen$ ) and pensions in concurrence ( $WcPen$ ) with other pensions (old-age and disability) according to the probability that the person is a recipient of old-age or disability pensions, which is given by the fraction of population that receives old-age ( $OPen$ ) or disability pensions ( $DPen$ ).

$$WsPen_t^{g,s} = WsPen_t^{g,s} \cdot \left( 1 - \frac{OPen_t^{g,s} + DPen_t^{g,s}}{Pop_t^{g,s}} \right) \quad (9)$$

$$WcPen_t^{g,s} = WPen_t^{g,s} - WsPen_t^{g,s} \quad (10)$$

The number of orphan's pensions is projected simply on the basis of the existing profile (age and sex specific ratio of orphan's pensions to population) since mortality rates for those aged less than 26 are not subject to any major changes. With respect to their limited importance this seems to be a good approximation.

Graph 4 - 3, Graph 4 - 4, Graph 4 - 5 and Graph 4 - 6 show the cross-sectional profiles of old-age pensions, full disability pensions, partial disability pensions and widow's/widower's pensions. Graphs portray not only the result of cohort methodology but also the method used to model the gradual rise in the statutory retirement age. The rise in retirement age leads to the postponement of the retirement but at the same time the number of substitute pensions (full and partial disability pensions) increases since disability is related to age. Shift in the curve for the widow's/widower's pensions is driven by the falling mortality rates.

However, the rise in the number of disability pensions due to increase in retirement age means that the fraction of population retiring (due to old age) will shrink. The model assumes that the share of old-age pensioners in the residual population (population less the number of full disability pensions,  $Pop - DPen$ ) is kept in line with the profile for the generation reaching the statutory retirement age in the base year, for men that is:

$$\frac{OPen_{t+(g-1942)}^{g,m}}{Pop_{t+(g-1942)}^{g,m} - DPen_{t+(g-1942)}^{g,m}} = \frac{OPen_t^{1942,m}}{Pop_t^{1942,m} - DPen_t^{1942,m}} \quad (11)$$

The profile of old-age pensions is then adjusted by the shift in the disability profile:

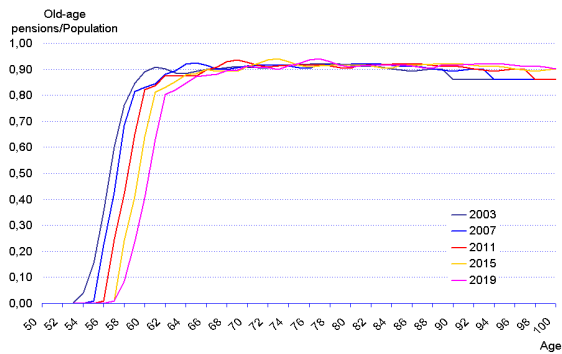
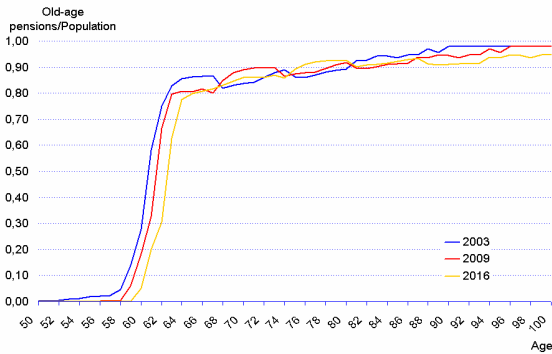
$$\left( \frac{OPen_{t+(g-1942)}^{g,m}}{Pop_{t+(g-1942)}^{g,m}} \right)^{adjusted} = \frac{OPen_{t+(g-1942)}^{g,m}}{Pop_{t+(g-1942)}^{g,m}} \cdot \frac{1 - DPen_{t+(g-1942)}^{g,m} / Pop_{t+(g-1942)}^{g,m}}{1 - DPen_t^{1942,m} / Pop_t^{1942,m}} \quad (12)$$

The following graphs show cross sectional profiles for years 2003, 2009 and 2016 for men and 2003, 2007, 2011, 2015, and 2019 for women. The years were not chosen randomly but they reflect the

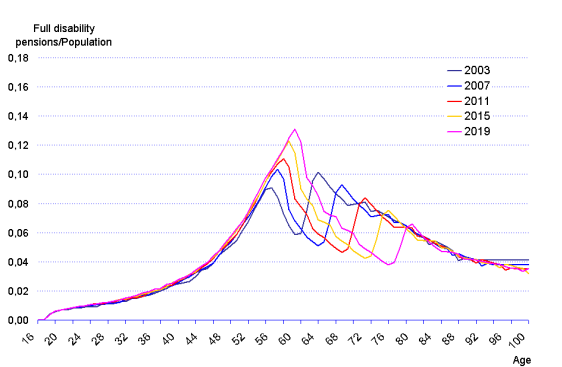
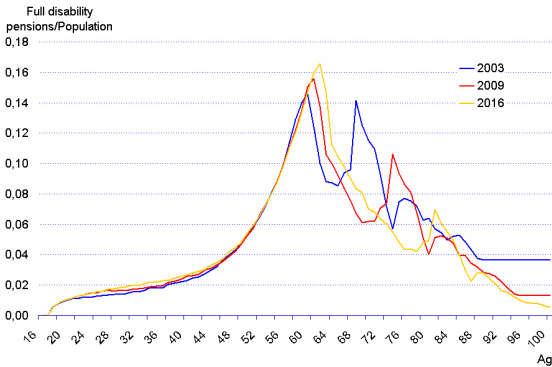
<sup>42</sup> After this age the entitlement for widow's/widower's pension is permanent (i.e. till the end of one's life) as opposed to the age before when the entitlement is only temporary (it lasts a year).

calendar year, in which the statutory retirement age increases by one additional year. It is apparent that the process takes longer for women despite the faster speed (rise by 2 months a year for men compared to 4 months for women). It is a result of the much higher increase in statutory age for women. Beyond 2016 and 2019 respectively the profile should be more or less stable (except for survivors' pensions where the profiles are shifted due to declining mortality rates). However, minor changes might result due to the applied cohort component approach.

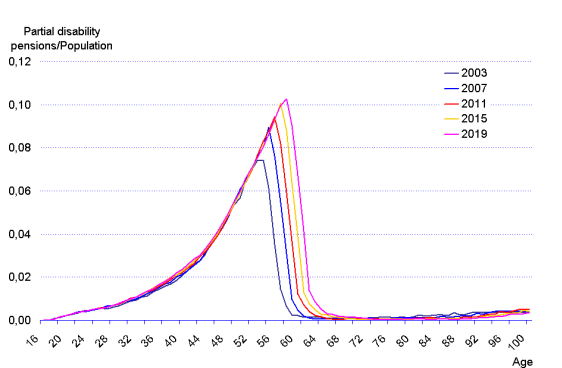
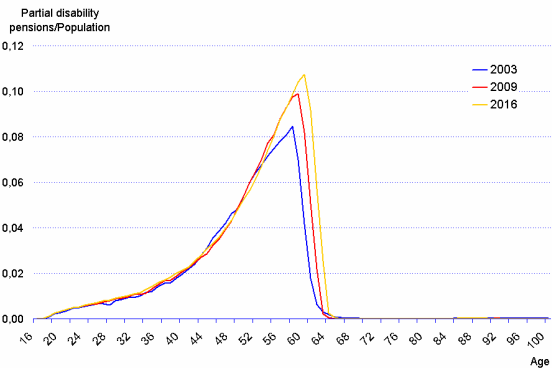
**Graph 4 - 3 Cross-sectional profiles of old-age pensions**  
 Male Female



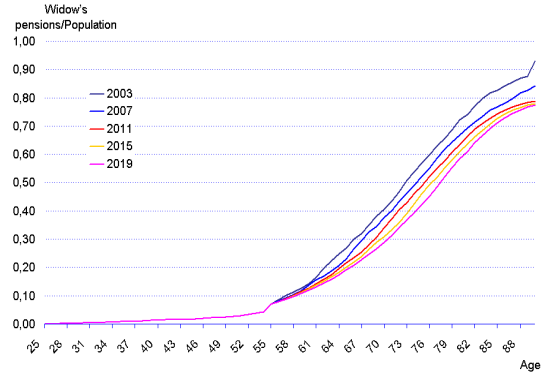
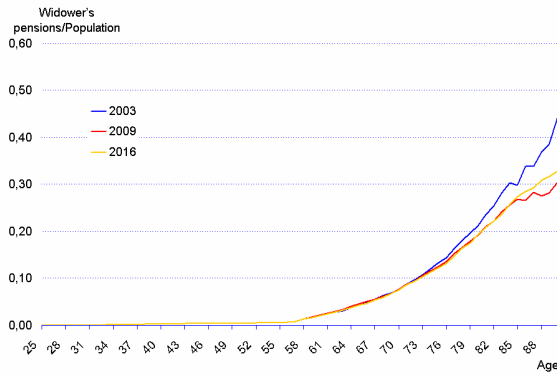
**Graph 4 - 4 Cross-sectional profiles of full disability pensions**  
 Male Female



**Graph 4 - 5 Cross-sectional profiles of partial disability pensions**  
 Male Female



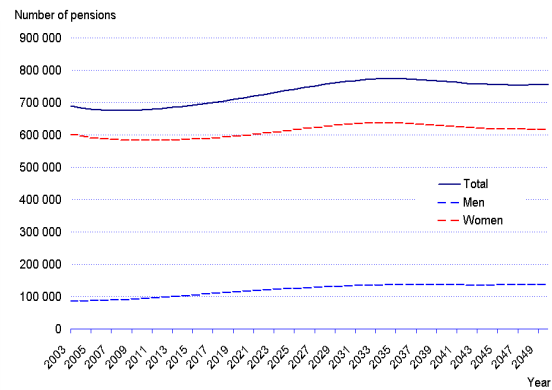
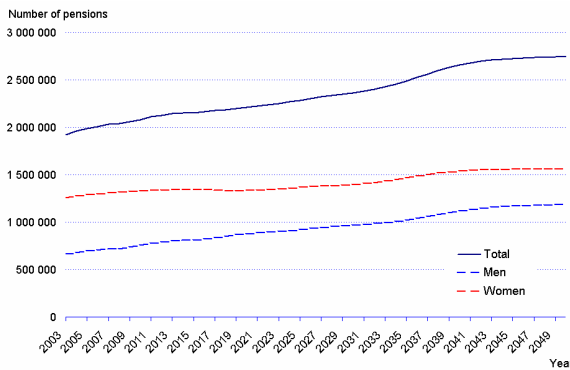
**Graph 4 - 6 Cross-sectional profiles of widower's/widow's pensions**  
Male Female



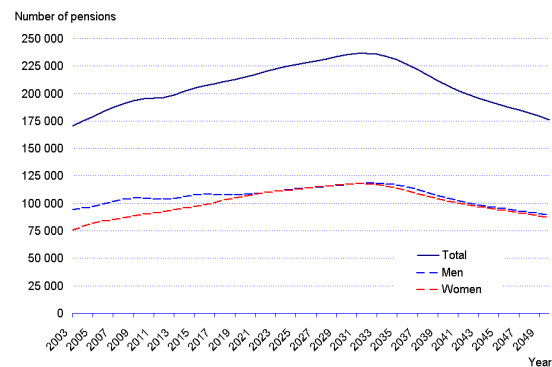
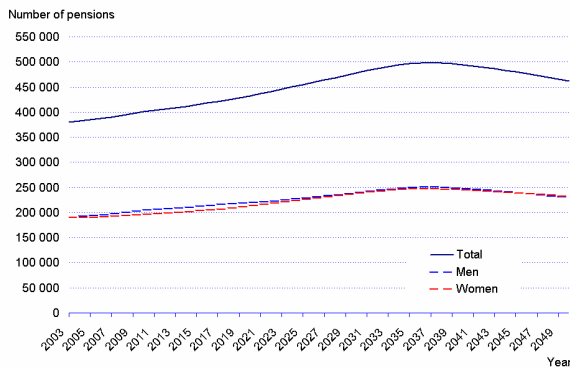
It is interesting that around 40 % of old-age pensions are granted before the statutory retirement age (Graph 4 - 3). Although there is strong penalty embedded in the system for the early retirement (the penalty exceeds an actuarially fair reduction as measured by implicit tax), people tended to retire before the statutory age. This may result from the fact that before 2004 people could use another early retirement scheme due to labour market reasons. This scheme was rather generous since the penalty (reduction in the benefit) was applied for those years before statutory retirement only. It follows that data may be somewhat biased towards early retirement by this latter early retirement scheme that was abolished in 2003. Nevertheless, data up to 2003 are the only data that were available at the time of making the projection.

The most important output of the block 1 is the numbers of all the different pension types. They are shown in the Graph 6-7 and Graph 6-8.

**Graph 4 - 7 Number of pensions: old-age and widow's pensions**  
Old-age pensions Widow's/widower's pensions



**Graph 4 - 8 Number of pensions: full and partial disability pensions**  
Full disability pensions Partial disability pensions



The number of new pensions ( $NPen$ ) in generation  $g$  and sex  $s$  is consistent with the stock of pensions ( $Pen$ ), from which it is computed with the use of the probability of survivorship derived from sex and generation specific mortality rate ( $\varepsilon$ ):

$$NPen_t^{g,s} = Pen_t^{g,s} - Pen_{t-1}^{g,s} \cdot (1 - \varepsilon_t^{g,s}) \quad (13)$$

There is no such straightforward relationship in the case of disability pensions since a disability benefit is withdrawn when the working capacity is restored. Thus the number of new pensions computed according to (13) would be underestimated and spending on disability benefits and an average benefit would be lower (under the assumption of indexation lower than the wage growth). The model assumes a fixed relationship between the number of new pensions and the stock of pensions in a given age ( $a$ ) and the ratio was calibrated on the basis of 2003 data<sup>43</sup>.

$$NPen_t^{g,s} = k_{g+a}^{g,s} \cdot Pen_t^{g,s} \quad (14)$$

$$k_{g+a}^{g,s} \equiv k^{a,s} = NPen_{2003}^{a,s} / Pen_{2003}^{a,s} \quad (15)$$

## Block 2 – determination of newly granted pension benefit

This block enables to (i) assess the impact of the government decisions (pertaining to the indexation of the main parameters of the pension formulae) on the level of newly granted pensions in the short run and (ii) simulate the impact of changes in the pension formulae in the long run.

The changes in pension formulae are simulated in a matrix with two dimensions – assessment basis and contribution period. It is a matrix (281×40), which gives the number of pensions for a given combination of assessment basis (average earnings during the assessment period) and contribution period. It is possible to compute a pension benefit for each cell of the matrix on the basis of the pension formulae (equations 16, 17, 18 and 19). Weighing the pension benefits by the number of recipients gives the average newly granted pension. The matrix with 2003 data was used for the projection exercise and the structure was held constant in all years of the projection horizon.

$$NBen = FRC + ERC \quad (16)$$

$$ERC = \{ae \cdot rc_1 - \max(0, ae - rb_1) \cdot (rc_1 - rc_2) - \max(0, ae - rb_2) \cdot (rc_2 - rc_3)\} \cdot (cp_1 + cp_2 \cdot 0,8) / 365 \cdot ar \quad (17)$$

$$ae = \frac{\sum_{y=Y-1-\min(30, Y-1-1986)}^{Y-1} ye_y \cdot \prod_{t=y}^{Y-1} i_t}{\min(30, Y-1-1986) - ncp / 365} \quad (18)$$

$$i_t = w_{t+1} / w_t \quad (19)$$

$NBen$  stands for newly granted pension benefit,  $FRC$  for flat rate component (currently CZK 1 400),  $ERC$  earnings related component,  $ae$  assessment basis (average earnings during the assessment period),  $rc$  reduction coefficient (currently 100 % up to CZK 8 400, 30 % up to 20 500 and 10 % over 20 500),  $rb$  reduction brackets (currently CZK 8 400 and CZK 20 500),  $cp$  contribution period up to the statutory retirement age in days (including non-contributory periods assessed as if contributory but only up to 80 %),  $ar$  accrual rate (1.5 %),  $Y$  year of retirement,  $ye$  yearly assessment basis in the last 30 years (but not before 1986) in present value calculated on the basis of index  $i$  derived from the growth rate of average wage in the economy ( $w$ ) and  $ncp$  is for excluded non-contributory periods. In fact, the

<sup>43</sup> That is, the model assumes a constant probability of restoring the working capacity.

equation 17 is more complex since earnings related component furthermore reflects the early or late retirement (before and after the statutory retirement age). In case of early retirement the *ERC* is reduced by 0.9 % of the assessment basis for each 90 days before the statutory retirement age. In case of later retirement the *ERC* is increased by 1.5 % of the assessment basis for each completed 90 days after the statutory retirement age.

The above given description concerns old-age pensions. The same procedure is used for other pension benefits. Although the procedure is the same, there are however minor changes in the pension formulae (see description of calculation of pension benefits above).

It should be apparent from the equations above that the Czech pension system is very flexible and there are many parameters that can be used to steer the system. The government can easily adjust the level of new pensions by changing the parameters of the pension formulae. On the other hand, absence of any government decision would lead to gradual decrease in the level of newly granted pensions since the flat rate component and the reduction brackets would remain constant in nominal terms. In the projection exercise we assume that the monetary parameters of the pension formulae (flat rate component, reduction brackets) are indexed to average wage growth. All other parameters (reduction coefficients, accrual rate) remain unchanged. Under these assumptions the replacement rate remains in principle constant.

### Block 3 – average pension and total pension spending

In the base year the average pension benefit (for all types of pensions) is reported for each age and sex by the Czech Social Security Administration. It then enters the equation computing total pension expenditure. Total spending on a given type of pension (equation 20) is a function of the average pension benefit (*Ben*) from the previous year indexed in accordance with the pension legislation (*ind*), the newly granted pension benefit (*NBen*) calculated in the block 2 of the model, and the number of pensions (*Pen*) and newly granted pensions (*NPen*) from the block 1.

$$E_t = \sum_{g,s} (Pen_t^{g,s} - NPen_t^{g,s}) \cdot Ben_{t-1}^{g,s} \cdot (1 + ind_t) + NPen_t^{g,s} \cdot NBen_t^{g,s} \quad (20)$$

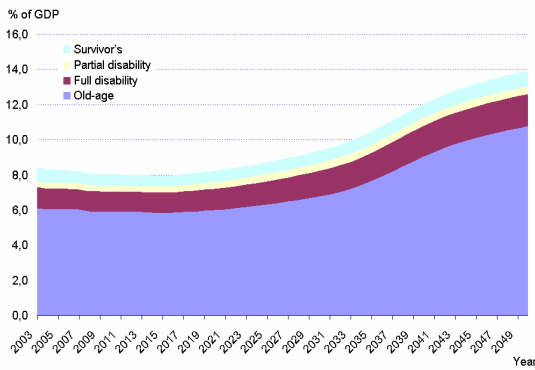
Total pension expenditure is simply a sum of the pension spending on all the pension types.

In the projection horizon the average pension benefit (*Ben*) for a given generation *g* and sex *s* is calculated on the basis of the pension spending (*E*) and the number of pensions (*Pen*). The average pension is a weighted average of average pension from the previous period and the newly granted pension benefits:

$$Ben_t^{g,s} = E_t^{g,s} / Pen_t^{g,s} = \frac{(Pen_t^{g,s} - NPen_t^{g,s})}{Pen_t^{g,s}} \cdot Ben_{t-1}^{g,s} \cdot (1 + ind_t) + \frac{NPen_t^{g,s}}{Pen_t^{g,s}} \cdot NBen_t^{g,s} \quad (21)$$

In the projection exercise the pension benefits are indexed as per legal minimum only, that is by CPI inflation and 1/3 of the average real wage growth. Although the indexation used to be more generous before 2003 (on average more than CPI inflation and 1/2 of the real wage growth), in 2003 the government committed themselves to index pensions to legal minimum only.

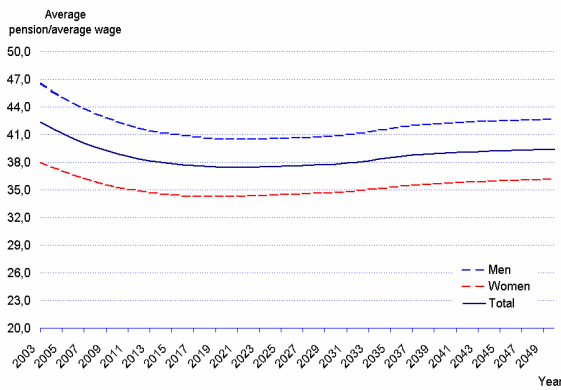
**Graph 4 - 9 Total spending disaggregated by type of benefits**



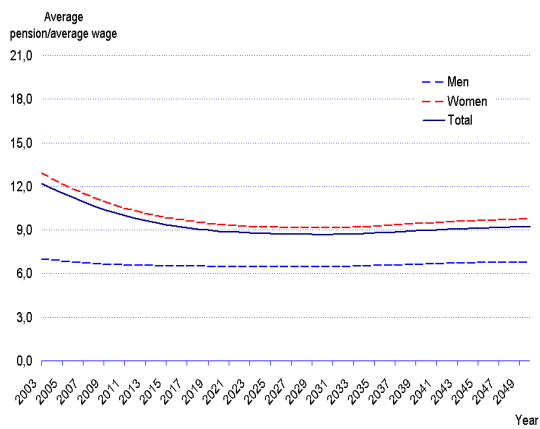
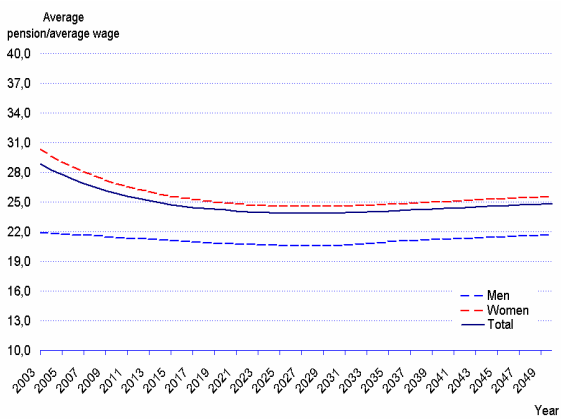
**Graph 4 - 10 Ratio of average pension to average wage - old-age pensions**



**Graph 4 - 11 Ratio of average pension to average wage - Full disability pension Partial disability pension**



**Graph 4 - 12 Ratio of average pension to average wage Widow's/widower's pension solo Widow's/widower's pension in concurrence**





Graph 4 - 10, Graph 4 - 11 and Graph 4 - 12 show the evolution of average pension to average wage ratio. The fall in the ratio is caused by the assumed indexation rate. Indexation was set equal to the minimum legal requirement (CPI inflation plus 1/3 of the real wage growth). It corresponds to the obligation adopted by the government but is significantly lower than the indexation applied in the past. The discrepancy between the current and the past indexation practice leads to the fall in the ratio. Moreover, there are other factors at play in case of the old-age pensions. The fall in the ratio of average old-age pension to average wage is more apparent because of a gradual increase in the number of early retirement permanently reduced pensions (this scheme was introduced in the half of 1990's and it will amend the structure of benefits in the next two or three decades) and because of the gradual increase in the retirement age<sup>44</sup> that slows down the inflow of higher (compared to average pension) newly granted pensions.

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<sup>44</sup> However, in the long run it will contribute to rise in the ratio since the period, in which the pension is disbursed, will be shorter. Thus the relative gap between the average pension and the average wage will become narrower.

## 5. Denmark

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### 5.1 The Danish pension system

The Danish pension system is based on three pillars, each with its own key objective and form of financing.

The *first pillar* consists primarily of the public old-age pension system and aims to secure a decent standard of living for all elderly citizens.

Public old-age pension is a basic (tax-financed) public pension meant to provide all citizens with a fair income when they retire, irrespective of their previous labour market attachment. The pension is granted from the age of 65. Pensioners receive the basic amount of public old-age pension independently of supplementary income from e.g. private pension schemes (although deductions are made for earned income). Means-tested supplementary benefits are available for people with little or no other income. Public old-age pension is financed on a PAYG basis.

To some extent, the statutory Labour Market Supplementary Pension (ATP) fulfils the same purpose.

The *second pillar* consists of primarily of (privately organized) labour market pension schemes and aims to secure citizens a reasonable replacement rate when they retire. Labour market pension schemes presently cover some 90 per cent of all full-time employees.

The bulk of labour market pensions are defined-contribution, savings-based group schemes that are either based on collective agreements or agreed in individual enterprises. Labour market pensions are typically mandatory for the individual person, but he/she may increasingly decide on the combination of benefits. Labour market pensions are robust against increasing life expectancy, since the individual pension saver bears and may influence the financial consequences. Labour market pension schemes have expanded considerably over the last couple of decades. There has been a general political consensus on leaving the expansion to employees and employers instead of having the public sector build up this part of the pension system.

The key objective of the *third pillar* is to ensure flexibility, i.e. to allow for individual requirements. Individual pension schemes, in particular, perform this function. Insurance companies, etc. provide a wide variety of savings options. About one million Danes pay to individual pension schemes.

In addition, there are a number of supplementary, statutory pensions such as the Labour Market Supplementary Pension Scheme (ATP), the Special Pension Savings Scheme (SP) and the Supplementary Labour Market Pension Scheme for Recipients of Anticipatory Pension (SAP), which cannot be placed unambiguously in one of the three pillars. ATP, SP and SAP are contribution-defined and savings-based schemes that also cover certain transfer payment recipients. In the AWG framework it is more convenient to place the ATP, SP and SAP in pillar two since they are fully funded and saving-based.

Almost all citizens of working age pay contributions to ATP and SP (however contributions to the SP scheme are presently suspended). Furthermore, several groups of persons temporarily or

permanently outside the labour market pay contributions to the schemes. Thus, these schemes ensure almost all future pensioners supplementary pension besides public old-age pension.

Table 5 - 1 shows the individual schemes in the pension system placed in relation to the three pillars.

<b>Table 5 - 1 The pillars in the Danish pension system and the pension schemes</b>			
	<b>Pillar 1</b>	<b>Pillar 2</b>	<b>Pillar 3</b>
	Publicly administered, universal (residence requirement)	Privately administered with requirement for membership	Privately administered with voluntary payments
Objective and method	Avoid poverty as a pensioner via same benefits to everybody, income-related benefits or guaranteed minimum pension	Ensure replacement rate via mandatory savings scheme in relation to employment	Flexibility through individual pension savings or other savings for retired life
Financing	Financed by taxes	Savings-based	Savings-based
Danish Schemes	Public old-age pension	Labour market pension	Individual pension schemes
	ATP	SAP SP	

Note: ATP, SAP and SP cannot be placed unambiguously as either pillar 1 or pillar 2 pensions. They have been placed in the table under both pension pillars and shifted towards the pillar with which they are assessed to have most common features. There are no residence requirements as such in ATP, SP and SAP. Anyone who pays contributions obtains a pension right..

The pension system is undergoing a gradual transformation that will bring the savings-based schemes to constitute a larger share of the income of future pensioners. This is particularly due to the expansion and greater prevalence of the labour market pension schemes, where the proportion of employees covered has increased from some 30 per cent in the early 1980s to some 90 per cent today.

### 5.1.1 Public pensions (first pillar pensions)

For the AWG projection, the civil servant, disability and voluntary early retirement pensions are considered as belonging to the first pillar pensions. In the following sections each of these is described separately.

**Public old-age pension** is a basic public pension granted from the age of 65.

The amount of the pension depends on the number of years of residence in Denmark. Maximum public old-age pension is achieved after 40 years' residence in Denmark after the age of 15. If the time of residence is shorter, the pension will be reduced proportionately.

Public old-age pension consists of a basic amount and a pension supplement. The pension is independent of the recipient's previous attachment to the labour market and previous earnings, but depends on the pensioner's present income and marital status. Assets have no effect on the amount of public old-age pension.

The basic amount is DKK 56,892 (euro 7,660) annually in 2005 and taxable. The basic amount is reduced only on the basis of earnings from earned income. If the pensioner has earned income of

more than DKK 241,700 (euro 32,530) annually, the basic amount is reduced by 30 per cent of the part of the earned income that exceeds DKK 241,700 (euro 32,530).

The pension supplement is DKK 57,276 (euro 7,710) annually for single pensioners and DKK 26,736 (euro 3,600) annually for married or cohabiting pensioners in 2005. The pension supplement is taxable and reduced if the pensioner or his/her spouse or cohabitant has earnings above a certain limit besides public old-age pension (earned income, supplementary pension income, equity income, investment income, etc.). If the pensioner's spouse/cohabitant does not receive pension, half of the spouse's earnings up to DKK 166,900 (euro 22,460) is disregarded in the calculation of the income base.

For single pensioners, the pension supplement is reduced by 30 per cent of the part of the earnings that exceeds DKK 53,300 (euro 7,170) on an annual basis. For married or cohabiting pensioners, the pension supplement is reduced by 30 per cent of the part of the earnings that exceeds DKK 107,100 (euro 14,415). If both spouses/cohabitants are entitled to pension supplements, their supplements are reduced by only 15 per cent of earnings over DKK 107,100 (euro 14,420).

In addition to the basic amount of public old-age pension and pension supplement, a supplementary pension benefit of DKK 6,200 (euro 830) a year is granted. The supplementary pension benefit is taxable and paid once a year. The benefit is targeted at the financially most disadvantaged pensioners and is consequently reduced if the pensioner or his/her spouse or cohabitant has earnings above a certain limit besides public old-age pension (earned income, supplementary pension income, equity income, investment income, etc.).

The supplementary pension benefit is reduced if earnings exceed DKK 15,400 (euro 2,073) for single pensioners and DKK 30,500 (euro 4,105) for married or cohabiting pensioners at 2005-level. For each increment of DKK 379/766 (euro 51/103) of earnings exceeding the above amounts for single and married/cohabiting pensioners, respectively, the supplementary pension benefit decreases by 1 per cent.

Public old-age pension is paid upon application from the age of 65. From 2004, rules on deferred pension have been introduced. Pursuant to these rules, older people who have reached public old-age pension age may choose to defer old age pension and participate actively in the labour market against having current public old-age pension increased later. It is a condition that the person who has deferred his/her public old-age pension has earnings from personal work for at least 1,500 hours each calendar year. When the older person chooses to receive public old-age pension, the current public old-age pension is increased by a share – the waiting percentage – for the rest of the pensioner's life. The waiting percentage is calculated as the ratio between the number of months the pension was deferred and the average life expectancy of persons at the age the citizen has when retiring.

**Disability pension** is an anticipatory pension for people who are not able to support their own living. The anticipatory pension system was reformed in 2003 and pensioners on the old system continue in this system. In the new system persons between 18 and 65 years may be awarded an anticipatory pension if they satisfy a number of conditions concerning citizenship, residence and entitlement. The key condition for being awarded anticipatory pension is that the working capacity is permanently reduced and that the reduction is of such an extent that the person will not be able to support himself full or partial from paid work cf. annex 1 for further details on the disability pension system.

**Voluntary early retirement pension** is for all employees and self-employed persons who are members of an unemployment insurance fund and who have reached the age of 60 years, but who

are not yet 65 years old, may join the voluntary early retirement pay scheme. Transition to this scheme may take place from employment, unemployment, transitional allowance and from part-time retirement.

The member must reside in Denmark or in an EEA country and must have been a member of an unemployment insurance fund for at least 25 years within the last 30 years. Furthermore it is a precondition that the person has paid voluntary early retirement contributions during this period. Special transition rules apply to members who do not meet the aforesaid seniority requirements. Furthermore, the member must also satisfy the conditions for entitlement to unemployment benefits in the event of unemployment at the time of transition to the voluntary early retirement pay scheme. Persons who meet the aforesaid requirements are furthermore entitled to a voluntary early retirement certificate. This certificate guarantees the person access to voluntary early retirement allowance after attaining the age of 60 years. This certificate forms the basis of a number of special rights, cf. below.

A person who receives voluntary early retirement pay may perform paid work without any limitation or receive income from self-employed activities, subject to deductions in the benefit. Voluntary early retirement pay cannot be paid to persons who live abroad for more than three months per year, unless they reside in an EEA country. Persons who receive social pension may not at the same time receive voluntary early retirement benefits.

Voluntary early retirement benefit is paid at an amount corresponding to the rate of unemployment benefits, which the person would have been entitled to in the event of unemployment, however not more than 91 per cent of the maximum rate of unemployment benefits, corresponding to a maximum of DKK 2.975 per week for full-time insured members and DKK 1.985 for part-time insured persons (2005 figures).

The voluntary early retirement pay is regulated according to the value of the member's pension schemes as well as income from paid work.

Members who choose to postpone the transition to the voluntary early retirement pay scheme for at least two years following the issuing of the voluntary early retirement certificate and who have been in paid employment for at least 3.120 hours (2.496 hours for part-time insured members) or who have been engaged in significant self-employed activities, are entitled to:

- voluntary early retirement benefit corresponding to the maximum rate of unemployment benefits (DKK 3.270 per week) during the entire voluntary early retirement period,
- favourable deductions for pension, and
- the right to earn a premium amounting to a maximum of DKK 122.000 (2005 figures). This premium is earned through continued employment for up to 12 x 481 hours (corresponding to 3 years' full-time employment).

**Civil service pensions** for government employees are regulated by law, while civil service pensions for local authority employees are regulated by pension regulations. Civil service pension schemes are defined-benefit schemes. The amount of the pension depends on the number of years of employment as a public servant and the pensionable pay – typically the final salary.

Pensions are funded by government, regional or local authorities out of current income, i.e. taxes. However, most local authorities and a few regional authorities have hedged their obligations by taking out insurance with the local authority insurance company Kommunernes Pensionsforsikring A/S (KP), to which the local authorities pay insurance premiums. Payments from KP thus cover these local authorities' expenditure on payments of civil service pensions.

In January 2004, some 107,000 employees were covered by pension schemes for central government employees (or employees in public-servant-like positions), including public servants in primary and lower secondary schools in the local authority areas.

Defined-benefit pension schemes in the form of civil service pension schemes have diminishing importance in both the central government and the local government sectors, where the employment form is being changed to the more flexible and individual pay forms implemented in the public sector in recent years, and where employees are to a wider extent covered by contribution-financed and contribution-defined pension schemes

**Indexation of public pensions.** The rates for different types of transfer payments (and the progressive limits etc. in the tax system) are automatically adjusted once a year on the basis of wage developments in the private sector (the area covered by the Danish Employers' Confederation). Transfer payments are adjusted at the rate adjustment percentage; cf. the Rate Adjustment Percentage Act.

The rate adjustment percentage for a given fiscal year is fixed on the basis of wage developments in the wage year, which is the year two years before the fiscal year. The rate adjustment percentage for 2005 was thus fixed on the basis of wage developments from 2002 to 2003. Wage developments are assessed on the basis of the Structural Statistics compiled by the Danish Employers' Confederation. The yearly wage for workers and salaried employees, respectively, is calculated excluding inconvenience payments, wage during sickness absence, etc., and pension contributions in the relevant year. Moreover, labour market contributions are deducted simultaneously in relation to the fiscal year, since transfer payment recipients do not pay labour market contributions. The yearly wage increase for workers and salaried employees is weighted together, and only wage information from businesses that have reported to the statistics in both years (identical businesses) is used.

If the annual wage increase is over 2.0 per cent, an amount corresponding to the wage increase less 2.0 percentage points, but not more than 0.3 per cent, is applied for a pool amount. The rate adjustment percentage is equal to the rise in yearly wage less the percentage rate set aside for the pool amount (hence, when the wage increase is above 2.3 percent, the rate adjustment percentage is the wage increase less 0.3 percentage points, and the pool amount corresponds to the 0,3 percentage points). The pool amount is used for measures in the social, health and labour market areas with a view to improving conditions for transfer payment recipients and weak groups.

### **5.1.2 Occupational pensions (second pillar pensions)**

In this description Labour Market Supplementary Pension Scheme (ATP), the Special Pension Savings Scheme (SP) and the Supplementary Labour Market Pension Scheme for Recipients of Anticipatory Pension (SAP) are placed in the second pillar together with the labour market pensions.

**Labour Market Supplementary Pension Fund (ATP)** is a statutory, supplementary pension scheme established in 1964. The scheme is mandatory and presently covers persons both in and outside the labour force.

All employees in Denmark between the ages of 16 and 64 who are employed for more than nine hours a week pay contributions to ATP. Since the early 1990s, the circle of contributors to ATP has been expanded to include a number of transfer payment recipients, including recipients of

unemployment benefits, sickness and maternity benefits, cash assistance, rehabilitation benefits, early-retirement benefits and anticipatory pension. Moreover, self-employed persons can pay voluntary contributions. At the end of 2004, ATP had some 4.4 million members, of which just over 3 million paid contributions and just over 500,000 received pension. In the long term, ATP will ensure almost all Danes a supplement to public old-age pension.

ATP is a contribution-defined and fully savings-based pension scheme. The ATP contribution does not depend on the individual citizen's income, but on hours worked. The annual contribution varies, but is typically DKK 2,700 (euro 360) annually for a full-time employee, corresponding to around 1 per cent of an average employee income. Individuals pay 1/3 of the contribution themselves. The employer pays the remaining two-thirds of the contribution for employees, while the government pays the remaining two-thirds of the contribution for transfer payment recipients.

The ATP scheme ensures members a life-long, current retirement pension from the public pension age. The scheme also includes coverage for spouse/cohabitant and children, where an amount is paid to the surviving relatives in case of the member's death.

The maximum current retirement pension for a 67-year-old is DKK 22,400 (euro 3,000) annually in 2005, corresponding to some 20 per cent of public old-age pension, provided that contributions have been paid to the scheme since its introduction in 1964. Most present ATP pensioners receive a considerably smaller ATP pension, having only paid contributions for a shorter period.

The ATP scheme was changed with effect from 2002. The reform means that, in future, the pension will be calculated on an age-differentiated basis.

**Special Pension Savings Scheme (SP)** is a statutory, supplementary pension scheme. Since 1999, all employees, self-employed persons and some transfer payment recipients have paid contributions to SP. At end-2004, there were some 3.4 million savings holders in the scheme.

SP is a purely savings-based scheme, where contributions are paid to individual accounts. The SP contribution is typically 1 per cent of income. However, the SP contribution has been suspended in 2004 and 2005. A political agreement has extended the suspension to cover also 2006 and 2007.

SP savings are paid as a ten-year annuity pension from the age of 65. In the event of death, the amount saved up will be paid to the estate of the deceased person. Since the SP scheme is only a few years old, a very small number of pensioners presently receive payments from it.

From January 2005, wider choice has been introduced in respect of administration and investment of SP savings.

**Labour Market Supplementary Pension Scheme for Recipients of Anticipatory Pension (SAP)** is a statutory, supplementary pension scheme for recipients of anticipatory pension. This is a voluntary scheme, the objective of which is to give recipients of anticipatory pension the possibility of earning a supplement to public old-age pension that resembles labour market pension.

The SAP contribution amounts to DKK 4,680 (EUR 630) annually in 2005, corresponding to 2.8 per cent of the anticipatory pension for a single person. The contribution is adjusted in step with wage developments in the labour market. The government contributes two-thirds of the sum, while the individual person contributes one third. The pension is granted as a life-long retirement pension from the age of 65. In the event of death, the amount saved up will be paid to the estate of the deceased person.

The SAP scheme is administered by ATP or another pension fund at the pensioner's own option. The scheme entered into force on 1 January 2003, and consequently only a very small number of pensioners presently receive payments from it.

**Labour market pension** schemes can be divided into schemes based on collective agreements and schemes agreed in individual enterprises. The schemes cover most of the Danish labour market. Some 90 per cent of all full-time employees were covered by a labour market pension scheme in 2002. Labour market pension schemes are mostly savings-based. Total savings in the labour market pension schemes are estimated at just over DKK 600 billion (euro 81 billion) or around two-thirds of total private Danish pension assets in insurance-based pension schemes.

Labour market pensions form part of the Danish agreement-based labour market model. The agreement-based schemes have been agreed between employee and employer organisations, while the schemes at enterprise level have been agreed between an enterprise and its employees.

Labour market pensions are organised as group insurance schemes, where membership is typically mandatory for the individual employee covered by an agreement or covered by an occupational pension scheme. Thus, the individual employee is unable to choose the pension fund in which the scheme is to be placed, but has a right and an obligation to be a member of the group scheme. Although the schemes are mandatory, the individual employee has increasing possibilities for choosing the benefits that best correspond to his/her present situation.

The fact that the schemes are group schemes and mandatory allows individuals to secure pension benefits at a price that may be independent of individual risks associated with death and disablement. This also means that the scheme can be taken out at a cost overall better than what can be achieved on an individual basis.

The bulk of labour market pensions are contribution-defined, i.e. the amount of the pension depends on the contributions paid. In 2004, contributions to the agreement-based labour market pension schemes were typically 7-10 per cent of the wage in the private labour market and 12-16 per cent of the wage in the public labour market. In connection with the collective bargaining in 2005, a number of increases of these contributions were agreed. The employer contributes two-thirds of the sum, while the individual person contributes one-third.

The composition of benefits in the labour market pension schemes varies considerably. Typically, a life-long current retirement pension is provided, which may be combined with annuity pension and/or capital pension. To this may come disability pension and spouse's and child's pensions.

### **5.1.3 Voluntary individual pensions (third pillar pensions)**

Individual, private pension savings plans are started on the initiative of private individuals and are independent of employment conditions. In these schemes, the individual makes his/her own choices about pension scheme, supplier, premium amount and composition of benefits.

Individual pension schemes can be set up with banks, insurance companies or pension funds. In 2000, more than one million persons paid contributions to individual pension schemes. The average contribution was some DKK 14,700 (euro 2,000). Self-employed persons form the group that pays the highest average contributions, since this group is rarely covered by labour market pension schemes.



The individual schemes are typically capital pension or annuity pension schemes, but may also be current life-long pensions. The amount of the pensions depends on the savings (including return) made by the individual.

#### 5.1.4 Retirement age

The statutory public old-age pension retirement age is 65 years as from 1 July 2004. Before 1 July the statutory retirement age was 67 years. For people who were between 65 and 67 years by 1. July 2004 the retirement age is still 67 years. The average age for a new recipient of public old-age pension was 67 year in 2003 and is expected to decrease to 65 in 2007 after the lower retirement age is fully implemented.

**Table 5 - 2 Average effective retirement age from the labour market in 2004**

Decomposition of average effective exit age			
Average retirement age	Old-age	Early retirement	Disability
61.6	67/65	61.1	46.8

Note: The average effective retirement age is from 2003. For Old-age the first number is from 2003 and the last is the expected in 2007.

As part of the reform that lowered the eligible age for public old-age pension the age where people were eligible for voluntary early retirement pension was reduced from age 60-66 to 60-64. In 2004 the average age for a new recipient of voluntary early retirement pension was 61.1 years. In the disability pension system the eligible age is 18 to 65 years. The average age for a new recipient was 46.8 years in 2004.

The average effective exit age from the labour market was 61.6 in 2003. The reason for the effective exit age is significant lower than the statutory public old-age pension age is that about 2/3 of a cohort retire before the statutory retirement age mainly by using the voluntary early retirement pension scheme.

#### 5.1.5 Recent reforms

The most important recent reforms of the Danish Pension System are set out below:

- In the collective agreements of 2004 covering parts of the private labour market, the social partners agreed that the pension contribution to private labour market pensions will be gradually increased from some 9 per cent to 10.8 per cent in 2006.
- In the collective agreements of 2004 covering the private labour market, the social partners also agreed that the contribution to the Labour Market Supplementary Pension Scheme (ATP), which is a fixed amount, will be increased by 9 per cent in 2006. The contribution has not been adjusted since 1996.
- In the local and county authority area and the state, the collective bargaining in 2005 led to agreements concerning a number of pension scheme expansions: (1) Payment of pension contributions in the periods of maternity/paternity leave where no wage is paid; (2) Increase of ATP contributions as in the private labour market for the majority of the agreement areas, and further extraordinary increases for a number of the groups that have paid rates lower than the usual A-rate; the average increase in ATP contributions for public employees is 17.1 per cent from 2006; (3) Increase in pension contributions to labour market pensions for many

agreement areas (e.g. teachers from 17.1 to 17.3 per cent) and a change of the conditions governing waiting periods; (4) Increase of pension contributions to labour market pensions to 12.5 per cent for certain individuals not covered by a group pension scheme, e.g. because of waiting period provisions.

- The contribution of 1 per cent of earned income to the Special Pension Savings Scheme (SP) has been suspended in 2004 and 2005. This was part of the Government's so-called Spring Package in 2004. A political agreement has extended the suspension to 2006 and 2007.
- The voluntary early retirement scheme was reformed in 1998 with a view to reduce and postpone take-up of early retirement. Dedicated contributions to the scheme were introduced and will have to be paid for at least 25 of the 30 years prior to receiving benefits, persons entering the scheme before age 62 receive lower benefits and face more stringent reductions for pension savings than persons who wait till age 62, and persons who continue working after having obtained the right to early retirement receive tax-free bonuses for staying active in the labour market. As part of the reform, the formal pensionable age was lowered from 67 to 65 years, thus reducing the maximum time in early retirement (where benefits are higher than the public old-age pension) from 7 to 5 years. The reform is assessed to raise the average effective retirement age, while the lowering of the formal pensionable age is not assessed to have any significant effect on the average retirement age.
- Rules on deferred pension were introduced with effect from 1 July 2004. Persons who have reached public old-age pension age and who participate actively in the labour market (at least 1,500 hours annually) may choose to defer their public old-age pension against having their subsequent public old-age pension increased by a supplement for deferred pension. This has made the public old-age pension age more flexible. The implicit tax on continued work for one year after public old-age pension age has thus been reduced by some 15 percentage points for an average employee income (see also OECD, Economic Surveys: Denmark, February 2005).
- Public old-age pension has been augmented by the introduction of a new supplement from 2003 – the supplementary pension benefit. The supplementary pension benefit is targeted at the financially most disadvantaged pensioners. The benefit is calculated according to fixed rules, taking into account the pensioner's other income and liquid assets. The supplement was raised in 2004.
- With effect from 2004, the rules on the right for self-employed persons to deduct contributions to pension schemes were improved. A self-employed person can now pay an amount corresponding to up to 30 per cent of the enterprise's profits into a pension scheme – without being obliged to make payments in subsequent years, as was previously the case. The new scheme takes into account the fact that profits can vary from one year to the next. The self-employed person can thus save up for his/her pension when possible.
- The reform of the disability pension - which took effect on 1 January 2003 – changed the criteria for granting the pension, as described above. The reform is assessed to reduce the inflow into disability pension significantly.

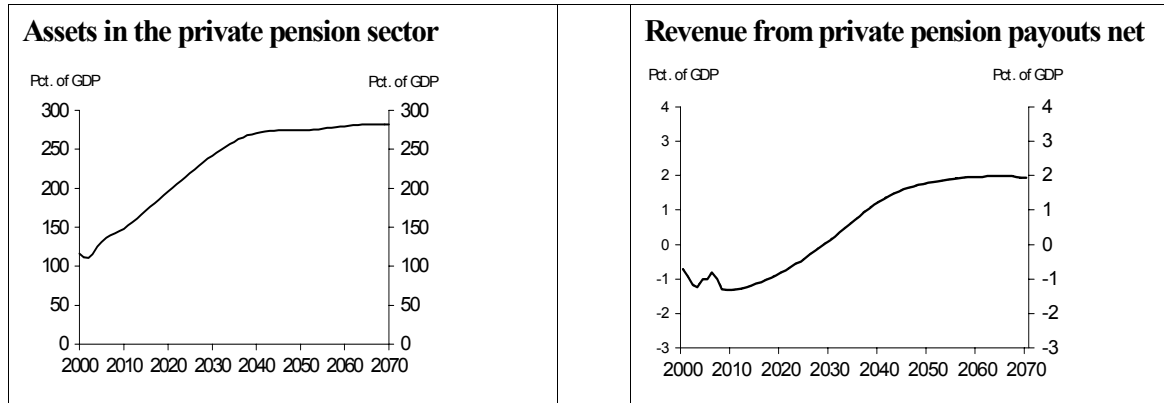
### **5.1.6 Coverage of the pension schemes in the projection**

The pension projection covers the public pension in the first pillar (old-age, disability, civil servant and voluntary early retirement pension). None of the pensions in pillar 2 and 3 are covered since these are contribution-defined and essentially fully funded. There are some tax-subsidies in the ATP and SAP schemes but these are of minor importance.

In the assessment of public sustainability the contributions received and payments made from the pension sector must be included, because pension savings are not taxed until the pensions are paid

out, while contributions to pension schemes can be deducted from ordinary income tax at the time they are paid into the schemes. All else equal, the future rise in revenue resulting from increasing pension payments will improve public finances. Because the revenue stems from deferred tax payments, the flip side is a higher general public net debt today.

**Graph 5 - 1 Assets and revenue from private sector pensions**



Source: *Convergence Programme for Denmark*

In 2004 the assets in the private pension sector were about 1.2 times GDP and they are expected to rise to 2.5 times GDP in 2035, Graph 5 - 1. Since the private pension funds are not yet matured the net payments (contribution net of pensions) from the pensions funds is negative. According to the Danish system where contributions are deductible in the personal income tax and pensions are taxed, this gives negative tax revenue from the private pensions. In the future where the pension funds mature, net tax revenue become positive and in 2050 the revenue is projected to be about 2 per cent of GDP, Graph 5 - 1.

## 5.2 Description of the Pension Projection Model and its Base Data

### 5.2.1 General description of the model

In the projection of the number of recipients of public pensions, the shares of the population in the various schemes (broken down by age, gender and ethnic origin) are assumed constant after 2010. In the years up to 2010 the number of recipients and the pension per recipients comes from a medium-term projection which takes account of the business cycles and recent economic reforms (including pension reforms). The average pension benefit (per pensioner) in real terms is assumed constant at the 2006 level. In the projection period, the pension rate is indexed to the wage growth according to the Rate Adjustment Percentage Act.

## 5.2.2 Data

The number of pensioners in each scheme broken down by age, gender and ethnic origin is from the Register based labour force statistics (RAS) provided by Statistics Denmark. The levels from RAS are adjusted to measure full-year recipients in the “Cohesive social statistics” also published by Statistics Denmark.

## 5.2.3 Assumption and methodologies applied

In the national model for the long-term projections of public expenditures, the population is distributed by age, gender and origin of birth (immigrants, descendants and natives) and the share of the population in different pension schemes is also distributed by age, gender and origin. Since the AWG population projection is only distributed by age and gender it is assumed that the distribution by origin is the same as in the national projection.

The pension supplement in the public old-age pension system is reduced if the pensioner has income beside the public old-age pension (for example pension from the private pension schemes). The projected increase in payouts from the private pension sector ([Graph 5 - 1](#)) implies that number of public old-age pensioners with a significant private pension income is higher. The number of pensioners which receive the pension supplement will hence decrease over time<sup>45</sup>.

The share of the population receiving civil servant pension is gradually reduced so about 30.000 person receives civil servant pension in 2050 compared to 125.000 person in 2005. The reduction stems from the changes in employment form where public employees are increasingly covered by contribution-financed and contribution-defined pension schemes.

The pensions are indexed to the wage growth according to the Rate Adjustment Percentage Act. The wage growth in the AWG projection is equal to the inflation rate plus the country specific labour productivity growth rate.

### 5.2.3.1 *Incorporation of recent reforms*

The reduction of the eligible age for public old-age pension is incorporated so cohorts older than 65 years in 2007 (in stead of 67 years old before) receive public old-age pension. Almost all persons above the statutory retirement age receive public old-age pension.

The reform of the voluntary early retirement pension system introduced a partial own contribution. The reform is assumed to reduce the number of recipients by 7.500 persons from 2004 to 2010. Furthermore the lower eligible age for public old-age pension reduce the number of recipients since only 5 cohorts are eligible as against 7 cohorts before the reform.

The reform of the disability pension system is assumed to reduce the intake by about 3.000 persons per year until 2010. From 2004 to 2010 the number of recipients will be reduced by 18.000 persons compared to a scenario without the reform.

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<sup>45</sup> Since the Danish pension projection (AWG baseline) does not include the private pension sector projections from the Convergence Programme 2005 is used.

### 5.3 Results

In the AWG baseline scenario the public expenditures to social security pensions is projected to increase with 3.2 percentages point of GDP from 2005 to 2050, *cf.* Table 5 - 3. The increasing expenditures stem primarily from the increasing public old-age pension expenditures. The expenditures to civil servant pension decreases because of the reduction in the number of public jobs with civil servant rights. Other pension expenditures are more or less constant in percentage of GDP.

**Table 5 - 3 Public expenditure on social security pensions in the AWG baseline projection**

	2005	2010	2020	2050	2005-50
Per cent of GDP					
<b>Social security pensions</b>	<b>9.6</b>	<b>10.1</b>	<b>11.3</b>	<b>12.8</b>	<b>+3.2</b>
<b>Old-age and early pensions</b>	<b>7.5</b>	<b>8.2</b>	<b>9.4</b>	<b>10.7</b>	<b>+3.2</b>
Public old-age pension	4.8	5.6	6.9	9.1	+4.3
Voluntary early retirement	1.5	1.5	1.4	1.3	-0.2
Civil servant pension	1.1	1.2	1.2	0.3	-0.8
<b>Other pensions</b>	<b>2.2</b>	<b>1.9</b>	<b>1.9</b>	<b>2.1</b>	<b>-0.1</b>
Disability pension	2.2	1.9	1.9	2.1	-0.1

The increase in the public old-age expenditures stem from the number of pensioners. According to the decomposition made by the Commission (*cf.* the main report) the average pension benefit (per pensioner) is slightly reduced during the projection period which stem from the reduced number of pensioners who receive the pension supplement in the public old-age pension system. The expenditures to public old-age pension would increase about 1 percentages point of GDP more without the reduction in the expenditures to the pension supplement.

**Table 5 - 4 Comparing the 2001 and 2005 projections of public expenditure on pensions**

	2005	2010	2020	2050	2005-50
Per cent of GDP					
2005-projection	9.6	10.1	11.3	12.8	+3.2
2001-projection	11.3	12.5	13.8	13.3	+2.0

In the 2001-projection the ATP-fund was considered a part of the public sector according to the national account statistics in 2001. Since 2001, Statistics Denmark has revised the national accounts methodology and data. The ATP-fund has been reclassified from the public sector to the private sector. The reclassification of ATP is based on a Eurostat decision from March 2004. The ATP-fund is hence part of the private pension sector in the 2005-projection.

The increase in public expenditures to pensions in the 2005-projection is partly due to a new population projection. In the 2001-projection the life expectancy is increased by 4.2 years for men and 3.5 years for females up to 2050, while the increase is 6.3 year for men and 5.6 year for females in the 2005-projection. The higher life expectancy results in a higher number of pensioners and thereby higher expenditures.

**Table 5 - 5 Public expenditures to social security pensions in sensitivity scenarios**

	2005	2010	2020	2050	2005-50
<b>Per cent of GDP</b>					
Baseline	9.6	10.1	11.3	12.8	+3.2
Higher/lower productivity	9.6	10.1	11.3	12.8	+3.2
Higher employment for older workers	9.6	10.0	11.1	12.5	+2.9
Higher life expectancy	9.6	10.1	11.4	13.4	+3.8
Higher/lower interest rate	9.6	10.1	11.3	12.8	+3.2

Higher (lower) labour productivity does not affect expenditures in per cent of GDP because public expenditures are more or less indexed to wage and productivity growth.

In the AWG projection GDP and labour productivity are independent of the interest rate and since either GDP or the labour productivity is affected expenditures are unchanged.

Higher employment will affect GDP and thereby reduce expenditures in per cent of GDP. Especially higher employment for older workers will reduce the expenditures since the number of pension receivers (voluntary early retirement pension and disability pension) is reduced.

## References

Budgetary challenges posed by ageing populations. Economic Policy Committee 2001.

Convergence Programme for Denmark 2005.

National Strategy Report on the Danish Pension System, July 2005.

The Danish unemployment insurance, internal paper March 2005, National Directorate of Labour.

## **Annex 1: The Disability pension system**

### ***Currant legislation:***

Persons between 18 and 65 years may be awarded an anticipatory pension if they satisfy a number of conditions concerning citizenship, residence and entitlement (the maximum age limit is 67 years for persons born before 1 July 1939).

The key condition for being awarded anticipatory pension is that the working capacity is permanently reduced and that the reduction is of such an extent that the person will not be able to support himself from paid work. If the working capacity can be improved through activation, vocational rehabilitation or other preventive measures so that the person concerned can be referred to seeking employment on the ordinary labour market or in a flex job, no pension will be awarded.

The working capacity of the person thus determines whether an anticipatory pension can be awarded. Working capacity is understood as the ability to satisfy the requirements of the labour market for being able to perform specific job functions with a view to obtaining an income for full or partial self-support.

The pension allowance takes the form of a taxable allowance corresponding to the maximum unemployment benefit rate in connection with unemployment/sickness for single persons: DKK 173.472 (2006 level) and 85 per cent of this amount for married/cohabiting persons DKK 147.444 (2006 level). The pension allowance is adjusted for the pensioner's own income and the income of the spouse/co-habitee. The pension allowance as such does not form part of the income basis.

The pension allowance to single persons is reduced by 30 per cent of the income basis exceeding DKK 59.000. The pension allowance to married/cohabiting persons is reduced by 30 per cent of the income basis exceeding DKK 93.600. However, the reduction will only be 15 per cent if the spouse/co-habitee is also a pensioner.

If the spouse/co-habitee is also a pensioner, any income of the spouse or co-habitee exceeding DKK 290.300 will not be taken into account in connection with the calculation of the income basis. This means that there is a ceiling to the reduction in the pension.

If the spouse/co-habitee is not a pensioner any income of the spouse or co-habitee of up DKK 147.444 will not be taken into account in connection with the calculation of the income basis. This will put them on a equal footing with pensioners who are married or co-habiting with another pensioner as anticipatory pension and old-age pension are not included in the income basis. Any income of a spouse or co-habitee exceeding DKK 192.100 is not taken into account. This means that there is a ceiling to the reduction in the pension.

The rules mean that the income of a spouse/co-habitee may as a maximum reduce the pension by 20 per cent of the pension allowance.

### ***Former legislation:***

The reform of the anticipatory pension reform - which took effect on 1 January 2003 - applies to persons aged 18-65 years who are awarded an anticipatory pension under the new rules. Persons who have been awarded or filed an application for anticipatory pension before 1 January 2003 will continue to be covered by the rules in force until then.

According to the former legislation anticipatory pension was granted, when the earnings capacity was reduced by at least 50 per cent because of a combination of ill health and social factors. There are 4 different amounts of anticipatory pension:

1) The highest amount of anticipatory pension awarded to persons between the ages of 18 and 60 whose working capacity is considered negligible in any employment. The highest amount consists of: basic amount + pension supplement + invalidity amount + unemployment amount.

2) The intermediate amount of anticipatory pension is awarded to:

- any person between the ages of 18 and 60 whose working capacity is reduced by approximately 2/3; and

- any person between the ages of 60 and 65 whose working capacity is reduced to the same extent as under subsection (1) hereof.

The intermediate amount consists of: basic amount + pension supplement + invalidity amount.

3) Increased ordinary anticipatory pension or 4) ordinary anticipatory pension is awarded to:

- any person between the ages of 18 and 65 whose working capacity is reduced by at least one half for health reasons;

- any person between the ages of 18 and 65 whose working capacity is reduced by at least one half for reasons other than ill health alone; and

- any person between the ages of 50 and 65 where social and health factors so warrant.

Increased ordinary anticipatory pension consists of: basic amount + pensions supplement + anticipatory amount.

Ordinary anticipatory pension consists of: basic amount + pension supplement.

From the 1. of January 2006 pensioners who receive increased ordinary anticipatory pension or ordinary anticipatory pension will receive an additional amount which means, that these pensioners will receive the same amount all in all as pensioners who are awarded the intermediate amount of anticipatory pension.

Pensioners whose financial situation is particularly difficult may also receive a personal allowance. Pensioners may also receive a supplement for medication etc.



## 6. Germany

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### 6.1 Key characteristics of the pension system

The pension projections performed for the AWG cover the statutory pension scheme as well as the pension scheme for life-time civil servants. Almost 90 % of the employed population are included in these two schemes: The general pay-as-you-go, earnings-related first pillar statutory pension scheme presently covers around 80% of the employed population in Germany (33 million people). In addition, the (life time) civil servants pension scheme covers about 6 % of the employed population. This note refers to the statutory pension scheme, if not otherwise mentioned, as it is predominantly important for the evolution of total public expenditure<sup>46</sup>.

Since 2003 the contribution rate for the statutory pension scheme is at 19.5%, paid in equal shares by employers and employees. Civil servants' pensions are paid directly from public budgets and special schemes exist notably for farmers and the liberal professions (e.g. for physicians, lawyers, architects). The statutory pension system is managed by the "Deutsche Rentenversicherung" and administrated by the Ministry of Labour and Social Affairs. The pension scheme for civil servants is managed by the Ministry of the Interior.

For each year of contributions, an insured person in the statutory pension scheme receives "pension points" that reflect the employees relative earnings position. The average wage or salary in a particular year is equal to one "pension point" for that year. When determining the individual pension the sum of personal pension points is multiplied by the current value of one pension point (measured in € per month) and multiplied by a specific factor for each kind of pension (e.g. 1.0 for old age pension at the age of 65 or 0.55 for a survivor's pension).

$$(1) \quad P = pp * pt * ppv$$

with P = pension

$$pp = \text{pension points} = \sum_{i=1}^I \frac{e_i}{ae_i}$$

e = earning in one year

ae = average earning of one year

pt = pension type factor, e.g. 1 for old age pension at the age of 65  
or 0.55 for a survivor's pension

ppv = pension point value

To give an example: A person retiring with a contribution period of 45 years based on an average income will have earned 45 pension points. These pension points are multiplied by a pension type factor of 1.0 – and thus remain unchanged - when retirement is entered at the age of 65. Another multiplication, this time by the current pension point value (26.13 € for pensioners from Western Germany) gives a gross pension of 1,175.85 € per month (45 \* 1.0 \* 26.13).

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<sup>46</sup> For further information see also:

[www.bmgs.bund.de/downloads/Pension\\_insurance-Rentenversicherung.pdf](http://www.bmgs.bund.de/downloads/Pension_insurance-Rentenversicherung.pdf)

The pension point value is adjusted annually. This is done in general in relation to the growth of gross earnings as a starting point, but some special factors in the indexation formula curb the size of the adjustment. Firstly, this is achieved by taking into account the change of the contribution rates to the statutory pensions scheme and to the subsidised private pension scheme (Riester-factor) in the preceding year. Secondly, this is due to the so-called sustainability factor that measures the change of the number of contributors in relation to the number of pensioners. The pension adjustment can thus be considerably lower than the increase of average earnings, or even fall to zero, if an ageing of the population takes place. All pensions are adjusted annually in line with the change in the pension point value, irrespective of the year of retirement. (For detailed information on the adjustment formula see Annex)

Due to differences in per capita income, corresponding average income levels for the earning of pension points as well as the pension point value differ between Western Germany (before 1991) and the Eastern part of Germany. The (preliminary) average income in 2005 necessary for earning one pension point is 29.569 € per year for Western Germany and 24.879 € per year for the Eastern part of Germany. The pension point value is currently 26.13 € in Western Germany and 22.97 € in the East. Therefore, the pension models are also differentiated for both parts of the country.

In several pension reforms, beginning in 1992 and lately in 2004, an increase of the statutory retirement age was legislated. The transition period of this increase will be completed by 2012 for those born 1952 or later. From that point of time on, only two types of old age pensions will be available: regular old age pensions and pensions for severely handicapped people. The statutory retirement age for regular old age pensions will be 65 for both men and women. Only persons with at least 35 years of contributions will be able to retire at age 62. But if they do so, their pension entitlements will be reduced by 3.6 % for each year of early retirement. The statutory retirement age for severely handicapped people will be 63. As part of the reforms, the formerly lower retirement age for female employees and for the unemployed will also be increased from 60 to 65 by the year 2012.

## **6.2 Latest reforms**

The main reforms in the statutory pension scheme – with an explicit aim of securing its fiscal sustainability - started as early as 1992 with the Pensions Reform Act, by changing pension adjustment, gradually increasing the retirement age to 65 and introducing actuarial reductions in case of early retirement. In 2001 then, the first of the reforms not mirrored in the last projection exercise, brought further changes. They led to a long-term reduction of the pension level in the first pillar by modifying pension adjustment, introducing a new widow's/widower's pension [with a child component] and creating funded (voluntary) additional old-age pension provision in the second and third pillar. In 2003 measures to avoid an increase in the contribution rate, otherwise anticipated for 2004, were put into force (e.g. deferral of the annual pension adjustment). Finally, in 2004, the Old-age Pensions Insurance Sustainability Act (Rentenversicherungs-Nachhaltigkeitsgesetz) modified the pension indexation mechanism and introduced the "sustainability factor" mentioned above. Measures with the same effect were also introduced in the civil servants pension scheme.

In 2005 a change of the tax regime of contributions and pensions was legislated with the Old Age Income Act (Alterseinkünftegesetz). Until 2004 contributions to the pension scheme paid by employees were liable to taxes. On the other hand, statutory pensions were tax exempted apart from a taxation of the accrued income, which was 27 % of pension benefits at the retirement age of 65.

This taxation regime is known as a TTE system (Taxed contributions, Taxed accrued income, Exempted pension benefits) although in Germany only employees contributions but not employers contributions were taxed. The aim of the Old Age Income Act is to change this tax regime into an EET system, where contributions and accrued income are exempted from taxation but the pension benefits are completely liable to taxation. For this rearrangement a long transition period is provided. Contributions will be completely exempted from taxation in the year 2025 and pensions will be completely liable to taxation in 2040. Due to the change of the tax regime, tax revenues of pension benefits were estimated to increase from 4 % in 2004 to 9.5 % in 2050 for the purpose of this projection exercise.

### **6.3 Description of the pension models**

The pension models for the statutory pension scheme are managed by the Ministry of Health and Social Security in close collaboration with the German pension insurance (Deutsche Rentenversicherung). The models are used for setting the contribution rate and the annual pension adjustment as well as for medium and long term projections. The so-called "Schätzerkreis", a working group on pension funding assembling members of the Ministry, the German Pension Insurance and the German Federal (Social) Insurance Authority (Bundesversicherungsamt) is responsible for the projection of the financial development of the statutory pension scheme. The underlying assumptions are regularly discussed and agreed upon in a preceding consultation process that also involves other Ministries, e.g. the Federal Ministry of Economics and Labour and the Finance Ministry.

The pension models consist basically of two sub models, firstly a cohort model for the projection of the demographic impact on pension expenditure and secondly a partial equilibrium model for the calculation of the dynamic financial development regarding pension adjustment and contribution rates. As already mentioned above, the models distinguish between Western Germany and the Eastern part of Germany due to different pension point values. The models are written in FORTRAN and run under the MBS application.

#### **6.3.1 Source of data**

The models make use of numerous pieces of information, most data concerning pensions themselves are provided by the official statistics of the Deutsche Rentenversicherung. For national projections, produced in the context of the most recent pension reform, the long term demographic and macroeconomic assumptions were set by the governmental Commission on "Achieving financial sustainability for the social security system" and supplemented by short and medium term economic forecasts of the government. In this case, however, the commonly agreed (AWG) assumptions were used.

- number of pensions
- average pension benefit of the persons already retired
- new pensions
- average pension benefit of new pensions
- population projection and mortality rates (AWG scenario)
- labour market (AWG scenario)

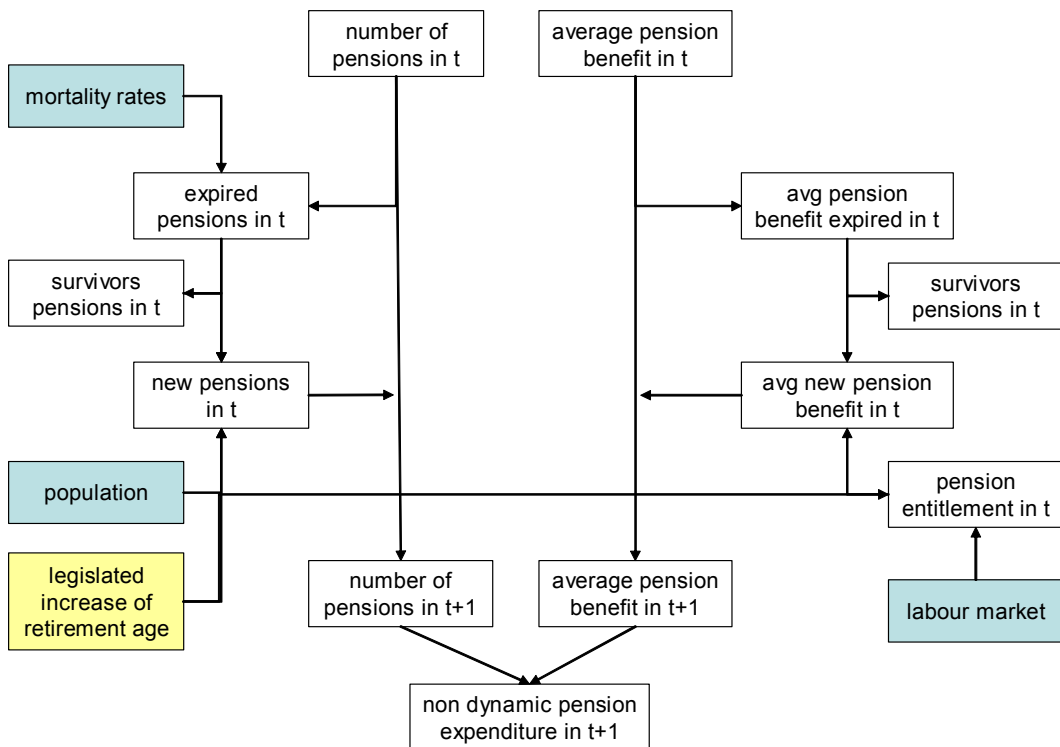
- wages (AWG scenario)

All items on pensions are disaggregated by age, gender, type of pension (old age/disability, survivor's pensions).

### 6.3.2 The demographic pension model

The demographic pension model is based on a cohort approach. In general the number of pensions in  $t+1$  (the model works with the number of pensions, not with the number of pensioners as it is possible to receive an old age pension and a survivor's pension at the same time) equals the number of pensions in  $t$  plus new pensions minus expired pensions. The same mechanism is used for the development of average pension benefits. The following figure illustrates the main dependencies of this model for Western Germany:

**Graph 6 - 1 The demographic pension model**



The number of the "expired" pensions by age and gender is equal to the number of pensions multiplied by the mortality rates given in the AWG population scenario. When old age pensioners

die, this leads - under the constraint of marriage probabilities - to newly granted survivors pensions. The newly granted old age and disability pensions are calculated using probabilities of pension entry estimated on the basis of past trends, while also taking into account the legislated increase of the statutory retirement age.

The projection of the average pension benefits is quite similar to the calculation of the number of pensions. In addition, the impact of changes in the labour market regarding unemployment and activity rates is taken into account projecting the pension entitlement. Also the deduction on pensions in the case of early retirement is considered.

Multiplying the number of pensions by the average pension benefit gives “non-dynamic” pension expenditure. As no indexation of pension benefits is taken into account within the demographic pension model, this result is only preliminary.

This model is slightly modified for the projection of pension expenditures in the Eastern part of Germany to consider differences in per capita income, probabilities of pension entry and pension benefits. However, it is assumed that activity rates, the share of insured persons in the statutory pension scheme and average income levels in both parts of Germany will converge. Therefore, probabilities of pension entry and pension benefits are also assumed to converge over time (by 2020, respectively 2050).

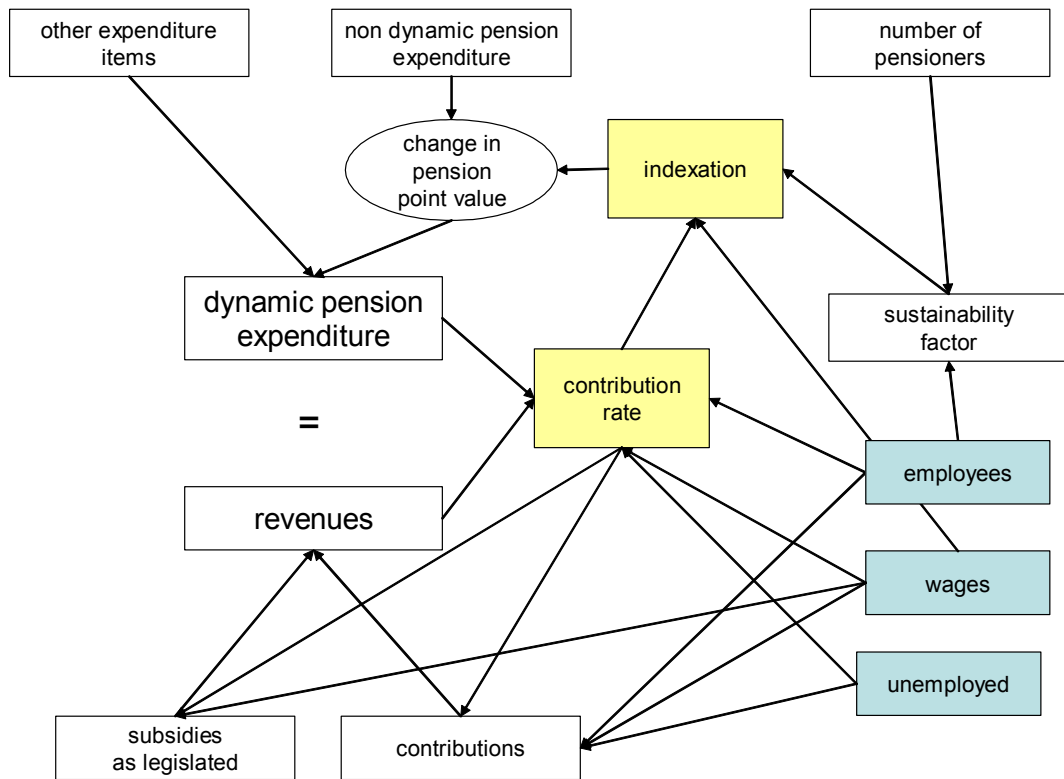
### **6.3.3 The financial pension model**

The financial pension model has the purpose to project dynamically evolving pension expenditures based on the non-dynamic pension expenditures and the macro-economic assumptions. The major driving force between “non-dynamic” and “dynamic” pension expenditures is the indexation of pension benefits or, more precisely, the calculation of the pension point value. Furthermore, the contribution rate for the statutory pension scheme is calculated by means of the financial pension model. This happens under the constraint, as stipulated by law, that revenues and expenditures have to be balanced in every year.

Starting from the non-dynamic pension expenditures, multiplied by the change in the pension point value, the model then shows the evolution of dynamic pension expenditure under consideration of other expenditure items (as rehabilitation or administrative costs). The indexation of the pension point value depends on the increase of gross wages (in this case given by the AWG), the change in the contribution rate and the sustainability factor, which is based on the change in the contributors/pensioner ratio as explained above.

The revenues of the pension system stem from governmental budgets and pension contributions. Flows from the budget are basically adjusted in line with wages and the contribution rate. The corresponding mechanism follows rules laid down by law. Contributions depend on the number of employees, the number of unemployed, the evolution of wages (AWG scenario) and on the contribution rate. The contribution rate is fixed annually under the constraint that revenues meet expenditures.

**Graph 6 - 2 The financial pension model**



### 6.3.4 Assumptions for the AWG projection

The assumptions agreed by the AWG are applied basically unchanged in the present exercise. Even though it was necessary to break down the demographic projections produced by EUROAT into separate figures for Eastern and Western Germany, the sum of the population in both parts of the country is almost identical to the AWG projection. The differences in absolute numbers are smaller than 0.2 % and the dependency ratio is exactly the same. Furthermore, as the German pension models are based on National Accounts, the adjusted labour force projections were used.

All legislated pension reforms are taken into account. The sustainability factor, in particular, is integrated into the indexation rules. Also the impact of the ongoing transition period of the introduction of pension reduction in case of early retirement and the increase in statutory retirement age to 65 is considered.

## Annex 1: The Adjustment Formula

Pensions are adjusted every year on 1<sup>st</sup> of July. The adjustment formula is stipulated as follows:

$$(1) \quad ppv_t = ppv_{t-1} * \frac{ae_{t-1}}{ae_{t-2}} * \frac{100 - rf_{t-1} - cr_{t-1}}{100 - rf_{t-2} - cr_{t-2}} * \left( \left( 1 - \frac{pc_{t-1}}{pc_{t-2}} \right) * \alpha + 1 \right)$$

$ppv$  = pension point value  
 $ae$  = average income based on National Accounts  
 $ae^\bullet$  = adjusted average income  
 $rf$  = contribution rate to subsidised private pension scheme  
 (2003: 0.5%, 2004: 1.0%, ... ,2010 ff: 4.0%)  
 $cr$  = contribution rate to statutory pension scheme  
 $pc$  = equivalent pensioners/contributors ratio  
 $\alpha$  = allocation factor = 0.25

In general, the pension point value is adjusted in line with the growth of average earnings but this increase is reduced by the so-called Riester-factor and the sustainability factor. However, the adjustment of the pension point value may not be lower than zero.

Regarding the calculation of the increase of average earnings, National Accounts figures are used as a basis. To take into account differences in the increase of average earnings based on National Accounts and average earnings of contributors to the statutory pension scheme, a correction factor is integrated within the formula: The time lag of this correction factor is t-3 due to statistical reasons. A lower increase of contributors' average earnings compared to National Accounts' average earnings leads to a decrease of the adjustment and vice versa.

$$(2) \quad ae_{t-2}^\bullet = ae_{t-2} * \frac{ae_{t-2} / ae_{t-3}}{ae_{t-2}^{ps} / ae_{t-3}^{ps}}$$

$ae^\bullet$  = adjusted average income  
 $ae$  = average income based on National Accounts  
 $ae^{ps}$  = average income of contributors to the statutory pension scheme

The so called Riester-factor leads to a reduction of the adjustment if the contribution rate e.g. to the statutory pension scheme has increased in the previous year. Up to 2011 a reduction of adjustment will also take place due to the implied increase of the contribution rate to the subsidised private pension scheme. For example, if the contribution rate to the statutory pension scheme increases from 19.5 % to 19.6 %, the adjustment is reduced by 0.13 percentage points.

$$(3) \quad \text{say: } \frac{ae_{t-1}}{ae_{t-2}} = 1.03 \text{ and}$$

$$\frac{100 - rf_{t-1} - cr_{t-1}}{100 - rf_{t-2} - cr_{t-2}}; \text{ e.g.: } \frac{100 - 4 - 19.6}{100 - 4 - 19.5} = 0.9987 \text{ and}$$

$$\left( \left( 1 - \frac{pc_{t-1}}{pc_{t-2}} \right) * \alpha + 1 \right) = 1.0 \text{ then}$$

$$ppv_t = ppv_{t-1} * 1.03 * 0.9987 * 1.0 = ppv_{t-1} * 1.0287$$

In order to maintain the long term financial sustainability of the statutory pension scheme, the sustainability factor is included in the adjustment formula. This factor causes a reduction of the adjustment if the number of those financing the system (contributors) decreases and/or if the number of pensioners increases. Therefore, the sustainability factor is calculated on the basis of the change of the pensioner/contributor ratio. As changes in part-time/full-time work should be eliminated, the number of pensioners and contributors are calculated on the basis of equivalents, which are defined differently for Western and Eastern Germany.

$$(4) \quad pc = \frac{ePen_W + ePen_E}{eCon_W + eCon_E}$$

$pc$  = pensioner/contributor ratio  
 $ePen$  = equivalent pensioners  
 $eCon$  = equivalent contributors  
 $W, E$  = Western, Eastern Germany

The number of equivalent pensioners is calculated as follows:

$$(5) \quad ePen = \frac{PE}{sp}$$

$PE$  = pension expenditure  
 $sp$  = standard pension,

The standard pension is a pension based on 45 pension points multiplied by the current pension point value (e.g. 26.13 € / month in Western Germany in 2004). By dividing the pension expenditures by a "standard pension" the number of "standard" or equivalent pensioners is obtained.

A similar approach is used for calculating the equivalent contributors: Total contributions are divided by a "standard" contribution, which has to be paid for earning one pension point, to receive the number of equivalent contributors.

$$(6) \quad eCon = \frac{CR}{sc}$$

$CR$  = contribution paid by employees and the unemployed  
 $sc$  = standard contribution

Summing up, the effect of the sustainability factor is as follows: For example an increase of life expectancy of 10 % would lead to an increase of the number of pensioners of also 10 % and therefore - at a first view - to the same increase of expenditures. But due to the sustainability factor the annual pension adjustment would be lowered, so that the increase of pension expenditures in this case would be below 10 %. Therefore the increase of the financial burden on contributors is limited. Regarding the number of contributors, the same mechanism operates. Hence, the impact of the sustainability factors depends on the demographic and economic development and therefore differs in respect to the underlying assumptions.



## **7. Estonia**

Tanel Steinberg, Ministry of Finance

### **7.1 General overview**

Estonian pension system is based on the three-pillar approach, where the first pillar is the state pension fund and which is included to general government accounts. Second pillar is mandatory to newcomers to the labour market (and to all the persons who have born 1984 and later) and third pillar is voluntary pension scheme. Second and third pillar pension funds are not included in general government accounts but second pillar funds are included in context of EPC AWG projection exercise because of it having significant impact on future pensions.

A multi-pillar pension scheme rests on the assumption that income in retirement age is to be formed from several different sources, each with different legal, organisational and financial principles. The current legal principles of state pension insurance are effective since 1999-2000. Then it was established that the right and the amount of the future old age pension is tied to the amounts of social tax paid by or on behalf of the person over the full career. Mandatory funded pension started from 2002. Possibilities for supplementary funded pension were created in 1998.

The first pillar of the Estonian pension scheme is state pension insurance based on pay-as-you-go financing and covers three social risks: old age, permanent incapacity for work and loss of a provider.

Protection ensured by state pension insurance includes two levels:

- 1) national pensions ensured for all residents of Estonia;
- 2) old-age, incapacity-for-work and survivor's pensions based on former work input.

A right to national pension on the basis of age starts from the age of 63, on condition that the pension applicant has lived in Estonia at least 5 years. National pension is paid in the fixed rate, in the so-called national pension rate.

In 2005, the retirement age for men is 63 and for women 59 years and 6 months. The age limit for women is rising and will be equalized with that of the men by 2016. The qualification period for old age pension is 15 years of pensionable service in Estonia.

Old age pension includes three parts: base amount, length-of-service component and insurance component. The base amount is a flat-rate element. The length-of-service component applies to periods of pensionable service through the end of 1998 and depends on the length of service (in years). The insurance component applies to pensionable service from 1999 and depends on social tax paid by the person (in case of self-employment) or on behalf of the person by the employer or by the state.

Since 1999, old age pension rights are acquired only on basis of social tax paid. Until 1999, pension rights were determined on the basis of the length of service. The pension formula includes a gradual transition from the old rules to the new rules. For persons who withdraw from work before 1999, the state pension depends only on the flat rate base amount and the length of service. For persons who entered the labour market in 1999 or later, the state pension also consists of two parts: base

amount and insurance component. In essence, the three-part pension formula applies only to those generations who have acquired pensionable service both before and after 1999.

The new pension formula used since 2000 can be described as follows:

$$P = B + s \times V + \sum A \times V,$$

where:

P – amount of pension (in EEK);

B – base amount (in EEK);

s – pensionable length of service (up to 1999, in years)

$\sum A$  – sum of annual pension insurance coefficients;

V – cash value of one year of pensionable length of service and the pension insurance coefficient 1.0 (in EEK).

To calculate the annual pension insurance coefficient for a given individual, the amounts of state pension insurance part of social tax paid or calculated for the person in the specific calendar year are divided by the Estonian annual average amount of the pension insurance part of social tax. Hence, annual pension insurance coefficient reflects the ratio of social tax calculated on the earnings of the person to the Estonian average.

Real values of pensions are influenced by the values of the base amount (B) and the cash value of the annual score (V), which are subject to regular indexation (see below). From 1 July 2005, the base amount is EEK 858 (ca 28% of the average old age pension) and the cash value of annual score is EEK 42.83.

State pension insurance is financed mainly from the state pension insurance part of social tax. The rate of state pension insurance part of social tax is 16% for persons having joined the II pension pillar and 20% for those who have not joined. The expenses of national pensions and pension supplements are covered from other revenues of the state budget. If necessary, the state budget shall also cover any current deficit of the pension insurance budget, i.e. any difference between social tax revenues and expenditures on pensions.

Increasing of pensions in payment is performed through regular indexation. The index depends with equal weights (50%-50%) on the increase of social tax revenues and the increase of consumer price index. However, different government coalitions have in addition to indexation also applied supplementary ad hoc pension increases.

Besides the general state pension insurance, the Estonian pension system also includes some special schemes – old age pensions at favourable conditions and superannuated pensions, enabling representatives of specific professions or persons with specific social status to retire before the general retirement age. Also, some categories of civil servants (for example judges, prosecutors, officials of the State Audit Office, police officers, members of the Defence Forces, Chancellor of Justice) have a right to favourable special pensions.

The second pillar of the Estonian pension system is a mandatory funded pension based on full pre-financing and covering only the risk of old age. The II pillar pension funds are administered by private asset management companies. In essence, the II pillar is an individual savings scheme, where the size of pension depends on the total contributions over the career and rate of return of the pension fund.

Participation in the II pillar is mandatory for persons born in 1983 or later. People born prior 1983 and participating at the labour market can join the II pillar on voluntary basis. The rate of the II pillar contribution is 6% of wages – the employee pays 2% from gross wages, which is supplemented by the state with 4% of gross wage on the account of social tax paid by the employer (see also p.3.1.2).

The retirement age in the II pillar is the same as in I pillar. An additional requirement to receive a funded pension is the fulfilment of a qualification period of 5 years, which has to be passed from the date of commencing the payment of contributions. II pillar was launched in July 2002. Thus the payment of first benefits shall commence from 2009 (benefits on the basis of inheritance starting from 2007).

In the beginning of October 2005, there were more than 460 thousand switchers in mandatory funded pension scheme. More than 50% of employees and more than 50% of eligible persons have joined the II pillar (around 2/3 of switchers are employed).

## **7.2 The pension model**

### **7.2.1 Name and organisation responsible**

Long-term pension budget model that includes all types of pensions (incl. II pillar pensions), other social benefits are excluded. Finance Policy Department of the Ministry of Finance of Estonia is responsible for managing the model.

### **7.2.2 Type of model**

The model is a simulation and forecasting model of social expenditures and revenues under alternative economic, demographic and legislative assumptions. The model is a macro-level numerical partial equilibrium top-down model based on historical relationships and identities constructed as a set of Excel files.

### **7.2.3 General purpose and use of the model**

The model was created in the context of pension reform. The main purpose of the model is to simulate different policy options, understand what will happen in future, make different scenarios etc.

## **7.3 Basic data required to run the model**

### **7.3.1 Sources of data**

For population and labour force there are used AWG projections (there is also possibility to use national assumptions). Data for I pillar pensioners comes from Estonian Social Insurance Agency, data for mandatory funded pillar pensioners comes from Estonian Central Depository of Securities. Wage statistics comes from Estonian Tax and Customs Board.

### **7.3.2 Organisation of data**

Most data for age cohorts (from 0 to 110) is available for both men and women. Only data on some special pension scheme is available in aggregated terms, but the number of these pensioners is around 1% of total. Basic units are 1 EEK and 1 person.

### **7.3.3 Coverage and possible exceptions**

All pension schemes are covered with this model (except III pillar – voluntary pension scheme, which is classified outside of general government).

## **7.4 Assumptions and methodology used in the calculation of main variables**

### **7.4.1 Underlying assumptions agreed with AWG**

Population forecast, mortality rate, migration, unemployment and employment rates, and also macroeconomic assumptions have been used in the estimates. Real wage growth in long-term is assumed to be equal to labour force productivity.

### **7.4.2 Additional assumptions and methodology**

- Wage structure development by age and gender to calculate contributions and pensions.
- Development for the number and structure of different pensioners by age and gender (according to the changes in law).
- II pillar switchers by age and gender, their wage difference to the total population wages etc.

## **7.5 Incorporation of future effects of enacted reforms**

### **7.5.1 Retirement decisions**

Increasing retirement age of the women is taken into account. Otherwise retirement pattern remain mostly the same, there is only small difference that is resulted from different labour force participation rates in older ages.

### **7.5.2 Taking up of early retirements**

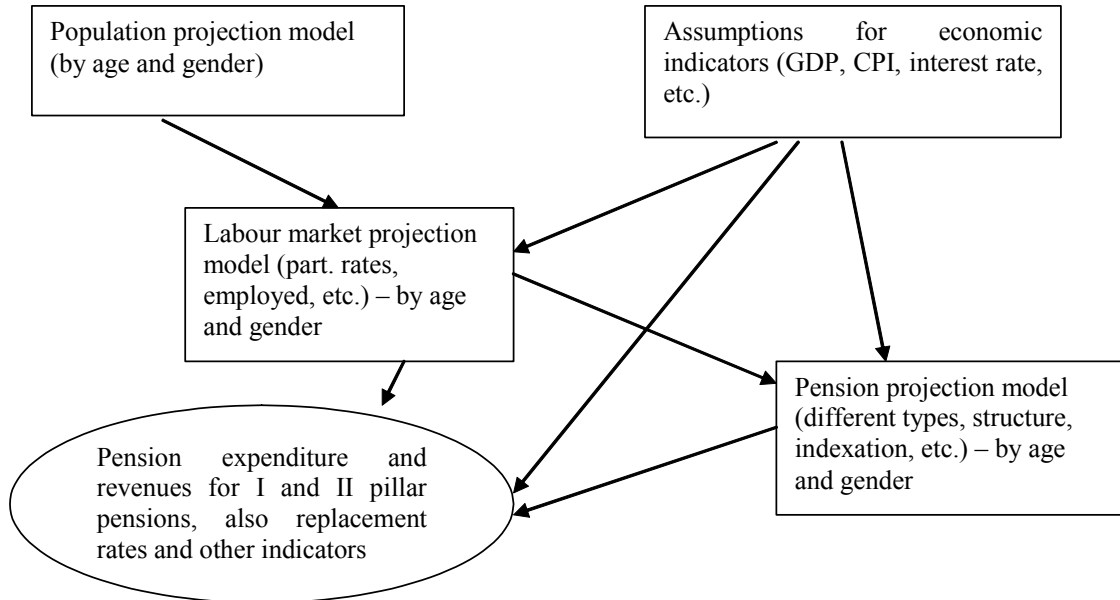
Early retirement is included to the model.

### **7.5.3 Application of indexation rules and adjustments**

Indexation rules will remain the same as now. Current indexation formula requires that the pensions be annually increased by the sum of half of the social tax increase and half of inflation.

## 7.6 Description of the projection (main equations)

Graph 7 - 1 The structure of the pension model



### **Population projection model:**

The model applies initial fertility, mortality and migration rates age specifically to a statistically observed initial population. The model can accommodate alternative assumptions regarding the future development of fertility and mortality rates.

To carry out projections the following data is used:

- Initial population:  $\{ L(x,0,s) ; \text{for all } x, s \}$
- Mortality rates:  $\{ q(x, t, s) ; \text{for all } x, t, s \}$
- Fertility rates:  $\{ F(x, t) ; \text{for } x=15, \dots, 49, \text{for all } t \}$
- Sex ratio of the newborn:  $SR$
- Net migration:  $\{ N(x, t, s) ; \text{for all } x, t, s \}$

There  $x$  - age,  $t$  - time,  $s$  - gender.

### **Assumptions for economic indicators:**

The model contains basic macro-economic assumptions as inputs (on GDP, labour productivity and wage growth, future inflation etc). These assumptions have automatic links and also feedback in the model.

Future productivity increases and average unemployment rates (for men and women) are exogenous inputs (assumptions). These two assumptions allow to see the impacts of less or more to GDP development. Future inflation rates (GDP deflator and CPI) are also exogenous. GDP growth rate for each year results from the change of employees and change of labour productivity.

Real GDP growth = (1+labour productivity growth)\*(1+change of employees) - 1

***Labor market projection:***

Labour force by age and sex is calculated by multiplying population by labour force participation rates for single ages up to the age of 100. In projections it is possible to change the level and the structure of participation rates. Unemployment is calculated by using general trend of unemployment rates and change in unemployment age structure. Employed persons are the difference between the labour force and the unemployment.

***Pension projection:***

In general the model calculates the number of insured who are actually contributing (for the I and II pillar) by applying compliance rates to the employed, by individual age and sex and also their actual wage, from which they pay taxes (this differs from national average wages). Numbers of pensioners for I and II pillar old age pensioners are calculated by applying retirement rate to the population. Difference between the number of pensioners of age x in year t and the surviving pensioners of age x-1 of year t-1 is taken as the number of new pensioners. Other pensioners (disability, survivor) are calculated by initial data and change vector as follows:

Disability pensioners = population \* disability structure base year \* disability change

Average pension amounts for all ages for old age pensioners are calculated on the basis of actual pension formula:

$P = B + s \times V + \sum A \times V$ ,  
see description above.

Base and V values are indexed, which results from macroeconomic and labour force projections. S value is real data and this has remained unchanged from 1999. A values come from wage statistics. Averages for all age cohorts are used.

To calculate mandatory funded pillar pensions, contribution rate is applied to the wage and these contributions will be accumulated with return rate. Finally it will be turned into annuities, using annuity return rate and unisex life expectancy.

***Output:***

Outputs of the projections are the overall expenditure and revenue of the public pension budget, II pillar assets, transfers from I pillar to II pillar, average pensions and replacement rates, different system indicators etc. For this projections are imported from other parts of the model and then consolidated to overall level.

## **8. Spain**

Juan Burdiel, Ministry of Economics  
Juan Varela, Ministry of Economics

### **8.1 Description of The Public Pension System**

#### **8.1.1 The pension system**

The public social security system is based on two schemes: basic scheme (non-contributory system) and labour-market-based social security scheme (contributory system).

The basic scheme is granted, as a general rule, to people with income below a threshold approved every year in the Budget Law (4,043.06 euros per year in 2005). The benefit is means-tested and no previous contribution is required. The scheme is managed by the central and regional governments. It was introduced in 1999 and it is gradually replacing the previous assistance scheme that is being phased out.

The labour-market-based social security scheme is a mandatory public system. The part of the scheme that covers the self-employed and the employees in the private sector and the public employees of the regional and local public administrations is administered and managed by the Social Security (SS), as a pay-as-you-go system. The military and the central government employees have their pensions administered and managed by the state (Clases Pasivas del Estado, CPE)<sup>47</sup>.

Pensions from the SS are financed by contributions from employers and employees and by state transfers to finance minimum pension supplements. Pensions from the CPE are financed by contributions from the employees and from the state. Pension benefits are taxed as labour income, while compulsory social contributions are excluded from the income tax base.

Private pension plans are voluntary and cover both individual and occupational pension funds (62 and 38 percent of total private pension plans, respectively, in 1998). They are funded and usually contribution-defined schemes. The occupational private pension schemes are agreed in the wage bargaining framework. They are usually financed by employers and employees. The pension funds derived from private pension plans have to be administered and managed by an authorised financial entity outside the companies. Private pension benefits are also taxed as labour income. Contributions to private pension schemes enjoy a favourable tax treatment.

#### **8.1.2 Eligibility requirements**

Eligibility requirements for old age pensions under the SS Contributory Public Pension System are 65 years of age and 15 contribution years. Under the Contributory Public Pension System (CPE) for the military and central government employees, the eligibility requirements for old age pensions are 65 years of age and 15 years of contributions. Since 1997, civil servants can retire after the age of 65 up to 70 on a voluntary basis.

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<sup>47</sup> The Social Security pensions are earnings-related pensions with a minimum and a maximum amount. The CPE pensions are based on a flat-rate scheme.

Under the SS scheme, there exists a possibility of early retirement with reduced pension benefits for workers 61 and older, provided very long contribution careers and being unemployed<sup>48</sup>. Exceptionally for people who have been contributing since before 1967, early retirement can be at the age of 60. Under the CPE scheme, early retirement is possible at 60, provided workers have contributed for at least 30 years or more.

Under both schemes, disability pensions requirements take into account the level and the cause of disability, the age of the worker and whether or not the worker is currently employed and contributing.

Under SS, widow(er)s, orphans and relatives of workers and of old age or disability pensioners are eligible to survivors pensions. In the case of active, contributing workers, contribution requirements are different according to the cause of death. In the case of pensioners, no period of contribution is required. Under CPE, widow(er)s, orphans or relatives of deceased workers are beneficiaries of survivors pensions.

### **8.1.3 Calculation method for pension benefits. Indexation. Taxation**

The calculation method for pensions managed by SS is earnings-based. The pension benefit is related to the number of years of working life and the so-called regulatory base (RB) linked to the contributions paid.

In particular, only if the worker has contributed at least 35 years, is he/she entitled to the full old-age pension associated to his/her regulatory base if he/she retires at 65. On the other hand, if the number of years of contributions is equal to the minimum required (15 years), the worker gets only 50 percent of the RB. The percentage of the RB increases by 3 percentage points for each additional year of contribution until 25 and by 2 percentage points for each additional contribution year afterwards, up to 35.

And as for the RB, it is calculated dividing by 210 the contribution base (CB) of the 180 months prior to retirement. The contribution base (CB) is essentially the monthly earned income. There are minimum and maximum CBs, so that pensions have also both limits. The minimum CB is similar to the minimum wage<sup>49</sup>. CBs corresponding to the 24 months just prior to retirement are computed in nominal terms. The remaining CBs are adjusted according to the evolution of the Consumer Price Index (CPI).

There are minimum and maximum pension benefits. In 2005, the maximum pension benefit was 30,228 euros per year. Minimum pension benefits depend on pensioner age and household composition.

In the case of early retirement, the pension benefit is reduced by 8 percent for every year or fraction of year before 65. If the worker has contributed for at least 40 years the percentage of reduction is only 6 percent per year.

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<sup>48</sup> See “Recent reforms” part, for the specific detailed requirements

<sup>49</sup> In the projections exercise, pensions have not been capped.



The amount of disability pensions varies according to the level and type of disability. The RB corresponding to these pensions is calculated differently from the one corresponding to old age and the pension may also differ depending on age. Concerning full permanent disability, the pension amounts to 55 percent of its RB, which can be increased by 20 percent in the case the worker is 55 and cannot work. Conversely, for absolute permanent disability the pension benefit amounts to 100 percent of RB.

Regarding survivors pensions, the pension benefit for the widow(er) amounts to 52 percent of the deceased spouse's RB, also defined specifically for such contingency. For the orphans, it is 20 percent of RB. However, in general, the total pension benefit for the family cannot exceed 100 percent of the RB. For other relatives, the pension benefit amounts to 20 percent of the RB, but it can be increased to 45 percent if there are no widow(er)s nor orphans.

For pensions managed by CPE, the calculation method is different. RB is fixed and depends on which group (listed from A to E) the civil servant belongs to. The pension benefit depends also on the number of years worked. If the working life is at least 35, the worker gets the full RB. This method is applied also for early retirement and for disability pensions. In case of permanent disability occurring while working, RB is multiplied by 2. For survivors, pensions are calculated as: 50 percent of the deceased spouse's RB for the widow(er); 25 percent of RB for a single orphan; 10 percent for each orphan when there are more than one plus an extra 15 percent to share among them; 15 percent for other relatives.

All pension benefits are indexed to expected inflation. If actual inflation is above the expected one, the difference is paid to all pensioners.

All pension benefits are taxed as labour income in general. Only certain disability pension benefits are tax-exempted. The average effective withholding tax rate in 2003 for pension income was 4.98 percent.

#### **8.1.4 Average retirement age and average replacement rate**

Under the SS, the overall (old age and early retirement) average retirement age was 63.6 years in 2005, whereas the average retirement age in the case of disability was 50.7 years in 2004.

The gross legal full<sup>50</sup> (maximum) replacement ratio for old age pensions was 91 per cent in 2005.

#### **8.1.5 Recent reforms on gradual and flexible retirement**

Since 2001, new reforms of the public pension system have been implemented. The most important ones are embodied in Law 35/2002 of 2002 on gradual and flexible retirement. It includes:

- The mandatory retirement age in the private sector (65 years) is abolished. Workers can remain active after 65 with an increase in their pension benefits of 2 percent for each additional year of work, and payments of social contributions by employers and workers with indefinite-term contracts are waived.

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<sup>50</sup> Retirement at the age of 65 years with 35 years of contributions.

- For workers reaching the age of 60, social contributions are reduced by 50 percent. This figure is increased by 10 percentage points every additional year until it reaches 100 percent, at the age of 65.
- Early retirement is possible from 61 years as long as the worker has paid social contributions for at least 30 years, has not left the company on a voluntary basis, and has been registered as unemployed for at least 6 months.
- Early retirement pension benefits are reduced. The reduction coefficients of the pension benefit for each year of early retirement are the following ones:
 

Years of contributions	Reduction. %
30	8.0
31-34	7.5
35-37	7.0
38-39	6.5
40+	6.0
- Between 60 and 64, it is possible to combine partial pension and a part-time job, if working hours are reduced between 25% and 85%. Another employee must replace the remaining working hours left by the partial pensioner. 15 years of contributions are required.
- It is possible to defer the take-up of pension after the normal retirement age. For people from 65 years old and with 35 years of contributions, the amount of the pension may exceed 100% of the calculation base. The benefit increases by 2% per year of deferral.
- From the age of 65 on, it is also possible to combine partial pension and part-time job, the pension benefit being reduced according to the length of the working day. In this case, there is no obligation to replace the remaining working hours.
- Further reforms are currently under discussion. With the new 2006 agreement on social security measures and the 2007 Draft Law, Early and Late retirement rules will change:
  - a) For people entering the system after 1967, the possibility for gradual retirement and partial pension starts from 61 years old (instead of 60); working hours must be reduced between 25-75%; partial retired worker must have been 6 years or more with the last employer and contributed 30 years or more in total (instead of 15).
  - b) Workers who have contributed 15 years or more (instead of 35) and continue working after 65 years old will increase their benefit by 2% of the base of calculation per additional year. The increase is 3% with 40 years of contributions. Pensioners entitled of a maximum pension entering retirement with 66 years or more will receive an annual lump sum (2% of the maximum pension per additional year after 65, 3% with 40 years of contributions).

## 8.2 The Projection Model

### 8.2.1 Coverage of the pension projections

The concept of public pensions used in the projections includes all kind of contributory public pensions and part of non-contributory public pensions, according to the following definitions:

**Contributory Public Pensions:**

- Old age and early retirement pensions
- Disability pensions
- Survivors pensions

**Non-contributory Public Pensions:**

- War pensions
- Other non-contributory pensions

**Old age and early retirement pensions:** includes all age pensions for people who are 65 and more plus old age pensions for 60-64 year old persons (early retirement pensions). It includes public pensions for private sector employees, public sector employees (both under SS and CPE), the self-employed and minimum pensions. It also includes the SOVI pensions (pensions for persons having contributed before 1967 to old mutual pension schemes).

**Disability pensions:** includes all disability public pensions for private sector employees, public sector employees, the self-employed and minimum pensions. Since 1997, disability pensions for persons older than 64 years are considered by the Social Security administration as old age pensions.

**Survivors pensions:** includes all survivors public pensions for private and public sector employees, the self-employed and minimum pensions.

**War pensions:** includes civil war (1936-1939) injury and survivors pensions. The total amount of these pensions are declining and will vanish with time.

**Other non-contributory pensions:** includes the remains of former public pension schemes to be extinguished, and means-tested assistance pensions.

**Table 8 - 1 The public pension expenditure by type of pension benefit**

<b><u>Type of pension</u></b>	<b><u>Percent</u></b>	<b><u>Percent of GDP</u></b>
<b>Total</b>	<b>100.0</b>	<b>8.8</b>
<b>Contributory Public Pensions:</b>	<b>96.7</b>	<b>8.5</b>
Old age and early retirement pensions	63.2	5.6
Disability pensions	11.6	1.0
Survivors pensions	21.9	1.9
<b>Non-contributory Public Pensions:</b>	<b>3.3</b>	<b>0.3</b>
War pensions	0.7	0.1
Other non-contributory pensions	2.5	0.2

As said before, the projections include all contributory public pensions and war pensions (part of the non-contributory public pensions). This means that the projections include 97.5 percent of total public pension expenditure. The “Other non-contributive pensions” have not been included in the projections due to the obvious difficulties to estimate their future evolution.

## 8.2.2

### Description of the model

Four independent models have been used for the projections:

**Model 1.** A model for simulating public pension expenditure administered by the Social Security, including old age and early retirement pensions for private sector employees, the self-employed, the public sector employees of the regional and local administrations, and their corresponding minimum pensions.

**Model 2.** A model for simulating public pension expenditure administered by the Social Security, including disability pensions for private sector employees, the self-employed, and the public sector employees of the regional and local administrations.

**Model 3.** A model for simulating public pension expenditure administered by Social Security, including survivors pensions for private sector employees, the self employed, and the public sector employees of the regional and local administrations.

**Model 4.** A model for simulating public pension expenditure for public sector employees of the central administration, administered by the State (CPE), including old age and early retirement pensions, disability pensions, survivors pensions, minimum pensions, and war pensions.

The relationship between public pension expenditure estimated by the models in the projections and the distribution of total public pension expenditure showed in Table 8 - 1 can be seen in Table 8 - 2 and Table 8 - 3.

**Table 8 - 2 Public pension expenditure by schemes in 2004**

<u>Scheme</u>	<u>Percent</u>	<u>Percent of GDP</u>
<b>Total</b>	<b>100.0</b>	<b>8.8</b>
<b>Contributory Public Pensions:</b>	<b>96.7</b>	<b>8.5</b>
SS public pension system	87.3	7.7
CPE scheme	9.4	0.8
<b>Non-contributory Public Pensions:</b>	<b>3.3</b>	<b>0.3</b>
SS public pension system	2.6	0.2
Assistance pensions	0.1	0.0
CPE war pensions	0.7	0.1

**Table 8 - 3 Public pension expenditure by models**

<u>Scheme</u>	<u>Percent</u>	<u>Percent of GDP</u>
<b>Total</b>	<b>100.0</b>	<b>8.8</b>
<b>Total contributory and war pensions:</b>	<b>97.5</b>	<b>8.6</b>
Model 1: SS old age, early retirement, and minimum pensions	57.6	5.1
Model 2: SS disability pensions	10.5	0.9
Model 3: SS survivors pensions	19.2	1.7
Model 4: CPE old age, early retirement, disability, survivors, minimum and war pensions	10.1	0.9

The four models are deterministic. The macroeconomic and demographic variables used in the projections are exogenous in the four models.

The four models simulate the net number of pensioners of each category every year, their average pension benefit, and the total pension expenditure per year. The basic model works through the three following steps:

1. Projection of demographic variables:
  - Projections of the number of pensioners
  - Projections of new entrants into the pension system (registrations)
  - Projections of people leaving the system
  - Projections of common pensioners (pensioners staying that year in the system)
  - Projections of pensioners with minimum supplements
2. Projection of quantitative variables:
  - Average contribution bases
  - Average pension benefit of new registrations
  - Average pension benefit of people leaving the system
  - Average pension benefit of common pensioners
  - Average minimum supplements

### **8.3 Results**

The description of models 1, 2, and 3 are annexed to this Country Fiche, including estimates of the number of pensioners, average pension benefits, total pension expenditure, and policy sensitivity analysis. As for the CPE scheme, model 4 is an application of models 1, 2, and 3 to the specific characteristics of public service in the central administration.

Pension expenditure projections are made regularly. They are published by the Government on a non regular time-basis. The last Government official publication took place in 2005 within the European open method of co-ordination in the field of pensions. The Parliament, social partners and the public regularly acknowledge, study and use official and unofficial projections made by the Government and by other public and private institutions, and researchers for their discussions.

### **8.4 Current Policy Scenario**

The underlying assumptions are the common ones agreed by the Ageing Working Group (AWG).

#### **8.4.1 Demographic assumptions**

The projections use the ad-hoc AWG demographic scenarios provided by Eurostat and national institutes for statistics. The baseline demographic scenario for Spain assumes an increase of total

population of 1.5 percent in the period 2004-2050, and a working age population (16 to 64) decrease of 21.0 percent.

At the same time, the population older than 64 is projected to increase by 110.5 percent, more than twofold. And the population older than 79 is projected to increase by 199.0 percent, around threefold.

The ratio of the population older than 64 to working age population is projected to increase from 24.6 percent in 2004 to 65.6 in 2050. This ratio would be very high relative to the European Union average (51.4 percent) and the highest of the twenty five countries in absolute terms. Taking into account that the old age dependency ratio in 2004 is very similar to the European Union average (24.5 percent), the evolution of this ratio throughout the projection period shows the significant ageing process assumed in the projections for Spain relative to the European Union.

The ageing process that started to accentuate in Spain in the mid eighties would slow till around 2010 due to the consequences of the civil war (1936-1939) and it would accelerate later on. The acceleration would be more pronounced after 2020, especially after 2030, and it would slow down again after 2045.

Two of the three key demographic assumptions behind this scenario, the fertility rate and annual net migration flows deserve some considerations. According to AWG assumptions, the fertility rate, 1.30 in 2004, would converge progressively to 1.40 around 2020 and would be kept constant at this rate up to the end of the projection period, the lowest rate in the Union (as the one for Italy). There are many uncertainties surrounding future fertility rates. However, since 1998 an increase in the number of births, in the fertility rate, has been observed due to the increase in the number of immigrants.

AWG migration assumptions (508 thousand net immigrants in 2004 which would decrease rapidly down to 112 thousand in 2010, decreasing down slowly to 102 thousand in 2050) seem questionable. The so-called push (supply of labour force) and pull (demand of labour force) factors seem to have been taken not very consistently with the demographic evolution shown in the scenario.

AWG base demographic scenario for Spain shows a dramatic fall of the labour force of 21.0 percent in the projection period. At the same time, it seems that there would be a dramatic increase of labour supply in neighbouring countries with significant lower income per capita and large unemployment rates. It seems quite reasonable to expect larger immigration flows than those projected by AWG in the base scenario, especially when the expected fall of the labour force is larger, that is, from 2025 to 2050.

#### **8.4.2 Labour-market assumptions**

As a result of the agreed labour-market assumptions, the total participation rate (ratio of total labour force to total population between 15 and 64) would increase during the projection period 9.2 percentage points, the largest increase of the Union only after Cyprus. The bulk of this increase would correspond to the female participation, narrowing down the gap between male and female participation rates from 25 percentage points in 2003 to 12 percentage points in 2050.

The unemployment rate would decrease down from 11.6 percent in 2003 to 7.0 percent in 2012, keeping this rate constant up to 2050.

Based on these assumptions, the ratio of the employed to total population between 15 and 64 would increase throughout the projection period from 59.7 percent in 2003 (64.6 in the Union) up to 71.4 in 2050 (70.9 in the Union). Nevertheless, due to the fall of working-age population the employment growth rate would start to be negative in 2022.

The total number of the employed would increase 23 percent between 2003 and 2025, decreasing 22 percent between 2025 and 2050. As a whole, the number of the employed would decrease 3.8 percent between 2003 and 2050.

This radically different evolution of employment in the first and the second part of the projection period is in part due to the assumptions used. While assumptions on migration, participation and unemployment rates show clear progress in the first half of the projection period, in the second half of the projection period the assumptions regarding those variables keep them practically constant over the projection period. This produces a notable deterioration of employment figures.

### **8.4.3 Macroeconomic assumptions**

The AWG production function approach has been used. After the extrapolation up to 2009 of total factor productivity (TFP) past evolution, it is assumed the convergence for all EU15 countries of TFP growth rate in 2030 (1.1 percent per year)<sup>51</sup>. The investment/GDP ratio is kept constant up to 2010. Afterwards, it converges to a constant capital/labour ratio in 2030. As a consequence, labour productivity growth is constant and the same one for all countries from 2030 up to 2050 (1.7 percent per year). In Spain, the labour productivity annual average growth rate for the whole projection period 2004-2050 would also be 1.7 percent.

Due to the negative contribution of employment in the second half of the projection period, the potential growth rate would slow down from 3.0 percent per year on average in the period 2004-2010 to 0.6 percent per year on average in the period 2031-2050.

The relative GDP per capita level *vis à vis* the EU15 would go from 85 percent in 2004 to 81 percent in 2050. The relative labour productivity level *vis à vis* the EU15 would go from 91 percent in 2004 to 88 percent in 2050.

The AWG production function approach produces strange results in some cases as the inputs of the production function are not homogeneous and comparable across countries. Moreover, it is assumed a convergence process in TFP growth rates but not in TFP levels. All in all, there is ample room for improvement of this approach.

#### **Other assumptions**

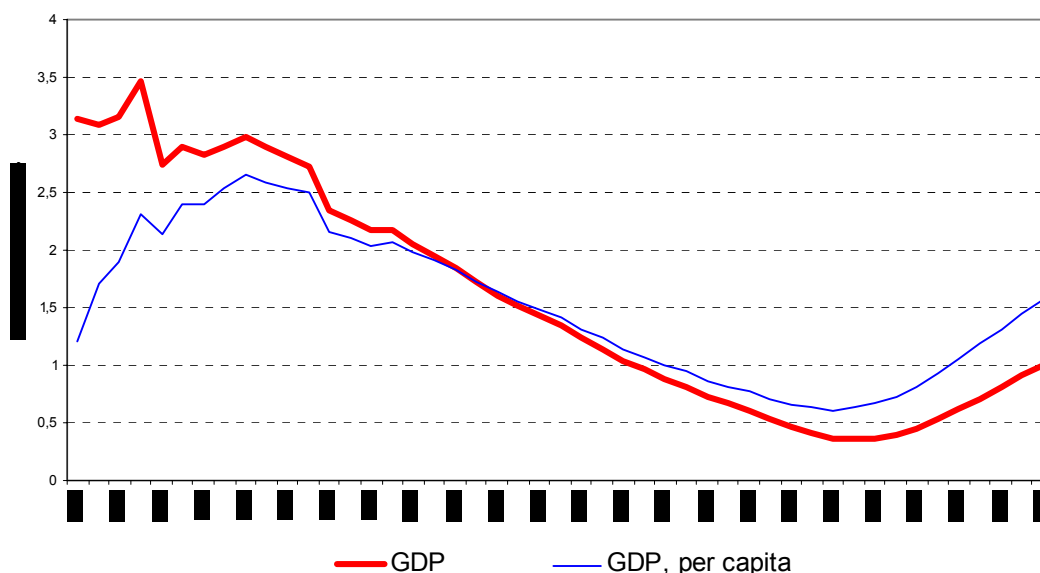
GDP deflator and inflation growth rates are kept constant at 2 percent per year in the projection period. Real interest rates are kept constant at 3 percent. To project public debt, a convergence period of ten years has been used (from the implicit interest rate in 2004 to this 3 percent rate).

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<sup>51</sup> Due to the strange results in the case of Spain, the minimum TFP growth rate would be zero, and the growth rate of 1.1 percent would be achieved in 2012 instead of 2030.

As a result of the macroeconomic and labour-market assumptions, along with the demographic scenario, real GDP growth, both in absolute and in per capita terms, shows a downward profile, which is accentuated in the period 2020-2040, with a recovery foreseen for the last decade of the projection period. The annual average growth rate of real GDP between 2004 and 2050 would be 1.6 percent.

**Graph 8 - 1 Annual growth rates of GDP and GDP per capita, 2004-2050**



## 8.5 Presenting And Explaining The Results

Table 8 - 4 and Graph 8 - 2 show the main results. According to these projections, total pension expenditure would increase from 8.6 percent of GDP in 2004 to 15.2 percent of GDP in 2050. Pension expenditure relative to GDP would remain broadly stable from 2004 until 2020 but then would accelerate until 2045. After 2045, pension expenditure as a share of GDP would stabilise and would decrease in the last four years up to the end of the projection period.

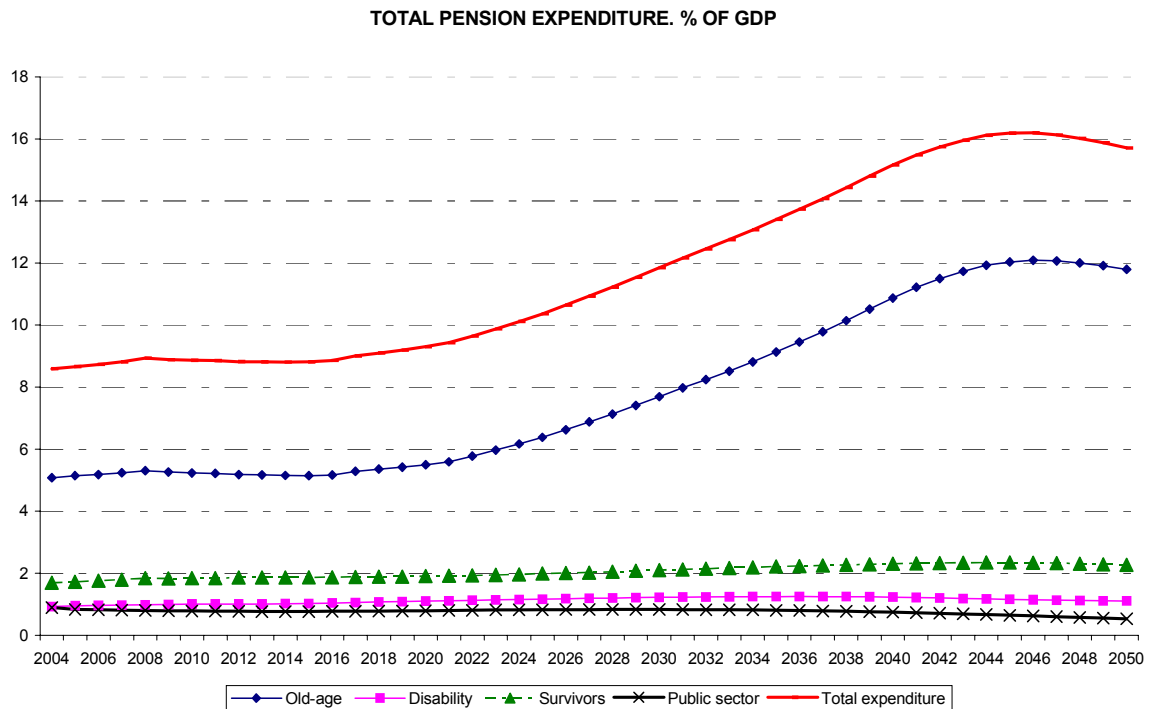
Given these results and the ones obtained carrying out the sensitivity tests described in Part 5, it is projected that the absolute peak of the ratio pension expenditure/GDP would be reached in 2046, 16.2 percent of GDP.

**Table 8 - 4 Total pension expenditure in percent of GDP**

<b>Pensions</b>	<b>2004</b>	<b>2005</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>
<b>Total Social Security scheme</b>	<b>7.7</b>	<b>7.8</b>	<b>8.1</b>	<b>8.5</b>	<b>11.0</b>	<b>14.4</b>	<b>15.2</b>
Old-age	5.1	5.2	5.2	5.5	7.7	10.9	11.8
Disability	0.9	0.9	1.0	1.1	1.2	1.2	1.1
Survivors	1.7	1.7	1.8	1.9	2.1	2.3	2.3
<b>Total CPE scheme</b>	<b>0.9</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	<b>0.7</b>	<b>0.5</b>
<b>Total pension expenditure</b>	<b>8.6</b>	<b>8.7</b>	<b>8.9</b>	<b>9.3</b>	<b>11.8</b>	<b>15.2</b>	<b>15.7</b>



Graph 8 - 2 Total pension expenditure as % of GDP



For a better understanding of what lies behind these results, it is useful to express old age Social Security public pension expenditure as a percentage of GDP as follows:

$$\frac{\text{Pension expenditure}}{\text{GDP}} = \frac{\text{Number of pensions}}{\text{Population 65+}} \frac{\text{Population 65+}}{\text{Working age population}} \frac{1}{\text{Employment rate}}$$

$$\frac{\text{Average pension}}{\text{Average productivity}}$$

The first component (number of pensions/population 65+, the eligibility ratio) is expected to contribute positively, 0.46 percentage points of GDP, to the net increase of the ratio pension expenditure/GDP over the whole projection period, 6.71 percentage points of GDP. It is consistent with the projected increase of the employment rate during the projection period.

The second component (population 65+/working age population, the dependency ratio) is expected to contribute also positively, 7.94 percentage points of GDP, to the net increase of the ratio pension expenditure/GDP, 6.71 percentage points of GDP. In fact, it accounts for more than the entire projected increase in pension expenditure in terms of GDP and mainly reflects the demographic movements. It is consistent with the increase in the dependency ratio, from 24.6 in 2004 to 65.6 in 2050.

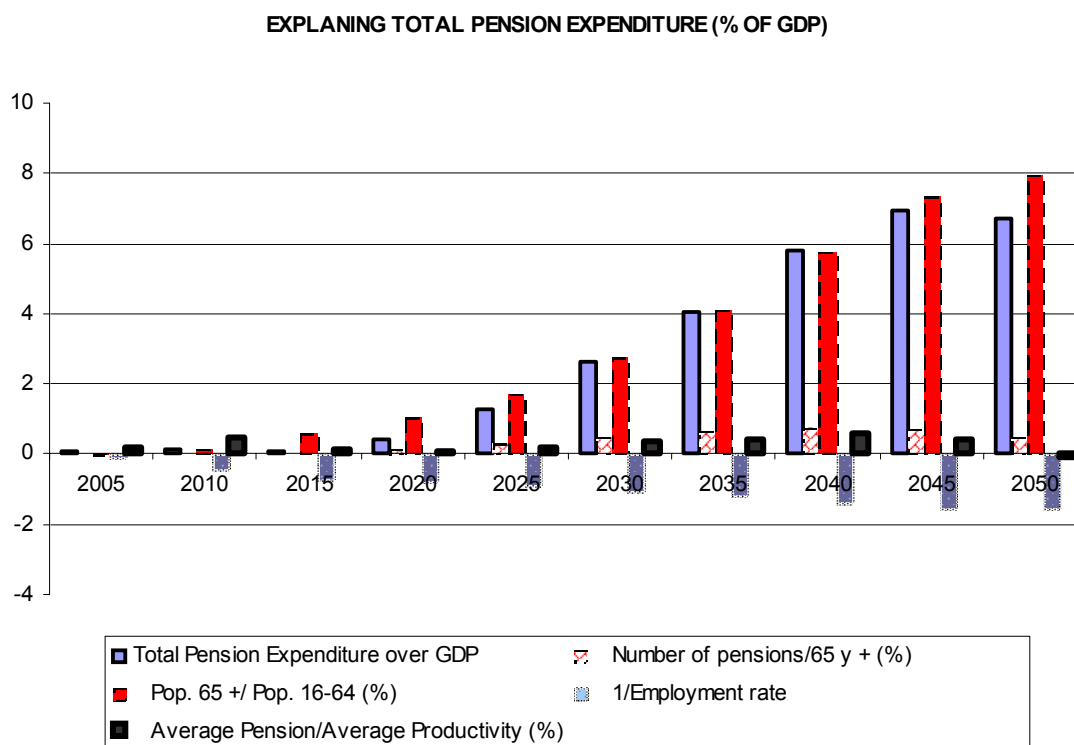
The third component (the inverse of the employment rate) is expected to contribute negatively, -1.58 percentage points of GDP, to the net increase of the ratio pension expenditure/GDP, 6.71 percentage points of GDP. Its negative contribution is notable and consistent with the projected increase in the employment rate.

The fourth component (average pension/average labour productivity, the benefit ratio) is expected to contribute slightly negatively, -0.10 percentage points of GDP, to the net increase of the ratio pension expenditure/GDP, 6.71 percentage points of GDP. The contribution of this component depends on the legal rules concerning the social contribution rates, the formula for calculating pension benefits and their indexation, and on productivity growth. This component has increased in the last few years due to the maturing of the system and to the minimum pension increasing faster than productivity. Given the rules to calculate pension benefits, information about the labour records of each individual is needed. However, as this information is not available, the estimation of this variable can only be taken as an approximation. Moreover, it should be taken into account that real wages are assumed to increase in line with productivity. Given all these assumptions, the effect of this fourth component on the increase of pension expenditure as a share of GDP would be very small.

**Table 8 - 5 Decomposition of the increase in old-age pension expenditure between 2004 and 2050, in percentage points of GDP**

<b>Old-age pension expenditure/GDP</b>	<b>6.71</b>
Number of pensions/Pop 65+	0.46
Pop 65+/Pop 16-64	7.94
1/Employment rate	-1.58
Average pension/Average productivity	-0.10

**Graph 8 - 3 Decomposition of the increase in total pension expenditure**



## 8.6 Sensitivity Tests

Only the Social Security pensions are taken into account.

### Higher life expectancy

A decrease of 15% in age-specific mortality rates (ASMRs) is assumed by 2050, via a linear increase from 0% in 2004. This leads to an increase in life expectancy at birth of 1.6 years for males and 1.3 years for females by 2050. Likewise, old-age dependency ratio would increase 2.8 points with respect to the baseline.

As it can be seen in [Table 8 - 6](#), this higher life expectancy has a limited effect on pension expenditure since the ratio of total pension expenditure to GDP just increases in one decimal point.

### Lower unemployment rate

It is assumed that the employment rate increases by 1 percentage point over the period 2005-2015 and remains 1 percentage point higher over the period 2015-2050. The change in the employment rate is reflected in a parallel change in the unemployment rate (NAIRU).

Changes in the unemployment rate do not seem to have important effects on pension expenditure and public finances as it is assumed an unchanged participation rate, and people receiving unemployment benefits keep contributing to the social security.

As a result, lower unemployment rates reduce total pension expenditure as a share of GDP by 0.06 percentage points in 2050.

### Higher employment amongst the older workers (aged 55-64)

It is assumed that the employment rate of older workers increases by 5 percentage points over the period 2005-2025 (that is about 0.25 per year) and remains 5 percentage points higher over the period 2025-2050. The change in the employment rate is reflected in a parallel change in the participation rate.

The effect of this change in the employment rate is small but larger than in the case of low unemployment, since the ratio of total pension expenditure to GDP decreases by 0.13 percentage points in 2050.

### Higher/Lower productivity

It is assumed that labour productivity increases/decreases by 0.25 percentage points over the period 2010-2015 (that is about 0.04 per year) and remains 0.25 percentage points higher/lower over the period 2015-2050.

Changes in labour productivity growth have effects on pension expenditure through changes in wages as they are assumed to vary according to productivity growth. The effect on pension expenditure is the result of variations in the average pension benefit of new entrants in the system with the result of variations in the substitution rate.

At the same time, productivity growth changes imply GDP growth variations. Thus, the final effect of changes in productivity growth on pension expenditure as a share of GDP will be the combination of these two effects which a priori work in opposite directions.

Changes in labour productivity as envisage in this sensitivity test imply a steady decrease from 2010 onwards in **the** ratio of pension expenditure as a share of GDP in the case of an increase in labour productivity, and an increase in this ratio in the case of a labour productivity decrease. The magnitude of the effects, in absolute terms, is very similar in both simulations, reaching a difference as regards the baseline of 0.9 percentage points of GDP in 2050.

### 8.6.1 Comparing the sensitivity test results

In principle, the assumptions and the results of the different sensitivity tests are not comparable. However, as all the sensitivity assumptions propose variations of the variables which seem reasonable in their respective fields, it would be interesting to confront their results to try to get a general idea of their relative impact on pension expenditure.

Table 8 - 6 Sensitivity test results						
	Baseline	Low unemployment	High life expectancy	High productivity	Low productivity	High employment amongst older workers
2004	7.70	7.70	7.70	7.70	7.70	7.70
2005	7.82	7.82	7.82	7.82	7.82	7.82
2010	8.08	8.10	8.08	8.07	8.08	8.06
2015	8.05	8.04	8.05	7.98	8.11	8.02
2020	8.51	8.49	8.51	8.35	8.67	8.46
2025	9.53	9.51	9.54	9.27	9.79	9.45
2030	11.01	10.98	11.03	10.63	11.39	10.91
2035	12.60	12.55	12.63	12.09	13.12	12.47
2040	14.41	14.36	14.46	13.76	15.09	14.26
2045	15.54	15.48	15.61	14.75	16.37	15.40
2050	15.17	15.11	15.26	14.32	16.08	15.05

**Table 8 - 7 The impact of key variable changes on pension expenditure, percentage point difference of GDP in 2050 relative to the baseline scenario**

Sensitivity test	Difference in p.p. of GDP
Higher life expectancy	+0.09
Higher employment amongst older workers	-0.12
Lower unemployment	-0.06
Higher productivity	-0.85
Lower productivity	+0.91

Changes in labour productivity growth would have stronger impact on pension expenditure as a share of GDP than changes in other variables.

## 8.6.2 Comparing The Results with the 2001 Projections

Comparing the results of the 2001 and 2005 projections of pension expenditure is not easy and might be misleading.

- There have been changes in the legislation concerning the pension system
- The demographic scenario is completely different
- GDP has been revised upwards
- The models to project pension expenditure have been changed and improved

However, it is interesting to have a look at the different results of these two projections.

**Table 8 - 8 Total pension expenditure as a share of GDP in the 2001 and 2005 projections**

<u>In % of GDP</u>	<u>2005</u>	<u>2010</u>	<u>2020</u>	<u>2030</u>	<u>2040</u>	<u>2050</u>
2001 projections	8.8	8.9	9.9	12.6	16.0	17.3
2005 projections	8.7	8.9	9.3	11.8	15.2	15.7

Although a direct comparison of these results is difficult and might be misleading, it could be said:

- The legislation changes might reduce total pension expenditure over GDP through an increase of older workers participation.
- The demographic scenario might increase total pension expenditure over GDP in the very long term through an increase in total population. However, in the medium and long term, it might decrease total pension expenditure over GDP. The 2005 baseline demographic scenario shows a larger total population than in the 2001 scenario but with a deeper aging process.
- GDP growth has been strong since 2001 and, in addition, GDP figures have been revised upwards, reducing total pension expenditure over GDP

All in all, this last factor, stronger GDP growth, may be the main reason for the differences in the results.

## 9. France

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### 9.1 Key Characteristics of the French Pension Scheme

#### 9.1.1 Description of the key features

The French pension system is based on the pay-as-you-go principle essentially. Its financing is mainly ensured by contributions from workers and employers (except in the case of central government service).

The retirement pension schemes can be classified in three main groups:

- Workers in the private sector can be gathered under two basic schemes, whose rules are similar: the CNAVTS<sup>52</sup> and the scheme for agricultural workers, administered by the MSA<sup>53</sup>. The basic pensions are supplemented by pensions paid out by compulsory complementary schemes, administered on a parity basis by the social partners: ARRCO<sup>54</sup> for all workers and AGIRC<sup>55</sup> for executives.
- Workers in the public service and in public-sector enterprises, in particular, have their own pension schemes. Central government employees fall under the “Civil and Military Pensions Code”; workers for local government and hospitals fall under the CNRACL<sup>56</sup>. The principal special schemes for non-farm workers are notably those of EDF-GDF, SNCF, RATP, the Mines, Banque de France, the Opera and the Comédie française. In addition, non-established employees working for the government and local authorities contribute to the CNAVTS for the basic scheme and have their own specific complementary scheme, IRCANTEC<sup>57</sup>.
- Independent workers fall essentially into five professional groups: those covered by the schemes for craftsmen and tradesmen (CANCAVA<sup>58</sup> and ORGANIC<sup>59</sup>, respectively); the rules governing these two schemes are aligned on that of the general scheme. The professions are

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<sup>52</sup> Caisse Nationale d'Assurance Vieillesse des Travailleurs Salariés (National Pension Fund For Salaried Workers).

<sup>53</sup> Mutualité Sociale Agricole (Mutual Agricultural Solidarity Fund).

<sup>54</sup> Association des Régimes de Retraite Complémentaires Obligatoires (Association of Complementary Pension Schemes for non-executive employees).

<sup>55</sup> Association Générale des Institutions de Retraite des Cadres (General Association of Pension Institutions for Executives).

<sup>56</sup> Caisse Nationale de Retraites des Agents des Collectivités Locales (National Pension Fund For Local Government Employees).

<sup>57</sup> Institution de Retraite Complémentaire des Agents non Titulaires de l'Etat et des Collectivités Publiques (Complementary Pension Institution for Non-Established Central and Local Government Employees).

<sup>58</sup> Caisse Autonome Nationale de Compensation d'Assurance Vieillesse Artisanale (Craftsmen's Pension Scheme).

<sup>59</sup> Organisation Autonome Nationale de l'Industrie et du Commerce (Scheme for business leaders, tradesmen and craftsmen).

covered by the CNAVPL<sup>60</sup>, with lawyers having their own scheme, the “Caisse nationale des barreaux français”<sup>61</sup>. Finally, pensions for farmers are administered by the MSA.

These schemes are affected by contrasting demographic tendencies reflecting shifts over time in the structure of their contributing and retired populations. The maintenance of a diversity of schemes is therefore leading to the introduction of financial compensation mechanisms aimed at ensuring solidarity at national level between pension schemes, in line with the pay-as-you-go principle. Rules for the basic pension under the CNAVTS and “aligned” schemes are given in the box A and rules for pensions in the public service scheme in the box B. The box C explains pension formula in complementary pension schemes for executives (AGIRC) and all workers (ARRCO).

**Box A: Method of calculating pensions under the CNAVTS and “aligned” schemes, basic pension**

Exercise of direct entitlements under the CNAV is possible on the date of the individual's 60<sup>th</sup> birthday. The retirement pension under the general scheme  $P$  is calculated as a proportion of base wage. This proportion is obtained by multiplying the pension rate ( $\square$ ) by a proratisation coefficient, given by the ratio between the validated contribution period to the general scheme ( $D$ ) (which takes into account not only the time worked but also increases in the duration of contribution periods, the housewives and “househusbands” contributions, periods of unemployment, provision for early retirement, military service, etc.) and a proratisation period  $T_1$ , currently standing at 150 quarters. This formula does not take into account the 10 % bonus granted to parents, men or women, who have raised at least 3 children.

$$P = t \times \min(1, D / T_1) \times SAM$$

- The reference wage (or Salaire Annuel Moyen (SAM) – average annual wage) is calculated as the average of the best wages (up to the ceiling applied for social security purposes) adjusted or changes in the price index (since 1987). The number of years taken into account varies between generations: 10 years for cohorts born in 1933 and earlier, rising thereafter by one year per cohort to reach 25 years for those born in or after 1948.
- The full (or maximum) rate of pension is 50 %. This is obtained :
  - if the contribution period to all schemes is at least equal to  $T_2$  quarters (raised in the 1993 reform from 150 to 160);
  - if the pension collection age is 65 or more;
  - or 60 in the case of unfitness for work.

If none of these three conditions is met, the pension rate is reduced by a “deduction” factor that is proportional to the shortfall in the number of quarters compared with the number needed to achieve the full rate. Given that exercise of rights is possible only from the age of 60 and that the full rate is in any case achieved in the case of retirement at 65, the maximum period to which the deduction can apply is 5 years. The pension rate can therefore be written as follows:

$$\tau = 50\% \times (1 - \delta \times \text{years of shortfall})$$

where  $\delta$  denotes the rate of deduction per year of shortfall. In practice, the shortfall is equal to zero if the individual has reached the age of 65 or if he has achieved validated contributions to all schemes for a sufficient number of quarters, equal to  $T_2$ , or, failing this, is equal to the minimum number of years remaining to be completed in order to meet one of these two conditions.

This can be written in formal terms as follows:

$$\text{years of shortfall} = \text{Max}[ 0, \text{Min}( 65 - \text{Age}, \frac{1}{4}(T_2 - T) ) ]$$

where  $T$  denotes the number of quarters validated by the person concerned for all schemes

<sup>60</sup> Caisse Nationale d'Assurance Vieillesse des Professions Libérales (National Pension Fund for the Professions)

<sup>61</sup> National Pension Fund for French Barristers

**Prior to the 2003 reform:**

- the required contribution period entering into the calculation of the proratisation coefficient  $T_1$  was 150 quarters;
- the 1993 reform gradually lengthened the all-schemes contribution period  $T_2$  entering into the calculation of the deduction from 150 quarters for the 1933 cohort to 160 quarters for the 1943-and-later cohorts and for all starting in 2003;
- the annual deduction  $\delta$  was 10 % per year of shortfall.

In order to illustrate the functioning of the deduction, one can take the case of two individuals, each of whom have validated 37.5 years of all-scheme contributions. The first takes retirement at 60, the second at 64.

**Calculation for two typical cases of the deduction prior to reform:**

Validated period	Age of exercise	Duration needed to reach age 65	Duration needed to reach 40 years contributions	Most favourable solution for the individual	Level of deduction applied
37.5 years	60 years	5 years	2.5 years	2.5 years	25%
37.5 years	64 years	1 year	2.5 years	1 year	10%

*How to read the table:* for the individual with 37.5 years validated contributions at the age of 60, 5 years are needed to reach the pivotal age of 65 and 2.5 years to reach 40 years contributions. It is therefore this more favourable solution from the point of view of the individual (2.5 years) that is adopted for the calculation of the deduction applied to his pension under the general scheme.

**After the 2003 reform:**

- The required contribution period entering into the calculation of the proratisation coefficient  $T_1$ , is gradually increased from 150 quarters for the 1943-and-earlier cohorts to 152 for the 1944 cohort and then progressively to 160 quarters for the 1948 cohort. Thereafter, it will be increased in line with the all-schemes contribution period:  $T_1 = T_2$ .
- the all-schemes contribution period  $T_2$  entering into the calculation of the deduction remains unchanged for the 1944-1948 cohorts (160 quarters). It will then rise at the rate of one quarter per cohort to reach 164 quarters for the 1952 cohort;
- the deduction will be progressively reduced to reach 5 % per year of shortfall; the precise calendar will be set out in a decree;
- a “capped premium” denoted as  $s$  is introduced, which raises the pension rate by the number of years (subsequent to the entry into force of the reform, i.e. 1 January 2004) that are validated over and above the age at which entitlement to the full rate is attained. This premium amounts to 3 % per additional year of contribution payable by the individual<sup>62</sup>. The pension rate can therefore be written as follows:

$$\tau = 50\% \times (1 - \delta \times \text{years of shortfall} + s \times \text{years over the full rate})$$

$$\text{years of shortfall} = \text{Max}[ 0, \text{Min}( 65 - \text{Age}, \frac{1}{4}(T_2 - T) ) ]$$

$$\text{years over the full rate} = \text{Max}[ 0, \text{Min}( \text{Age} - 60, \frac{1}{4}(T - T_2), D_{2004} ) ]$$

Where *Age* denotes age at the time of exercise of rights and  $D_{2004}$  the number of years that have passed since 1 January 2004.

<sup>62</sup> The following formula is therefore an oversimplification; in that only those quarters that in fact give rise to a contribution on the part of the individual entitle him to the benefit of the premium, not the entirety of the quarters validated over and above the target period.



## **Box B: Method of calculating pensions in the public service schemes**

### **Before the 2003 reform:**

Unlike private-sector workers, workers in the public service are not subject to the superimposition of a basic scheme and a compulsory complementary scheme. The retirement pension  $P$  for public-service workers is calculated as a fraction of the final wage, being itself calculated by multiplying the final wage  $S$  (excluding bonuses) by a pension rate of 75 % and by the ratio between the duration of actual service and the legally required duration  $T_l$  (proratisation).

$$P = 75\% \times \frac{D}{T_l} \times S$$

The calculation differs from that under the general scheme in three essential respects:

- the reference wage taken into account is the final wage (excluding bonuses) received for at least 6 months, as against the average of the best 25 years' wages (including bonuses) in the private sector;
- the pension rate is higher (75 %) because the pension scheme for the public service contains only one basic pension. Furthermore, this rate is identical for all and is not reduced in the case of an incomplete career; in other words, there is no deduction, the only factor applied in the case of early cessation of activity being the proratisation;
- as in the general scheme, the duration taken into account for the purpose of proratisation is limited to 150 quarters for time actually spent in service. On the other hand, the credits (for children or for military campaigns) can be taken into account up to a maximum of 160 quarters.

It may be noted that the calculation of the proratisation is mathematically analogous in the two schemes. In the civil and military pensions code, the annuity value is defined as 2 %, giving a pension rate of 75 % for a career spanning 37.5 years. In the social security code, the pension rate is 50 % for 37.5 years (before deduction), giving an implicit annuity value of 1.33 % per year.

### **After the 2003 reform:**

The level of the pension rate (75 %) and the reference wage  $S$  are unchanged by the reform. On the other hand, several modifications have been introduced in order to improve the harmonisation with the general scheme:

- a deduction will be gradually introduced in order to converge with that already applied in the general scheme. When this process is complete, the pension will be reduced for each quarter of shortfall compared with either the reference contribution period or the age of 65<sup>63</sup>. As under the general scheme, it is the most favourable solution that will be applied for the individual and the deduction cannot be applied for a period exceeding 20 quarters. The creation of the deduction therefore represents an innovation in the calculation of the pension, since from now on it requires the calculation of the duration of all pension contributions, taking all schemes together. In any event, the introduction of the deduction will be progressive: the pivotal age for elimination of the deduction is 61 (for sedentary workers) in 2006, rising gradually to 65; the level of the deduction is very small at the beginning of the period and gradually converges to the level of 5 % per year of shortfall;
- the target contribution period, all schemes taken together, rises at the rate of two quarters a year to fall in line with the target period for the general scheme (160 quarters) in 2008; thereafter the respective periods will move in parallel;
- a premium similar to that of the general scheme is to be introduced as of 1 January 2004.

Furthermore, the periods taken into account for proratisation, identical in the two schemes, will rise in parallel (at the rate of two quarters a year between 2004 and 2008 and then by one quarter a year between 2009 and 2012). Finally, a complementary scheme will be introduced for public sector workers, under which bonuses paid in will give entitlement to a pension.

<sup>63</sup> This is the general case, applicable to the so-called sedentary categories. The limiting age is lower for certain public servants ("active" categories, members of the Armed Forces) so as to take into account the specific features of these occupations.

**Box C: Method of calculation of pensions under the mandatory complementary pension schemes: AGIRC (executives) and ARRCO (all workers)**

The complementary schemes are of the pay-as-you-go type operating through points and with defined contributions, these points representing pension rights. The contributor acquires each year a certain number of points through his own contributions and those of his employer, calculated on the basis of a rate  $\square_t$ , known as the “contractual rate”, applied to a bracket of his gross wage. The purchase price of each point, still known as “reference wage”, depends on the year in question.

$$\text{Number of points acquired in year } t = \square_t \times (\text{Gross wage} / \text{Purchase price of a point})$$

The actual contribution rates differ from those that generate entitlement, i.e. the contractual rates. This is because since 1971 the contractual rate has been affected by a percentage (denoted as  $x$ ), which, if above 100 %, implies surplus contributions not producing rights paid by the contributor in order to help to achieve equilibrium for the complementary scheme. We then have:

$$\square_t = \text{Actual contribution rate} / x$$

In 2003, the maximum effective contribution rate applied to the first bracket in ARRCO is 7.5 % and the “assessed rate” 125 %, giving a maximum contractual contribution rate of 6 %.

At the time of exercise of pension rights, the transformation of the accumulated points into monetary units is a function of the contributor's age and duration of contribution and of the purchase price of a point at the date of calculation. The complementary pension is then calculated in the following manner:

$$\text{Pension} = \text{Total number of points acquired} \times \text{Value of a point} \times \text{shortfall coefficient}$$

The “full rate” in the complementary pension schemes is granted to those who meet the conditions needed to benefit from the full rate in the general scheme. In the event that the individual exercises his pension rights before reaching the full rate of the CNAVTS, the value of a point is adjusted downward by means of an “shortfall coefficient”.

**Shortfall coefficient applicable to the complementary schemes:**

Age	Shortfall (quarters)	Coefficient
60	20	0.78
61	16	0.83
62	12	0.88
63	8	0.92
64	4	0.96

The contribution base and the contribution rates vary from one scheme to another and according to the wage brackets involved. Non-executive workers contribute to ARRCO on the basis of that part of the wage that lies below three times the Social Security ceiling, now equal to 29,184 euros per year. Executive employees contribute to both ARRCO (with respect to wages up to the ceiling) and to AGIRC (for wages between 1 and 8 times the ceiling).

**9.1.2 Recent reforms included in the projections and adherence to the common agreement**

In the last years, the French pension schemes had two main reforms: the Balladur reform in 1993 (private sector) and the Fillon reform in 2003 (both private and public sectors).

These two main reforms have a progressive impact, which is included in the projections after 2003:

- The commonly agreed participation rates include this two reforms.
- The average pension calculation includes also these two reforms.

- According to the 2003 reform, the contribution rate in the private sector will grow by 0.2 point of gross wages in 2006. That will increase pension schemes contributions of 0.08 point of GDP. This is also included in our projections.

### **9.1.3 Extent of the coverage of the pensions projections and adherence to the agreed coverage and disaggregation**

French pension schemes projection covers all pensions from social security system, i.e. all public pensions. In this system, both the basic and complementary mandatory have been taken into account. Occupational pensions (with contractual agreements between employers and employees) are not covered by projections. But this type of pensions has a very low weight in the French pension system. Private mandatory pensions do not exist in France.

Projections cover old-age and early pensions as well as widows' pensions. Disability pensions are covered by health insurance contributions and are not included in pension projections.

According to the aggregate model used, the French pension projections cannot separate between various items of social security pensions. Survivors' and partial pensions paid to people below the standard retirement age are just a little part of social security pensions, so we assume that all social security pensions are old-age or early pensions.

## **9.2 The Pension Models Used for the EPC Projection**

### **9.2.1 Coordination with the national projections of the COR**

Because of the important number of pension schemes in France, the projection of pension expenditure is a complex exercise. It is necessary to establish a separate forecast for each scheme individually and then to aggregate the different projections.

In parallel with the EPC exercise, the COR<sup>64</sup> (the French pensions policy council) has been leading its own projections on a national basis. They include a baseline scenario and several sensitivity tests. In order to ensure consistency between the European and the national projections, and to avoid duplicating projections, the same projection material coming from the various pension schemes was used. But as the general frameworks display some differences, specific adaptations had to be made in the case of the European projection.

Thus the global model for projections should be separated in two stages:

- In a first step, each pension scheme used its own model to make a projection of its financial balance, based on the baseline assumptions of the COR. Then all the projections were combined in order to compute a global scenario.
- In a second step, an aggregate model was used by the DREES (Direction de la Recherche, des Études, de l'Évaluation et des Statistiques) to modify the demographic and macroeconomic framework of the projection, in order to establish a new projection consistent with the AWG assumptions for the European scenario.

Annex 1 gives a global diagram of this projection procedure.

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<sup>64</sup> Conseil d'Orientation des Retraites.

## 9.2.2 **First stage: the national projection based on the COR assumptions**

As we relied on the work of each of the pension scheme, 21 models were used. We will only describe here the two models for the major pension schemes: the CNAVTS scheme (salaried workers) and the two schemes for civil servants (Central government employees' scheme and CNRACL for workers for local government and hospitals).

### 9.2.2.1 *Model used for the CNAVTS (salaried workers)*

The pension model for the private sector scheme (CNAVTS) is a dynamic micro simulation model, in which the individual data are updated on a quarterly basis. The starting year is 2004. The initial sample is 1/100 of the contributors and pensioners of the CNAVTS.

Before the simulations can be run, 4 stages are needed in order to prepare the data:

- 1 – Death completion;
- 2 – Children completion;
- 3 – Completion of the ages when leaving school;
- 4 – Working life completion;

After that, transition equations are computed and are used to simulate the evolution of the sample during working life and retirement (stage 5 to 9):

- 5 – Working life transitions;
- 6 – Wage estimation;
- 7 – Pensions for housewives and “househusbands”;
- 8 – Simulation of retirements;
- 9 – Survivor pensions.

#### Stage 1 to 4

Stages 1 to 4 are just data completions with econometric methods.

#### Stage 5: Working life transitions

Stage 5 is the main part of the simulation. For each of the quarters before they retire, all individuals in the sample can follow under one of seven states:

- 1 – Labour market participation, working and contribute to the CNAVTS scheme;
- 2 – Labour market participation, working and contribute to another scheme with the same rules as the CNAVTS scheme;
- 3 – Labour market participation, working and contribute to a scheme with different rules than the CNAVTS scheme;
- 4 – Labour market participation but joblessness;
- 5 – Illness with sick leave;
- 6 – Disability or pensioners for occupational injury;
- 7 – Other, without validating any pension right.

The transition equations between these seven states are computed thanks to econometric estimations, and then used to simulate the sample in the future.

#### Stage 6: Wage estimation

Two equations are computed for wages (one for males and one for females). The wage in logarithm is explained by several variables. One of them is a temporal trend which grows in line with the labour productivity growth hypothesis.

#### Stage 7: Pensions for housewives and “househusbands”

A mother or a father may be temporarily out of the labour force in order to educate their children. Then they are eligible to new pension rights. This module simulates the corresponding contributions.

#### Stage 8: Simulation of retirements

Transition equations for retirement are computed in order to simulate retirement in the future. They do not reflect a behavioural model. Instead of this, they are exogenously calibrated so as to replicate the expected impact of the 2003 French pensions reform. According to simulations from Insee (Institut National de la Statistique et des Études Économiques), the COR assumes that the impact of this pension reform will lead to 400,000 workers more and pensioners less in 2050. Concerning the CNAVTS scheme, this means a postponement of retirements of 0.6 year in average for men and a earlier retirements of 0.3 year in average for women.

#### Stage 9: Survivor pensions

In order to compute survivor pensions, marriages are simulated between men and women in the CNAVTS population. The projection of survivor pensions in 2004 and thereafter results from the implementation of death projections, taking into account the initial stock of survivor pensions in 2003.

### **9.2.2.2**

#### ***Projection of the Public sector schemes***

The pension schemes for the territorial public servants and for the State public servants follow the same rules. Therefore, both projections are made with the same model, named ARIANE and realised by the Budget Directorate of the Ministry of Finance. ARIANE is a model of weighted set cases.

### **9.2.2.3**

#### ***Aggregation of all the pension schemes projections***

The 21 pension schemes have run their projections using the assumptions defined by the COR. These projections have then been aggregated in order to compute the total pension expenditures. To forecast the average pension, we also need to estimate the number of pensioners. But the global number of pensioners is less than the sum of pensioners from each pension scheme: as a matter of fact, many people have contributed to several pension schemes and thus benefit from several pensions. We name these people “multipensioners”. We assume that all pensioners have contributed to the CNAVTS. So, we can estimate the number of multipensioners as the number of pensioners in the CNAVTS who contributed to another pension scheme. Finally, we assume that the number of pensioners is the sum of pensioners of all schemes minus our estimation of the number of multipensioners.

### **9.2.3**

#### **Second stage: Taking account of the AWG hypotheses**

#### **9.2.3.1**

#### ***Taking account of the AWG hypotheses***

The AWG projections rely on specific hypotheses which were discussed by the AWG and the EPC. To take these assumptions into account, the DREES<sup>65</sup>, which has been involved together with the

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<sup>65</sup> Directorate for Research, Studies, Assessment, and statistics (in French: Direction de la Recherche, des Études, de l'Évaluation et des Statistiques). Ministry for Health and Solidarity.

DGTPE in these projections, uses an aggregate model of the French pension system, which follows a partial equilibrium approach. The inputs of the model partially come from the projections of the COR and partially from the assumptions defined by the AWG. These assumptions are reminded in Table 9 - 1 and compared with those used by the COR.

**Table 9 - 1 Comparison of the assumptions of the COR and the AWG**

	<b>Assumptions of the COR</b>	<b>Assumptions of the AWG</b>
<b>Fecundity Index</b>	1.8 child per woman	Converges towards 1.85 in 2030
<b>Net migration flow</b>	50,000 per year	Converges towards 59,000 per year in 2050
<b>Birth life expectancy</b>	Males: 84.3 years in 2050 Females: 91.0 years in 2050	Males: 82.3 years in 2050 Females: 87.9 years in 2050
<b>Impact of reform, participation rate</b>	- In 2050, the 2003 French reform for pension schemes has an impact of 400,000 workers more and 400,000 pensioners less. - The participation rate for 55 old and more goes from 17.5% in 2003 to 15.3% in 2050	- The participation rate for 55 old and more grows from 19.2% in 2003 towards 20.2% in 2050
<b>Unemployment rate</b>	Converges towards 4.5% in 2015	Converges towards 6.9% in 2015

The DREES model is a global model with a single theoretical pay-as-you-go pension scheme. This scheme covers all workers and simulates the aggregation of all the French pension schemes (basic and complementary pensions). This model was built in order to simulate demographic and macroeconomic sensitivity tests around the baseline scenario of the COR. Given these characteristics, this model has been used to calculate the AWG baseline scenario and sensitivity tests.

The inputs of the model include the annual growth rates for labour supply and labour productivity, the unemployment rate, the number of pensioners and the average pension

Labour supply, labour productivity and unemployment assumptions come from the AWG hypotheses. The average pension is established referring to the COR baseline scenario. The number of pensioners is computed using the number of pensioners in the COR scenario, and the AWG and COR elderly populations and participation rates. On the one hand, the elderly populations do not have the same evolutions according to the AWG and to the COR, because of the differences of mortality. So, the number of pensioners has to be adapted to the size of the elderly population (60 years-old and more) when dealing with the AWG projection. On the other hand, there is a significant difference in older labour supply. Elderly participation grows in the AWG scenario whilst it declines in the COR scenario (cf. Table 9 - 2). Taking into account these two differences in the baseline assumptions of the two exercises, we assume that the ratio of pensioners to the elderly population out of the labour force grows the same way in both scenarios (cf. equation below). The numbers of pensioners and elderly people out of the labour force in 2003 are the same in the two scenarios (COR and AWG).

The elderly population considered here is the population of people who are 55 years-old and more. We can assume that all pensioners are 55 year-old or more and so this ratio is a retirement rate for elderly people out of the labour force.

$$\frac{\frac{\text{Pensioners (AWG, t)}}{\text{Population out of the labour force } \geq 55 \text{ old (AWG,t)}}}{\frac{\text{Pensioners (AWG, 2003)}}{\text{Population out of the labour force } \geq 55 \text{ old (AWG,2003)}}} = \frac{\frac{\text{Pensioners (COR,t)}}{\text{Population out of the labour force } \geq 55 \text{ old (COR,t)}}}{\frac{\text{Pensioners (COR,2003)}}{\text{Population out of the labour force } \geq 55 \text{ old (COR,2003)}}}$$

**Table 9 - 2 AWG and COR assumptions of participation of the elderly**

<b>Participation rate, 55 years old and more</b>	<b>2000</b>	<b>2003</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>
<b>Assumption of the COR</b>	14.8%	17.5%	18.7%	19.1%	17.1%	16.0%	15.3%
<b>Assumption of the AWG</b>	-	19.2%	22.7%	22.9%	22.1%	20.6%	20.2%

### 9.2.3.2

### *The model of the DREES*

#### **Pension expenditures**

Pension expenditures are computed as the result of the average pension (computed by the COR) times the corrected number of pensioners, calculated as indicated below (cf. diagram in appendix B).

This method relies on two approximations. On the one hand, the impact of the reform passed in 2003 according to the AWG is stronger than in the assumptions of the COR. The longer pension contributors work, the higher their pensions are. Our calculations<sup>66</sup> suggest that assuming the average pension to be the same in the two projections, in spite of different retirement ages, leads to an under-estimation of pension expenditures of about 0.4 point of GDP. On the other hand, the average pension computed by the COR is in line with the assumption of labour productivity growth of 1.8% per year, which is different from the assumption of the AWG. This leads to an over-estimation of the pension expenditure of about 0.4 point of GDP in 2050<sup>67</sup>. In 2050, the two opposite effects have about the same magnitude and cancel each other.

Net pension expenditures are computed using the recent past implicit contribution rate paid by pensioners to the social security system. State taxes are graduated; and so, it is not possible to know what part of state taxes pensioners pay: therefore, we don't take into account State taxes paid by pensioners in our calculation of net pensions.

<sup>66</sup> In the scenario of the AWG, the life expectancy at 60 years old is about 26 years in 2050. The difference of elderly participation rate between the COR and the AWG assumptions is about 2.8 points, which is equivalent to an average postponement of retirement of about 0.7 year. A one-year increase of working life would increase the pension between 3% and 4%. If we retain 3.5%, with a postponement around 0.7 year, the average pension increases of 2.5%. Pension expenditures will be about 15 points of GDP in 2050; so the average increase is about 0.4 of a point of GDP.

<sup>67</sup> In 2050, an average-age pensioner will have retired 11 years before, in 2039. In 2039, his pension will have been computed using the 25 last wages. So, the median year for the average yearly wage will be 2027. In 2027, the difference of productivity growth between the COR (1.8%) and the AWG (1.7%) assumptions leads to a difference in the estimation of this wage of 2.4% (0.1% per year during 24 years, from 2004 to 2027). So the difference between the two projections in terms of pension expenditure is about 0.4 point of GDP again.

## Macroeconomic balance and pension contributions

GDP growth is computed with the growth of labour supply and labour productivity. Repartition between wage and capital is supposed to be constant.

In 2003, the pension contribution rate is computed as an implicit rate, which equalises contributions and expenditures for the pension scheme. Without changes in the contribution rate, contributions grow in line with the GDP.

As acted in the French reform of August 2003, an increase of 0.2 point of gross wage is added in 2006. This is equivalent to an increase of 0.08 point of GDP. Afterwards, the contribution rate remains constant.

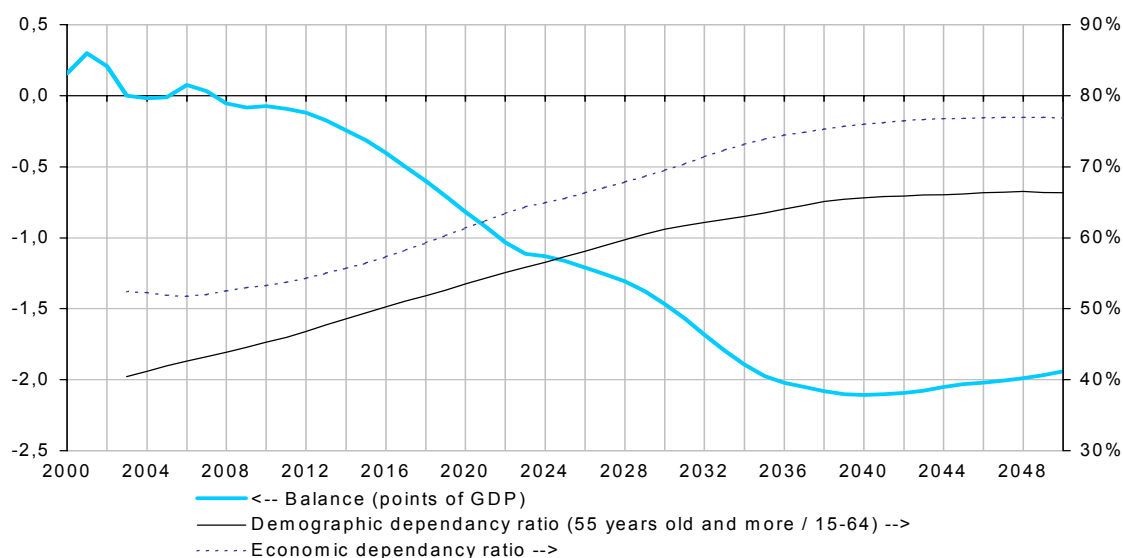
### 9.3 Results of The Projection

The effects of ageing can be seen as early as the first years of the projection. The demographic dependency ratio starts increasing in 2004 and accelerates in 2008. Its growth will decelerate around 2035 when all the baby-boomers will have retired (Graph 9 - 1).

During the first years of the projection, the French pension reform of August 2003 partly offsets the impact of the retirement of the baby-boomers: the economic dependency ratio increases slower than the demographic one, but it accelerates around 2013.

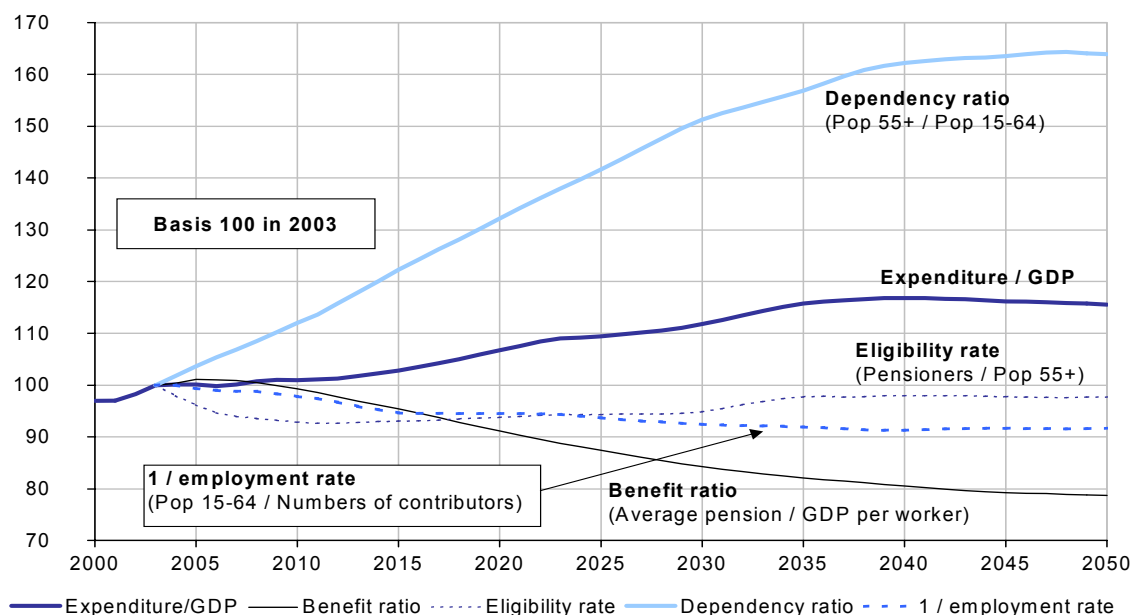
In connection with this evolution, the global financial balance of the pension schemes remains roughly constant until 2013. Between 2005 and 2013, the pension schemes deficit is around 0.1 of a point of GDP. After that, the balance decreases strongly towards -1.9 points of GDP in 2050.

**Graph 9 - 1 Demographic and financial projections of the pension schemes**





**Graph 9 - 2 Decomposition of pension spending projections (basis 100 in 2003)**



**Table 9 - 3 Financial balance of the pension schemes**

(in points of GDP)	2000	2005	2010	2015	2020	2030	2040	2050
<b>Contributions</b>	12.6	12.8	12.9	12.9	12.9	12.9	12.9	12.9
<b>Expenditures</b>	12.4	12.8	12.9	13.2	13.7	14.3	15.0	14.8
<b>Balance</b>	0.2	0.0	0.0	-0.3	-0.8	-1.5	-2.1	-1.9

Definitions of the sensitivity tests are given in Annex 3.

## 9.4 Projection of the Assets of the Pension Funds

### 9.4.1 Coverage

The French pension schemes are financed on a pay-as-you-go basis. Therefore, they do not explicitly own financial assets. This is the reason why our projections of the assets of the pension funds covered the FRR (Fonds de Réserve des Retraites) only. This is a buffer fund which has to smooth the impact of the retirement of the baby-boomers. Until 2020, the FRR will grow according to two different sources: attributed taxes and the surpluses of the pension schemes. After 2020, the fund will pay contributions to the pension schemes of the private sector (CNAVTS, MSA, ORGANIC, CANCAVA). The modalities of these contributions have not been defined yet.

In our projections, the additional funding and withdrawals concerning the FRR are not taken into account in the global evaluation of expenditures and contributions for the pension schemes:

- Additional funding is financed by specific taxes.
- Even if withdrawals from the FRR are expected to decrease the deficits of the pension schemes after 2020, they do not appear in our calculations as contributions to these schemes.

The private sector complementary pension schemes (AGIRC for executives and ARRCO for all workers) have specific reserves. However, we cannot forecast their future evolution, because the social partners managed them. At the end of 2003, the reserves of AGIRC and ARRCO amounted to 45.3 billions of euros.

## 9.4.2 Projection method

### 9.4.2.1 From 2000 to 2020

The projection of the FRR is computed using the same method as the financial balance of the pension schemes. Therefore, it relies on the projections established by the Social Security Directorate for the COR. More precisely, as the COR is leading a sensitivity test in which the unemployment rate converges towards 7 % in 2015, this is the scenario we used here.

We project the assets of the FRR at the end of each year.  $A_t$  is the assets in euros 2004 at the end of year  $t$  and  $r$  is the net return to capital in real terms. The projection begins in 2005 and so, amounts for 2000 to 2004 are not the results of a projection. The first projected amount is for the end of 2005. The accumulation is given by the formula:

$$A_t = A_{t-1} (1+r) + F_t$$

According to the AWG hypothesis, we assume that the net return to capital  $r$  is the no-risk long-term interest rate and its value is 3 % in real term. This is a conventional hypothesis. In reality, an accumulation of assets in a fund allows a higher return of capital than the no-risk interest rate thanks to a mixed allocation of assets. FRR assets are composed of 45 % of shares and 55 % of bonds, including an important part of foreign bonds.

Until 2020, the Social Security Directorate forecasted FRR additional funding in the COR scenario with 7 % of unemployment rate. The most part of the financial contributions to the FRR consist in specific taxes, which grow at the same pace as the GDP. In order to take account of the AWG scenario, we calculate the additional funding in euros 2004 ( $F_t$ ) as a constant part of GDP in the AWG and COR scenarios:

$$F_t^{AWG} = \frac{GDP_t^{AWG}}{GDP_t^{COR}} F_t^{COR}$$

This method is quite realistic as far as the most part of the additional funding is concerned. Nevertheless, a significant part of the additional yearly funding comes from the “Fond de Solidarité

Vieillesse” (FSV, the Ageing Solidarity Fund)<sup>68</sup>. The main function of this fund is to pay contributions to the pension schemes for not contributive pension rights: jobless period pension rights and additional pensions for children. The FSV contributes to the FRR with its surpluses. The balance of the FSV depends principally on unemployment; so, additional funding from the FSV to the FRR follows unemployment evolutions. With our simplified method, the sensibility test linked with the NAIRU is not realistic for the FRR additional fund calculations: additional funding would normally depend more on the unemployment rate than in these results.

#### 9.4.2.2

#### *From 2021 to 2050*

After 2020, there is no more additional funding and we supposed that the share of withdrawals ( $W_t$ ) in the GDP would be constant ( $W_t / GDP_t = cste$ ). After 2050, the fund will be empty ( $A_{2050} = 0$ ).

$$A_t = A_{t-1} (1+r) - W_t$$

Therefore it is possible to assess the decrease of pension scheme deficit, which these withdrawals could allow in the future, as a share of GDP. However, these assumptions differ from those made by the COR in its FRR projections where withdrawals decrease in the period 2021 – 2050 towards 0 in 2050.

#### 9.4.3

#### Results

In the baseline scenario, the amount of FRR assets at the end of the year 2020 is 90 Bn€ 2004. After 2020, FRR withdrawals would be 0.16 point of GDP per year.

In the sensitivity tests linked with demographic or economic assumptions, the FRR assets are close to amounts in the baseline scenario<sup>69</sup>. Theoretically, the NAIRU would have an important impact; but it has just a very weak impact with our simplified calculation of the additional funding.

On the contrary, the hypothesis of return to capital has a strong impact on the assets of the FRR. In the 6<sup>th</sup> (respectively 7<sup>th</sup>) sensitivity test, with a return rate of 4 % (respectively 3 %), the FRR assets are 100 Bn€ 2004 (respectively 82 Bn€ 2004) at the end of the year 2020.

**Table 9 - 4 Additional funding (+) and then, withdrawals (-), in amounts term**

Billions euros 2004	2000	2005	2010	2015	2020	2030	2040	2050
<b>Baseline scenario</b>	3.0	4.4	1.9	3.8	4.0	-4.3	-5.1	-5.9
<b>Sens. Test 1: higher life expectancy</b>	3.0	4.4	1.9	3.8	4.0	-4.3	-5.1	-5.9
<b>Sens. Test 2: lower unemployment</b>	3.0	4.4	1.9	3.8	4.0	-4.4	-5.1	-6.0
<b>Sens. Test 3: higher elderly employment</b>	3.0	4.4	1.9	3.8	4.0	-4.3	-5.1	-5.9
<b>Sens. Test 4: higher labour productivity</b>	3.0	4.4	1.9	3.8	4.1	-4.3	-5.2	-6.2
<b>Sens. Test 5: lower labour productivity</b>	3.0	4.4	1.9	3.7	3.9	-4.4	-5.0	-5.7
<b>Sens. Test 6: 4 % return on capital</b>	3.0	4.4	1.9	3.8	4.0	-5.5	-6.4	-7.5
<b>Sens. Test 7: 2 % return on capital</b>	3.0	4.4	1.9	3.8	4.0	-3.4	-4.0	-4.7

<sup>68</sup> In 2020, in the COR scenario with the unemployment rate of 7%, 1/3 of the FRR assets would have come from the FSV.

<sup>69</sup> Cf. appendix C for the definitions of various sensitivity tests.

**Table 9 - 5 FRR assets at the end of the year, in amounts term**

Billions euros 2004	2000	2005	2010	2015	2020	2030	2040	2050
<b>Baseline scenario</b>	3.4	24.6	37.3	59.2	90.2	75.2	47.1	0
<b>Sens. Test 1: higher life expectancy</b>	3.4	24.6	37.3	59.2	90.2	75.2	47.1	0
<b>Sens. Test 2: lower unemployment</b>	3.4	24.6	37.4	59.3	90.5	75.5	47.2	0
<b>Sens. Test 3: higher elderly employment</b>	3.4	24.6	37.3	59.2	90.4	75.4	47.2	0
<b>Sens. Test 4: higher labour productivity</b>	3.4	24.6	37.3	59.3	90.6	76.6	48.6	0
<b>Sens. Test 5: lower labour productivity</b>	3.4	24.6	37.3	59.1	89.7	73.8	45.6	0
<b>Sens. Test 6: 4 % return on capital</b>	3.4	24.7	39.1	63.8	99.6	86.6	56.6	0
<b>Sens. Test 7: 2 % return on capital</b>	3.4	24.4	35.6	54.9	81.8	65.2	38.9	0

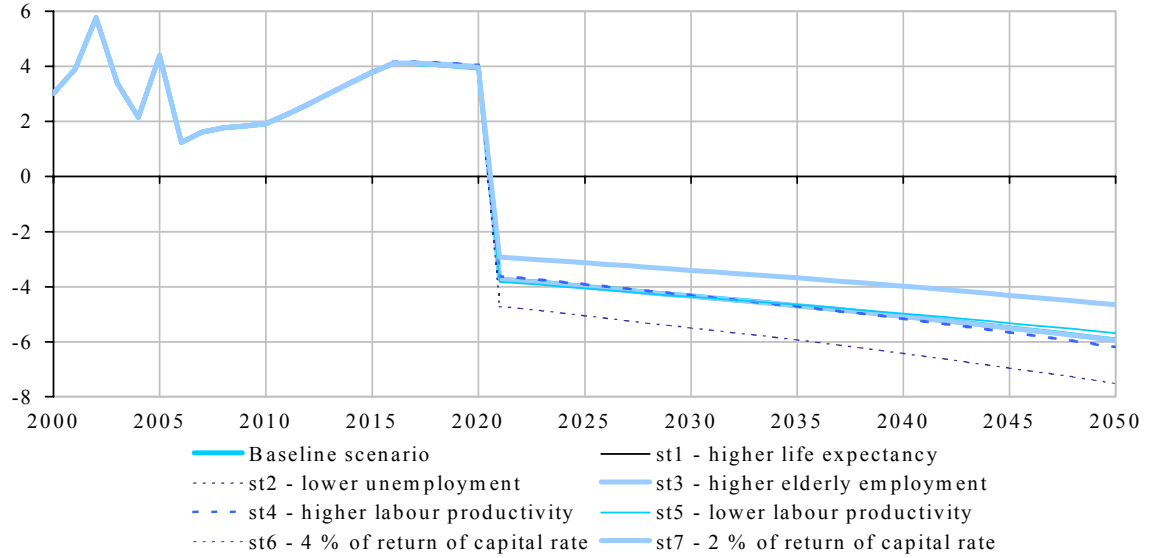
**Table 9 - 6 Additional funding (+) and then, withdrawals (-), as a share of GDP**

points of GDP	2000	2005	2010	2015	2020	2030	2040	2050
<b>Baseline scenario</b>	0.20	0.26	0.10	0.18	0.18	-0.16	-0.16	-0.16
<b>Sens. Test 1: higher life expectancy</b>	0.20	0.26	0.10	0.18	0.18	-0.16	-0.16	-0.16
<b>Sens. Test 2: lower unemployment</b>	0.20	0.26	0.10	0.18	0.18	-0.16	-0.16	-0.16
<b>Sens. Test 3: higher elderly employment</b>	0.20	0.26	0.10	0.18	0.18	-0.16	-0.16	-0.16
<b>Sens. Test 4: higher labour productivity</b>	0.20	0.26	0.10	0.18	0.18	-0.16	-0.16	-0.16
<b>Sens. Test 5: lower labour productivity</b>	0.20	0.26	0.10	0.18	0.18	-0.17	-0.17	-0.17
<b>Sens. Test 6: 4 % return on capital</b>	0.20	0.26	0.10	0.18	0.18	-0.21	-0.21	-0.21
<b>Sens. Test 7: 2 % return on capital</b>	0.20	0.26	0.10	0.18	0.18	-0.13	-0.13	-0.13

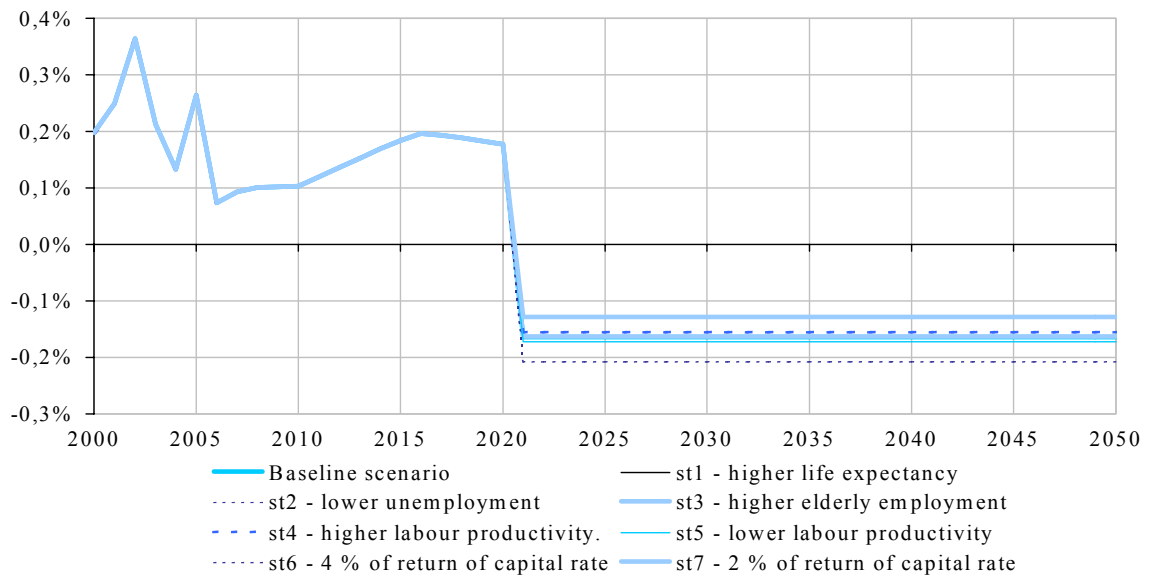
**Table 9 - 7 FRR assets at the end of the year, as a share of GDP**

points of GDP	2000	2005	2010	2015	2020	2030	2040	2050
<b>Baseline scenario</b>	0.2	1.5	2.0	2.9	<b>4.0</b>	2.8	1.5	0
<b>Sens. Test 1: higher life expectancy</b>	0.2	1.5	2.0	2.9	<b>4.0</b>	2.8	1.5	0
<b>Sens. Test 2: lower unemployment</b>	0.2	1.5	2.0	2.9	<b>4.0</b>	2.8	1.5	0
<b>Sens. Test 3: higher elderly employment</b>	0.2	1.5	2.0	2.9	<b>4.0</b>	2.8	1.5	0
<b>Sens. Test 4: higher labour productivity</b>	0.2	1.5	2.0	2.9	<b>4.0</b>	2.8	1.5	0
<b>Sens. Test 5: lower labour productivity</b>	0.2	1.5	2.0	2.9	<b>4.1</b>	2.9	1.6	0
<b>Sens. Test 6: 4 % return on capital</b>	0.2	1.5	2.1	3.1	<b>4.5</b>	3.3	1.8	0
<b>Sens. Test 7: 2 % return on capital</b>	0.2	1.5	1.9	2.7	<b>3.7</b>	2.5	1.3	0

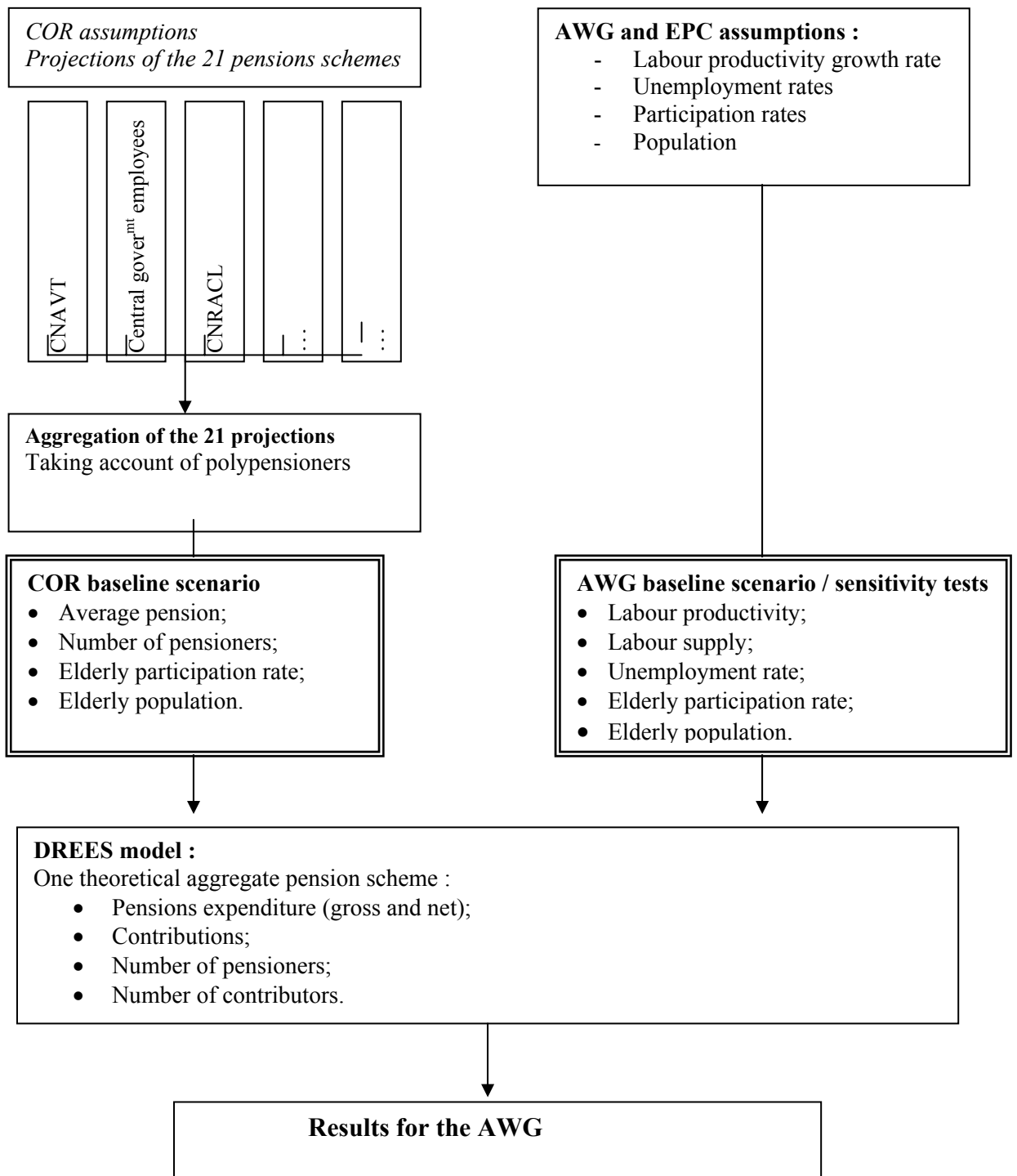
**Graph 9 - 3 Additional funding (+) and then, withdrawals (-), in Bn€ 2004**



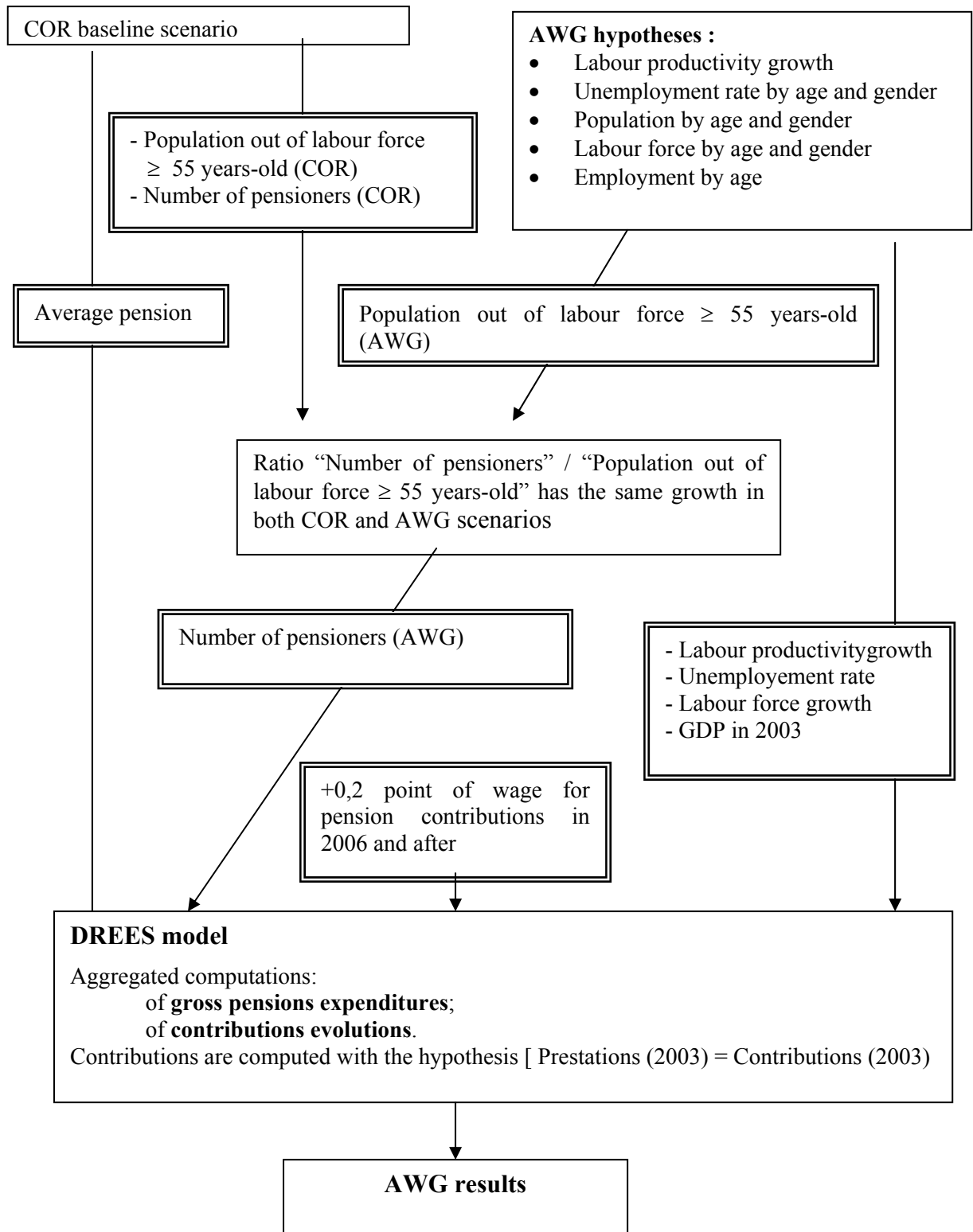
**Graph 9 - 4 Additional funding (+) and then, withdrawals (-), as a share of GDP**



## Annex 1 : Global diagram of the forecasting models available in France



## Annex 2 : Diagram of the DREES model



We can resume the computation of the number of pensioners in the COR scenario with the equation :

$$\frac{\frac{\text{Pensioners (AWG,t)}}{\text{Population out of the labour force } \geq 55 \text{ old (AWG,t)}}}{\text{Pensioners (AWG,2003)}} = \frac{\frac{\text{Pensioners (COR,t)}}{\text{Population out of the labour force } \geq 55 \text{ old (COR,t)}}}{\text{Pensioners (COR,2003)}}$$

$$\frac{\text{Population out of the labour force } \geq 55 \text{ old (AWG,2003)}}{\text{Pensioners (AWG,2003)}} = \frac{\text{Population out of the labour force } \geq 55 \text{ old (COR,2003)}}{\text{Pensioners (COR,2003)}}$$

**With:**

- Pensioners (AWG,2003) = Pensioners (COR,2003)
- Population out of the labour force  $\geq 55$  old (AWG,2003) = Population out of the labour force  $\geq 55$  old (COR,2003)

### Annex 3: Overview of the sensitivity tests

#### Overview of the sensitivity tests

Sensitivity test			Definition
Population	1	<b>Higher life expectancy</b>	Decrease of 15 % in age-specific mortality rates (ASMRs) by 2050, via a linear increase from 0 % in 2004. This leads to an increase in life expectancy at birth of roughly 1-1.5 years by 2050.
	Labour force	2	<b>Lower unemployment</b>
3		<b>Higher elderly employment</b>	Employment rate of older workers increases by 5 p.p. over the period 2005-2025 (that is about 0.25 per year) and remains 5 p.p. higher over the period 2025-2050. The change in the employment rate is reflected in a parallel change in participation rate.
Productivity	4	<b>Higher labour productivity</b>	Labour productivity increases by 0.25 over the period 2010-2015 (that is about 0.04 per year) and remains 0.25 p.p. higher over the period 2015-2050.
	5	<b>Lower labour productivity</b>	Labour productivity decreases by 0.25 over the period 2010-2015 (that is about 0.04 per year) and remains 0.25 p.p. lower over the period 2015-2050.
Interest rates	6	<b>Higher interest rate</b>	Interest rate 1 p.p. higher than the 3 % in baseline scenario.
	7	<b>Lower interest rate</b>	Interest rate 1 p.p. lower than the 3 % in baseline scenario.



## 10. Ireland

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### 10.1 Introduction

As part of the Economic Policy Committee's (EPC) 2005 ageing projections exercise, Member States were asked to project forward pension spending, contributions, pensioners and the number of contributors using national models. The agreed reporting framework also provided for the inclusion of information on the nature of the country specific models used in the course of the projections exercise. In fulfilment of these requirements, this fiche provides an overview of Ireland's pension model and projections methodology. In addition, underlying demographic and macroeconomic assumptions are presented, along with the results of the baseline scenario and those of a range of sensitivity tests.

### 10.2 Definitions

For the purpose of its' 2005 projections exercise, the Ageing Working Group (AWG) adopted the following definition of pensions<sup>70</sup>:

'Pensions should cover pensions and equivalent cash benefits granted for a long period (over one year) for old age, early retirement, disability, survivors (widows and orphans) and other specific purposes which should be considered as equivalents or substitutes for above-mentioned types of pensions, i.e. pensions due to reduced capacity to work or due to labour market conditions'.

Furthermore, it was proposed that social security and other public pensions be disaggregated in terms of two broad categories namely<sup>71</sup>:

'Old age and early retirement pensions (including minimum and earnings-related pensions), and if possible, disability and widow's pensions paid out to people over the standard retirement age'

'Other pensions (disability, survivors', partial pensions without any lower age limit, including minimum and earnings-related pensions)'

The schemes included in Ireland's model respect the above definition and classification of pension payments.

### 10.3 Main Characteristics of the Irish Pension System

The Irish pension system is divided into two main pillars. The first is the Social Welfare pay-as-you-go system which is administered by the Government and funded through social insurance

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<sup>70</sup> ECFIN/C5/REP/50496rev.2 (13 April 2005) *Reporting framework for pension expenditure and contributions: definitions and clarifications.*

<sup>71</sup> EPC / DG Ecfm (14 October 2005) *Background note - The 2005 EPC budgetary projections exercise: detailed description of agreed underlying assumptions and of projection methodologies.*

contributions and tax revenue. The second consists of voluntary supplementary pensions including Public Service pay-as-you-go schemes; personal pensions arranged by individuals and funded occupational pension schemes set up by employers.

The analysis in this study is confined to the different elements that make up the First Pillar and the Public Service component of the Second Pillar as discussed below.

### 10.3.1 Social Security Pensions

The First Pillar Social Welfare system provides for flat rate payments (intended to cover basic living expenses) and embodies two types of schemes - Social Insurance and Social Assistance. Eligibility for social insurance pension benefits is dependent on an individual's Pay Related Social Insurance (PRSI) record, whereas non-contributory social assistance pensions are available on a means tested basis to those who do not meet the social insurance requirements. First Pillar pension payments are financed through a combination of contributions from employers, employees and the self employed (Social Insurance schemes) and general taxation (Social Assistance pensions).

Table 10 - 1 outlines the Social Security pension schemes covered as part of Ireland's projections exercise. A summary of the associated eligibility requirements is provided in Annex 1.

**Table 10 - 1 Social security pension schemes**

<i>Pension Scheme</i>	<i>2005 Weekly Payment Rates (€)</i>	
	<i>Social Insurance</i>	<i>Social Assistance (Top Rate)</i>
Old Age Contributory / Retirement	179.30	-
Old Age Non-Contributory	-	166.00
Invalidity (65+/64-)	179.30 / 154.30	-
Widow(er)s Contributory (66+/65-)	179.30 / 154.30	-
Widow(er)s Non-Contributory (66+/65-)	-	166.00/148.80
Carers, Blind Persons, Lone Parents (66+/65-) <sup>72</sup>	-	169.80, 166.00, 166.00 / 153.60, 148.80
Disability Benefit	148.80	-
Disability Allowance	-	148.80
Pre-Retirement Allowance	-	148.80

In addition to these core payments, a range of supplementary benefits are available. For example, extra allowances are payable to those aged 80 and over and / or living alone, and for qualified adults and child dependents. Subject to certain qualifying conditions, non-cash benefits such as telephone rental and fuel allowances can also be claimed by persons aged 66 years and over.

In terms of the system's coverage, it is estimated that the number of beneficiaries of pension payments amounted to 606,000 in 2004<sup>73</sup>. Approximately 391,000 of these individuals were aged

<sup>72</sup> The 'Lone Parent 66 and over' category also includes two closed schemes – Deserted Wife's Benefit and Deserted Wife's Allowance - which have respective payment rates of €179.30 and €166.

65 and over which, when compared with an estimated figure of 449,000 persons in this age group for the State as a whole, implies that First Pillar coverage was almost 87 per cent of the relevant population. Moreover, the majority of those currently in the labour force will qualify at retirement age for a Social Welfare pension<sup>74</sup>. As such, the system's coverage will increase over time beyond its present day level.

Furthermore, note that taken on their own Social Welfare pensions are not taxed as they do not reach the minimum tax threshold. However, when appropriate, such payments are included in income tax assessments in conjunction with any other income and taxed accordingly.

### **10.3.2 Public Service Pensions**

Second Pillar Public Service occupational pensions take the form of *defined benefit* schemes ie. the pension benefits payable are specified on the basis of clear rules. For each year of pensionable service, public servants in Ireland accrue a retirement pension of 1/80<sup>th</sup> of pensionable remuneration (or of net remuneration for public servants in the full Pay Related Social Insurance class) and a retirement lump sum of 3/80<sup>th</sup>s of pensionable remuneration.

With respect to retirement age, there are considerable variations between the different groups of existing public servants. Furthermore, different categories of public servants pay different Social Insurance contributions. Many pay a lower rate of PRSI than applies to employees in general and as such, do not qualify for a range of benefits. However, public servants who pay full PRSI are entitled to Social Insurance pension payments and consequently, the occupational pension entitlements of these individuals are subject to integration, that is, their Social Insurance benefits are taken into account when making up their replacement incomes at retirement. Moreover, as a result of the Government's decision that all public servants appointed on or after 6 April 1995 should be in the full PRSI class, the number of public servants whose occupational pensions and contributions are subject to integration will increase in the coming years.

Finally, reforms implemented from 2004 onwards have allowed for the raising of the minimum pension age and the removal of a compulsory retirement age for most new public servants (these measures are expected to have a positive impact on future labour supply). In addition, a cost-neutral early retirement scheme with actuarially reduced benefits (facilitating improved labour mobility) has also been introduced.

Annex 2 details the main features of Public Service pension schemes in Ireland.

### **10.3.3 National Pensions Reserve Fund (NPRF)**

A further feature of the Irish pension system is the National Pensions Reserve Fund. Established in 1999, the purpose of the NPRF is to pre-fund in part the future Exchequer cost of Social Welfare and Public Service pensions. A statutory obligation has been placed on the Government to pay a sum equivalent to 1% of GNP into the Fund each year until at least 2055. Drawdowns are prohibited prior to 2025. Overall, it is anticipated that the NPRF will help to ease the age-related spending pressures set to materialise in the coming decades.

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<sup>73</sup> The term 'beneficiaries' includes both direct recipients of the above pension payments and the number of adult dependants covered under the Old Age Contributory, Retirement and Old Age Non-Contributory schemes.

<sup>74</sup> With the exception of certain categories of public servants.

## 10.4 Demographic and Macroeconomic Assumptions

This section briefly outlines the demographic and macroeconomic assumptions that underlie Ireland's projection results. For a detailed discussion of these assumptions, the reader is referred to the EPC's background note<sup>75</sup>.

### 10.4.1 Demographic Assumptions

The following table presents the 'AWG Variant' demographic projections prepared by Eurostat for Ireland. These figures are based on, but not identical to, Eurostat's EUROPOP2004 projections. The key difference relates to the life expectancy at birth assumptions which were modified for the purpose of this exercise so as to allow for convergence amongst the EU15 Member States.

**Table 10 - 2 Demographic assumptions**

	2004	2010	2020	2030	2040	2050	Change
Fertility rate	1.97	1.89	1.81	1.80	1.80	1.80	-0.17
Life Expectancy: Male	75.5	76.8	78.7	80.2	81.3	82.2	6.6
Female	80.7	81.8	83.6	85.0	86.0	86.8	6.2
Net Migration Flows (thous)	16	15	14	13	13	12	-
Total Population (mill)	4.0	4.3	4.8	5.1	5.3	5.5	36%
Population (0-14)	0.8	0.9	0.9	0.9	0.9	0.9	4%
Population (15-64)	2.7	2.9	3.1	3.3	3.3	3.2	16%
Population (65+)	0.4	0.5	0.7	0.9	1.2	1.4	219%
Population (80+)	0.1	0.1	0.2	0.2	0.3	0.4	313%
Old Age Dependency Ratio	16.4	17.5	22.5	28.3	36.0	45.2	29

In analysing these population projections, the starting point is the fertility rate. While Ireland emerges as one of the few EU countries in which fertility falls by 2050, the above rates are still ahead of those of the EU25 average for the length of the projection period. With regard to life expectancy, the adjusted demographic projections indicate that Ireland will experience an increase in male life expectancy in excess of the EU25 average of 6.3 years. The change for females will be even higher than the corresponding EU25 average of 5.1 years. Additionally, it is projected that the flow of immigrants will account for a slightly greater percentage of the Irish population going forward than the average across all EU Member States. Nevertheless, between 2004 and 2050 immigrant inflows as a percentage of the population are expected to fall from 0.4 to 0.2%.

Taken together, the above assumptions imply that Ireland's population will grow by 35.9% over the period 2004-2050. This figure is the second highest amongst the 25 Member States. While all age groups in Ireland are set to experience growth, a marked increase in the number of people aged 65 plus and those aged 80 and over is expected to occur – the corresponding growth rates for these two cohorts are respectively the highest and second highest in Europe. Moreover, it is projected that by

<sup>75</sup> EPC / DG Ecfm (14 October 2005) *Background note - The 2005 EPC budgetary projections exercise: detailed description of agreed underlying assumptions and of projection methodologies.*

2050, the percentage of the population aged 65 and over relative to the population aged 15-64 (the old age dependency ratio) will be 45.2%. This more than twofold increase is broadly in line with the increases projected for the majority of EU countries.

#### 10.4.2 Macroeconomic Assumptions

In estimating GDP out to 2050, the Ageing Working Group formulated and combined a set of common assumptions covering the labour force (participation, employment and unemployment rates), labour productivity and the real interest rate. The resultant macroeconomic assumptions for Ireland are outlined in Table 10 - 3.

**Table 10 - 3 Macroeconomic assumptions**

	<i>2004</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Real GDP (growth rate)	6.1	5.2	3.0	2.1	1.4	1.6
Labour Input (growth rate)	2.7	1.4	0.8	0.4	-0.3	-0.2
Labour Productivity (growth rate)	3.3	3.8	2.2	1.7	1.7	1.7
Population Growth (15-64)	1.8	0.8	0.7	0.3	-0.3	-0.2
Employment Growth	3.7	1.4	0.8	0.4	-0.3	-0.2
Participation Rate (15-64)	69.7	73.4	75.7	76.7	77.1	77.2
Employment Rate (15-64)	66.7	70.9	73.2	74.0	74.5	74.6
Unemployment Rate (15-64)	4.3	3.4	3.4	3.4	3.4	3.4
Real Interest Rate	3.0	3.0	3.0	3.0	3.0	3.0
Inflation Rate	2.0	2.0	2.0	2.0	2.0	2.0

With respect to the labour force components, firstly, the above projections indicate that the participation rate of the working age population (the cohort aged 15-64) will rise steadily from 69.7 in 2004 to 77.2 in 2050. A more detailed breakdown reveals that the most significant change in this respect is the projected increase of 18.5% in the participation rate of those aged 55-64. Secondly, the unemployment rates presented in Table 4.2 reflect the AWG's simplifying assumption that the unemployment rate in each Member State would converge to its structural level (NAIRU) by 2008 and thereafter be held constant – at 3.4% in Ireland's case. The corollary is that the rate of employment amongst the population of working age is projected to remain ahead of both the EU15 and the EU25 averages out to 2050.

In terms of labour productivity, Ireland's growth rate stays above the 3% mark until 2016, after which it begins to gradually converge towards the assumed EU15 rate of 1.7% by the end of the period.

Combining these various assumptions and projections leads to estimates of GDP growth. Over the coming years, the Irish economy is projected to remain well ahead of the EU15 and EU25 in GDP terms. For example, the 2050 GDP per capita estimate for Ireland relative to the EU15 base figure of 100 is in the order of 167.

## 10.5 Pension Projections Methodology

Ireland's projection methodology is reasonably straightforward. It may be described as a partial equilibrium approach which produces integrated demographic, economic and pension projections based on a clear set of assumptions. A detailed overview of the approach is provided below. In addition, Table 10 - 4 decomposes the Social Security and Public Sector pension schemes modelled in the analysis into the categories requested by the Ageing Working Group.

**Table 10 - 4 Description of coverage and specification of schemes <sup>1</sup>**

<i>Specification of Schemes</i>	<i>Age Group</i>	<i>Coverage</i>
<b>Social Security Pensions: Old Age and Early Pensions</b>		
<i>Social Assistance:</i>		
Minimum flat rate Old Age Non-Contributory pension <sup>1</sup>	66+	All Sectors <sup>2</sup>
Widow / Widower's Non-Contributory pension	66+	All Sectors <sup>2</sup>
Carers, Blind Persons, Lone Parents	66+	All Sectors <sup>2</sup>
<i>Social Insurance:</i>		
Flat rate Old Age Contributory and Retirement pensions <sup>1</sup>	66+ and 65	Private sector, self-employed and some Civil Servants <sup>3</sup>
Widow / Widower's Contributory pension	66+	All Sectors
Invalidity	65+	Private sector, self-employed and some Civil Servants <sup>3</sup>
<b>Social Security Pensions: Others</b>		
<i>Social Assistance:</i>		
Widow / Widower's Non-Contributory pension	65 and under	All Sectors <sup>2</sup>
Carers and Blind Persons	65 and under	All Sectors <sup>2</sup>
Pre-Retirement allowance	55-65	All Sectors <sup>2</sup>
<i>Social Assistance &amp; Insurance:</i>		
Disability <sup>4</sup>	66 and under	Private sector, self-employed and some Civil Servants <sup>3</sup>
<i>Social Insurance:</i>		
Invalidity	64 and under	Private sector, self-employed and some Civil Servants <sup>3</sup>
Widow / Widower's Contributory pension	65 and under	All Sectors
<b>Public Service Occupational Pensions</b>		
Pensions, lump sums and spouses	Varying	Public sector (Civil Service, Defence Forces, Gardai, Education, Non-Commercial State Bodies, Health and Local Authorities)

1. Includes dependant adults of all ages but not child dependants. Additional payments for those aged 80 and over and / or living alone are also recorded in the pension expenditure figures.

2. While all sectors of the economy are eligible to apply for these pensions, some sectors will not be eligible to receive them given the means tested nature of the schemes.

3. Civil and Public Servants recruited after 6 April 1995 are in the full PRSI class and will therefore receive an integrated Social Security and occupational pension upon retirement. Those recruited pre-6 April 1995 pay a lower rate of PRSI and as such, are not entitled to all benefits.

4. This category is comprised of Disability Allowance and Disability Benefit. The latter is a sickness benefit scheme and is not a long-term payment in every case. On average 50% of the stock of claims in respect of this payment are for a period greater than a year. Accordingly, 50% of overall Disability Benefit expenditure and recipients are included in the projected figures.

### 10.5.1

### Social Security Pensions

*Number of Pensioners:* In projecting forward the number of Social Security pensioners, the starting point is the 2005 provisional estimates of the proportion of the population aged 65/66 and over in receipt of pension payments of the types covered in the 'Old-Age and Early pensions' category, and those aged 65 and under covered by the 'Other pensions' heading<sup>76</sup>. On the basis of assumptions as to how these proportions will change between the base year and 2050, the number of recipients of the various pension payments in a given year is calculated via a gradual move between the start and end points. The core assumptions imposed are that approximately 97% of males and 76% of females will be entitled to an Old Age Contributory pension in 2050. The move between the two points takes into account demographic developments and also changes in the employment rate. The latter allows for the fact that some eligible individuals may choose to continue working and therefore not claim a pension.

With respect to disaggregating pensioners by age, the pensioner numbers reported in the 'Old-Age and Early pensions' and 'Other pensions' categories relate to pensioners who are for the most part aged 65/66 and over in the case of the former, and 65 and under for the latter<sup>77</sup>. As such, an age breakdown broadly in line with those above and below pension age (65/66) is implicitly provided.

*Pension Expenditure:* Gross pension expenditure projections adopt a bottom up approach. Firstly, the rates applicable to the various pension payments are projected out to 2050, taking into account appropriate extra allowances. The Old-Age Contributory pension rate is indexed to nominal earnings and all other rate rises are at this same flat rate<sup>78</sup>. An estimate of overall spending is provided by multiplying the projected payment rates by the number of pensioners claiming each type of payment. The resultant figures are then converted into constant 2004 price terms.

Net pension expenditure projections are not provided.

*Contributions:* Social Security pensions in Ireland are financed through a combination of general tax revenues (Social Assistance schemes) and PRSI contributions (Social Insurance pensions).

Based on an analysis of historical trends, the projected values of Pay Related Social Insurance contributions (employer, employee and self-employed) are held constant over the entire timeframe at 4.3% of GNP. However, as PRSI revenue is used to fund a wide range of social insurance benefits, it is necessary to try and assign some value to the pension contingency element of these contributions. In 2002, the GAD Actuarial Review projected that pension expenditure as a proportion of total social insurance spending would increase to 85% by 2056<sup>79</sup>. For the purpose of these projections, this view is deemed to hold throughout and accordingly, 85% of projected PRSI receipts are recorded as contributions towards Social Security pension expenditure.

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<sup>76</sup> The numbers in receipt of Disability Allowances, Disability Benefit and the Pre-Retirement Allowance are based on 2004 data as 2005 provisional estimates for the number of recipients of these payments are not yet available.

<sup>77</sup> The figures for pensioners in receipt of Old Age Contributory, Retirement and Old Age Non-Contributory pension payments also include adult dependants some of whom may be below 65/66 years in age.

<sup>78</sup> However, increases for means tested pensions are adjusted downwards in line with the current means adjustment mechanism in place for the Old Age Non-Contributory and Widow / Widower's Non-Contributory schemes. As such, the difference between contributory and non-contributory payment rates that applies in 2005 is maintained throughout the projection period.

<sup>79</sup> Department of Social and Family Affairs (2002) *Actuarial Review of the Financial Condition of the Social Insurance Fund as at 31 December 2000*. Dublin: The Stationery Office.

In line with the AWG's reporting requirements, an estimate of the taxation revenues used to finance Social Assistance pension payments is not reported.

*Number of Contributors:* The number of individuals paying PRSI in 2003 (the most recent year for which this data is available) is taken as the base figure when projecting forward contributors<sup>80</sup>. Over time, the number of contributors is assumed to grow in tandem with the rate of employment growth.

## **10.5.2 Public Service Pensions**

*Pension Expenditure:* The estimates provided in this study relate to gross Public Service pension expenditure and are expressed in constant 2004 price terms. These projections represent an update of the detailed analysis carried out by the Commission on Public Service Pensions (2000), and are based on the large number of assumptions made at that time in relation to withdrawals, age, illness and retirement patterns<sup>81</sup>. Actual spending on Public Service pensions in 2004 is taken as the starting point and the number of public servants is assumed to remain constant over the projection period. Furthermore, reforms implemented in 2004 including the raising of the minimum pension age and the removal of a compulsory retirement age for most new public servants are accounted for in the projected spending figures.

As in the case of the Social Security projections, net pension expenditure estimates are not reported as it is impossible to distinguish Public Service pension income from non-pension income on the basis of tax records.

*Number of Pensioners:* Projections in relation to the number of Public Service pensioners allow for an increase over time in line with the general age and gender profile of the sector.

*Contributions:* Contribution projections reflect the different rates in place for many pre-1995 and post-1995 public servants. This situation follows from the Government's decision that new entrants to the Public Service after 6 April 1995 should be in the full PRSI class. Again, the figures presented in the spreadsheet are reported in terms of fixed 2004 prices and assume that the number of public servants remains constant.

## **10.5.3 Assets of Pension Funds and Reserves**

The average net assets of the National Pensions Reserve Fund are projected out to 2050. In projecting forward the NPRF, the starting point is its value at 31 December 2004. The fund is rolled forward by assuming a real interest rate of 3% and by allowing for the continuation of Exchequer contributions amounting to 1% of GNP until 2055. While withdrawals are permitted to begin in 2025, there are no set legislative rules as of yet governing the manner of drawdown. Thus, for the purpose of this exercise, it is assumed that post 2025 drawdowns increase from the initial level (which is set at 0.1% of GNP) in line with the increase in the population aged 65 and over from the 2025 base figure. In addition, the drawdown level as a percentage of GNP is assumed to peak in 2055 before being scaled back so as to lead to the exhaustion of the Fund by 2070.

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<sup>80</sup> Data source: Department of Social and Family Affairs.

<sup>81</sup> Current data on these patterns is not available for many of the numerous Public Service groups.



#### 10.5.4

#### Additional Information

- The GNP figures used in the course of these projections are estimated by applying the Commission's methodology for calculating GDP to a GNP base figure taken from Budget 2005.
- As a final point, note that Social Security and Public Service pensioner numbers are not summed in order to provide a total figure. As a result of integration there is an element of overlap between the two that cannot be separated out.

### 10.6 Pension Projection Results

The results of Ireland's pension projections exercise are presented in Table 10 - 5. These figures are based on information available in the autumn of 2005 and do not incorporate any policy measures announced in Budget 2006 or more recent developments<sup>82</sup>.

**Table 10 - 5 Pension projection results (% of GDP)**

	<i>2005</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Total Social Security Expenditure:	3.4	3.8	4.5	5.5	6.8	8.4
'Old-Age and Early pensions'	2.3	2.5	3.3	4.2	5.5	7.1
'Other pensions'	1.1	1.2	1.3	1.3	1.3	1.3
Public Service Expenditure	1.2	1.4	2.0	2.4	2.6	2.7
Total Pension Expenditure	4.6	5.2	6.5	7.9	9.3	11.1
Total Contributions	3.6	3.4	3.4	3.4	3.4	3.4
Value of the National Pensions Reserve Fund	8.0	11.1	18.1	26.0	28.3	21.9

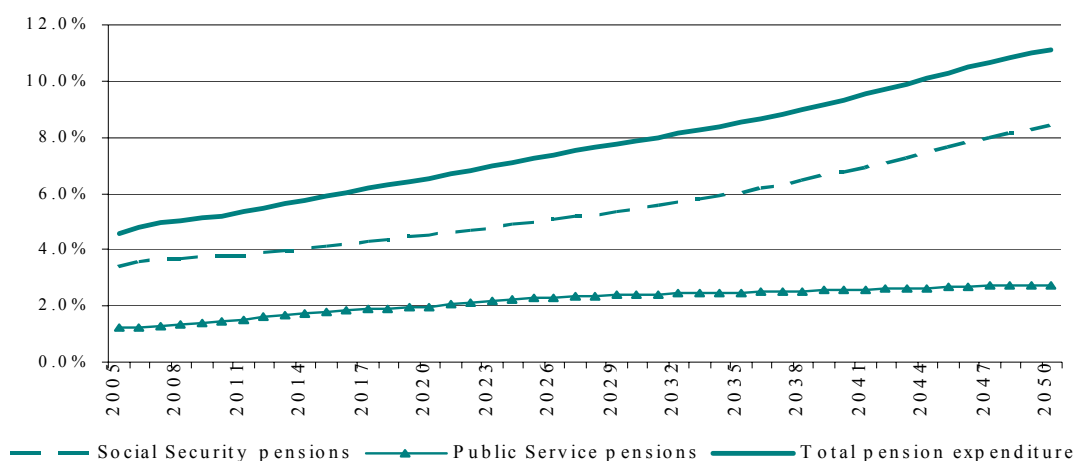
Total public pension expenditure in Ireland is projected to rise significantly over the period 2005-2050. The above table indicates that spending on pensions will amount to some 11.1 % of GDP in 2050, more than double the corresponding 2005 figure of 4.6%<sup>83</sup>. Furthermore, as is evident from Graph 10 - 1, the majority of this increase is accounted for by the First Pillar component of the pension system. Most notably, spending on the 'Old-Age and Early pensions' category, which covers pensioners who are aged 65/66 and over, is set to rise from 2.3% of GDP in 2005 to 7.1% in 2050. In contrast, Public Service pensions are projected to contribute just 1.5 to the 6.5 percentage point change between 2005 and 2050.

<sup>82</sup> In addition, note that the Ageing Working Group agreed that the cut-off date for the inclusion of pension reforms in the projection models of Member States would be the end of 2004.

<sup>83</sup> Previous national figures, prepared as part of a similar EPC exercise undertaken in 2001, projected that pension expenditure would account for just over 9% of GNP in 2050. The results presented in Table 10 - 5 reflect the wider definition of pensions adopted by the AWG this time round and therefore, the projected 2050 pension spending share of 11.1% of GDP (13.3 % of GNP) reported above is not comparable with the previous estimate.

Decomposing these results further reveals that the much of the projected increase in Social Welfare pension expenditure is attributable to unfavourable demographic developments (see Table 10 - 2). As discussed previously, over the coming decades a marked increase in the number of people aged 65 plus and 80 and over is expected to occur. Moreover, it is projected that by 2050, the percentage of the population aged 65 and over relative to the population aged 15-64 (the old age dependency ratio) will be in the order of 45.2% compared to a figure of 16.4% in 2004. This projected change in the composition of Ireland's demographic structure has a number of implications for the evolution of the public finances. Foremost amongst these is the substantial increase in age-related public expenditure that will come about as a result of a larger share of the population moving into age brackets that require such spending. Furthermore, the maturation of the Social Security pension scheme will give rise to higher average pension payments, thereby adding to the upward spending pressures implied by the ageing of the population.

**Graph 10 - 1 Pension expenditure projections (% of GDP)**



With respect to the financing of the Irish pension system, the results indicate that PRSI and Public Service contributions as a percentage of GDP remain constant throughout the projection period at approximately 3.4%. While such contributions help to fund the system, a growing shortfall between these sources of revenue and projected pension spending is obvious from the figures provided in Table 10 - 5. However, the accumulation of assets through the National Pensions Reserve Fund will facilitate the closing of this gap and thereby, ease age-related spending pressures in the future. In addition, factors such as Ireland's low level of debt, low tax ratio, established record of sound budgetary management and relatively high potential growth rate, suggest that Ireland is in a reasonably favourable position to deal with the potential risks posed by population ageing.

Finally, recall that First Pillar Old Age Contributory pension payments are assumed to grow in line with nominal earnings in Ireland's pension model. From a welfare perspective, this assumption implies a relatively static replacement rate of approximately 33% of earnings from 2007 onwards.

## 10.7 Sensitivity Tests

In addition to the baseline scenario, Member States were asked to carry out a range of sensitivity tests so as to quantify the responsiveness of the projection results to changes in the underlying demographic and macroeconomic assumptions. The results of these projections are detailed below. (For the number of contributors and pensioners, a plus / minus sign indicates an increase / decrease with respect to the baseline results. However, as pension expenditure and the value of the National Pensions Reserve Fund are expressed as a percentage of GDP, the figures presented under these headings should be interpreted as percentage point changes from the baseline scenario).

### 10.7.1 Higher Life Expectancy

The original life expectancy assumptions are altered for the purpose of this sensitivity test by decreasing age-specific mortality rates out to 2050, via a linear increase from zero per cent in 2004. This adjustment leads to an increase in life expectancy at birth of about 1 to 1.5 years by 2050. In terms of the overall impact on pension spending, the change relative to the baseline scenario is positive but marginal.

**Table 10 - 6 Higher life expectancy projection results**

	<i>2005</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Public Pension Expenditure (p.p. change)	0	+ 0.01	+ 0.03	+ 0.09	+ 0.18	+ 0.33
Social Security Pensioners ('000 change)	0	+ 1	+ 7	+ 19	+ 39	+ 68

### 10.7.2 Higher Employment Rate

In the following scenario, the employment rate is assumed to increase by 1 percentage point between 2005 and 2015 and to remain 1 percentage point higher over the period 2015-2050. This change in the employment rate is reflected in a parallel shift in the unemployment rate. The main deviations from the baseline projections relate to total pension expenditure and the number of PRSI contributors. As expected, the former falls slightly while the latter rises as a result of more people working.

**Table 10 - 7 Higher employment rate projection results**

	<i>2005</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Public Pension Expenditure (p.p. change)	0	- 0.02	- 0.05	- 0.05	- 0.06	- 0.07
Social Security Contributors ('000 change)	+ 4	+ 23	+ 45	+ 48	+ 48	+ 46

### 10.7.3 Higher Employment Rate amongst Older Workers

This sensitivity test allows for the employment rate of older workers (aged 55 – 64) to increase by 5 percentage points over the period 2005-2025 (approximately 0.25 p.p. per annum) and to stay 5 percentage points higher than the baseline scenario for the remainder of the projection period. In this case, the change in the employment rate is reflected in a parallel change in the participation rate. Again, pension expenditure and the number of PRSI contributors are affected, but as before, the total change is relatively small.

**Table 10 - 8 Higher older employment rate projection results**

	<i>2005</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Public Pension Expenditure (p.p. change)	0	- 0.01	- 0.03	- 0.06	- 0.08	- 0.08
Social Security Contributors ('000 change)	+ 1	+ 9	+ 30	+ 47	+ 54	+ 46

### 10.7.4 Higher / Lower Labour Productivity

In order to test the sensitivity of the projection results to changes in labour productivity, the baseline productivity assumptions are raised / lowered by 0.25 percentage points from 2010 to 2015 (about 0.04 per year) and are then allowed to remain 0.25 percentage points higher / lower out to the end of the timeframe. As pension payment rates are indexed in part to real earnings, which in turn are assumed to grow in line with productivity, the assumed productivity changes impact on the pension spending projections. In the lower productivity scenario, the end result is a marginal fall in the pensions burden relative to the baseline, whereas the impact is positive when the higher productivity assumption is imposed.

**Table 10 - 9 Higher / lower productivity projection results**

	<i>2005</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Higher Productivity:						
Public Pension Expenditure (p.p. change)	0	0	+ 0.01	+ 0.03	+ 0.04	+ 0.04
Lower Productivity:						
Public Pension Expenditure (p.p. change)	0	0	0	-0.01	0	0

### 10.7.5 Higher / Lower Interest Rates

For the final two tests, the interest rate is respectively increased / decreased by 1 percentage point above / below the baseline scenario of 3%. As a consequence of altering the underlying interest rate assumption, there is a marked change in the value of the National Pensions Reserve Fund. Firstly, with respect to the higher interest rate scenario, the assets of the Fund rise by 6.54 percentage points relative to the baseline results in 2050. Secondly, and in contrast, the relative fall in the value of the Fund is some 5.20 percentage points in response to the adoption of the lower interest rate assumption.

**Table 10 - 10 Higher / lower interest rate projection results**

	<i>2005</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Higher Interest Rate:						
NPRF Assets (p.p. change)	+ 0.04	+ 0.49	+ 1.91	+ 4.20	+ 6.13	+ 6.54
Lower Interest Rate:						
NPRF Assets (p.p. change)	- 0.04	- 0.47	- 1.70	- 3.53	- 5.01	- 5.20

As a whole, Ireland's baseline pension projection results exhibit little response to the altered demographic and macroeconomic assumptions discussed above. The one exception to this conclusion is the strong impact of the assumed interest rate changes on the value of the National Pensions Reserve Fund's assets.

## **10.8 Conclusion**

In summary, this note has sought to provide an overview of the model and methodology used by Ireland for the purpose of projecting forward pension spending, contributions, pensioners and the number of contributors as requested by the Ageing Working Group. In addition, a description of the Irish pension system and a discussion of the baseline projection results, and those of a range of sensitivity tests, are presented.

Overall, national projections indicate that public pension spending in Ireland will rise as a share of GDP from 4.6% in 2005 to 11.1% in 2050. Public Service pensions are projected to contribute just 1.5 to this 6.5 percentage point change. As such, the majority of the expected increase is attributable to the First Pillar component of the pension system and principally, to spending on old age and other age-related pension payments. Unfavourable demographic developments in Ireland over the longer term suggest that spending on these two components will increase from 2.3% of GDP in 2005 to some 7.1% in 2050.

Notwithstanding the above costs, Ireland is well placed in terms of its ability to meet the budgetary challenges posed by population ageing. In particular, the range of appropriate and timely policy responses that have been implemented to date - such as the establishment of the National Pensions Reserve Fund and ongoing public sector pension reforms and initiatives - will facilitate the easing of age-related spending pressures in the future. Furthermore, Government strategy is geared towards maintaining the existing low levels of debt and unemployment, improving labour force participation rates and supporting the economy's long-term growth potential by means of strategic public investment. Combined, these measures should enable Ireland to absorb the potentially high costs associated with the 'greying' of its population.

## Annex 1: Eligibility Requirements for First Pillar Pensions

<i>Pension Scheme</i>	<i>Requirements</i>
Old Age Contributory Pension	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be 66 years or over</li> <li>▪ have commenced paying PRSI contributions before age 56</li> <li>▪ have at least 260 full rate contributions paid</li> <li>▪ a yearly average of 48 paid / credited since 1979 to the end of the relevant tax year <b>or</b> a yearly average of 10 paid / credited since 1953 (or since commencement of insurable employment if later) to the end of the relevant tax year</li> </ul>
Old Age Non-Contributory Pension	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be 66 years or over</li> <li>▪ have a valid Personal Public Service (PPS) Number</li> <li>▪ be a permanent resident of the State</li> <li>▪ satisfy a means test</li> </ul>
Retirement Pension	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be 65 years</li> <li>▪ have commenced paying PRSI contributions before age 55</li> <li>▪ have at least 260 full rate contributions paid</li> <li>▪ a yearly average of 48 paid / credited since 1979 to the end of the relevant tax year <b>or</b> a yearly average of 24 paid / credited since 1953 (or since commencement of insurable employment if later) to the end of the relevant tax year</li> </ul>
Widow(er)'s Contributory Pension	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be widowed <b>or</b> divorced from late spouse and not remarried / cohabiting</li> <li>▪ have 156 weeks PRSI paid before pension age / death of spouse</li> <li>▪ an average of 39 weeks PRSI paid / credited over 3 or 5 tax years (whichever is most beneficial) before pension age / death of spouse <b>or</b> an annual average of 24 PRSI contributions for a minimum pension, or an average of 48 for a maximum pension</li> </ul>
Widow(er)'s Non Contributory Pension	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be widowed <b>or</b> divorced from late spouse and not remarried / cohabiting</li> <li>▪ satisfy a means test</li> <li>▪ be living in the State</li> <li>▪ satisfy the Habitual Residence Condition</li> </ul>
Invalidity Pension	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be deemed incapable of work due to illness</li> <li>▪ have 260 PRSI contributions paid</li> <li>▪ have 48 PRSI contributions paid / credited in the relevant tax year</li> </ul>
Pre-Retirement Allowance	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be 55 years or over</li> <li>▪ be retired from the workforce</li> <li>▪ satisfy a means test</li> </ul>

	<ul style="list-style-type: none"> <li>▪ have received Unemployment Assistance for 390 days or Unemployment Benefit for 390 days and have shown that he / she qualifies for Unemployment Assistance <b>or</b> is no longer entitled to the One Parent Family Payment or to the Carer's Allowance <b>or</b> is separated from his / her spouse and has not been employed or self-employed for the preceding 15 months</li> </ul>
Disability Benefit	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be unable to work due to illness</li> <li>▪ be under 66 years</li> <li>▪ have at least 52 weeks PRSI contributions paid and 39 weeks PRSI contributions paid / credited in the relevant tax year (13 of which must be paid contributions) <b>or</b> 26 weeks PRSI contributions paid in the relevant tax year and 26 weeks PRSI contributions paid in the tax year immediately before the relevant tax year</li> </ul>
Disability Allowance	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ satisfy the Habitual Residence Condition</li> <li>▪ have a disability that has continued or is expected to continue for at least one year and causes an inability to do work that would otherwise be suitable</li> <li>▪ be between 16 and 65 years</li> <li>▪ satisfy a means test</li> </ul>
Carers Allowance	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be 18 years or over</li> <li>▪ satisfy a means test</li> <li>▪ be in close proximity to the person they are caring for</li> <li>▪ care for the person on a full-time basis</li> <li>▪ not be employed outside the home for more than 10 hours a week</li> <li>▪ satisfy the Habitual Residence Condition</li> <li>▪ not live in a hospital or similar institution</li> </ul> <p>Person claimant cares for must</p> <ul style="list-style-type: none"> <li>▪ be so disabled as to need full-time care and attention</li> <li>▪ not normally live in a hospital or similar institution</li> <li>▪ be 16 years or over <b>or</b> under age 16 if a Domiciliary Care Allowance is being paid</li> </ul>
Blind Persons Pension	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be 16 years or over</li> <li>▪ be blind or have low vision</li> <li>▪ be a permanent resident of the State</li> <li>▪ satisfy a means test</li> </ul>
One Parent Family Payment	<p>Claimant must</p> <ul style="list-style-type: none"> <li>▪ be the main carer of at least one child</li> <li>▪ be living with the child</li> <li>▪ not be cohabiting</li> <li>▪ have earnings of €293.00 or less per week</li> <li>▪ satisfy a means test</li> <li>▪ satisfy the Habitual Residence Condition</li> </ul>

## **Annex 2: Main Features of Second Pillar Public Service Pension Schemes**

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### ***Terms Applicable to all Pensionable Staff***

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Pensions	<ul style="list-style-type: none"><li>▪ 1/80<sup>th</sup> of net pensionable pay per year of service</li><li>▪ Net pensionable pay is pensionable pay less twice the Old Age Contributory pension (OACP) for staff subject to integration and is full pensionable pay for others</li></ul>
Lump Sums	<ul style="list-style-type: none"><li>▪ 3/80<sup>th</sup>s of pensionable pay per year of service on retirement or earlier death</li></ul>
Spouse's Pensions	<ul style="list-style-type: none"><li>▪ 1/160<sup>th</sup> of spouses net pensionable pay per year of service</li><li>▪ For spouses pension purposes, net pay is either full pensionable pay or pay less twice the rate of the OACP or full pay less once the rate of the OACP depending on the scheme</li><li>▪ Some public service staff and pensioners are not members of a Spouse and Children's scheme</li></ul>
Maximum Benefits	<ul style="list-style-type: none"><li>▪ Based on 40 years of service</li></ul>

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### ***Public Servants with Standard Terms***

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Retirement Age	<ul style="list-style-type: none"><li>▪ For staff recruited prior to 2004 retirement is optional from age 60 with a maximum retirement age of 65</li><li>▪ For staff recruited since 2004 the minimum pension age is 65 and there is no maximum retirement age</li><li>▪ No integration applies for staff recruited prior to 6/4/95</li><li>▪ For staff recruited since 6/4/95, integration applies to main scheme and spouses pensions (where integration applies, a supplementary pension may be paid under certain conditions)</li></ul>
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### ***Public Servants with Special Terms***

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Retirement Age	<ul style="list-style-type: none"><li>▪ Gardai and prison officers can retire from age 50, subject to 30 years service. Each year after 20 counts as double</li><li>▪ Retirement terms vary for members of the army</li><li>▪ Certain staff (mainly professional grades) may receive notional added years i.e. benefits are based on actual service plus extra years</li><li>▪ For some Public Service groups, many staff members recruited prior to 1995 were subject to integration either in part or in full</li><li>▪ Un-established civil servants have a minimum and maximum retirement age of 65</li><li>▪ Teachers (recruited prior to 2004) may retire from age 55 on, subject to having 30 years service</li><li>▪ Psychiatric nurses may retire from age 55. Service in excess of 20 years is doubled</li></ul>
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## **11. Italy**<sup>84</sup>

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### **11.1 Introduction**

This paper aims to illustrate the projection of the Italian public pension system made by the model of the Department of General Accounts (Ragioneria Generale dello Stato - RGS), on the basis of the scenario hypotheses defined within the second round of budgetary projections promoted by the Economic Policy Committee - Ageing Working Group (EPC-AWG). The results of the previous round of budgetary projections were finalised in November 2000 and published the following year. Since then, the projections of the Italian pension system, based on EPC-AWG assumptions, have been yearly revised to take into account the updating of the starting data and any changes to the legal-institutional framework legislated afterwards. Such projections have been regularly utilised in the Stability and Converging Programmes of Italy, in the section devoted to the analysis of the mid-long term sustainability of public finances.

The first paragraph provides a description of the Italian pension system in which particular attention is paid to the reform process starting from 1992. The following paragraph is aimed at illustrating the main features of the forecasting model. Besides a description of the main methodological aspects, this section provides information concerning the coverage of pension projections. The last paragraph is devoted to reporting the results of the projection under the EPC-AWG baseline scenario and the sensitivity analysis concerning alternative demographic and macroeconomic assumptions. In the annexes, more in depth analyses are provided, concerning specific aspects related to pension legislation and projection results.

### **11.2 Description of the pension system**

#### **11.2.1 An overview of the legal and institutional framework**

The Italian pension system is almost entirely composed of a compulsory, public component that is financed as a pay-as-you-go system. In addition, it is fragmented into over fifty different schemes. The five largest schemes cover more than 9/10<sup>th</sup> of the total pension expenditure. Most of the other schemes involve very few workers or pensioners. About 73% of the Public Pension System is administered by INPS (Social Security Institute for the private sector), about 24% is administered by INPDAP (Social Security Institute for the public sector), and the remaining 3% is administered by a number of small institutions.

In 2003, the public pension expenditure accounted for 14,2% of GDP gross of tax revenue on it. Discarding the component of social pensions, the public pension expenditure was attributed to direct pensions (old age, seniority and disability) for 83% and to survivors' pensions for the remaining 17%. Moving on to the decomposition by sectors, 61% of pension expenditure was assigned to the privately employed, 24% to the publicly employed and 15% to the self-employed.

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<sup>84</sup> This note was prepared at the end of 2005 for the purpose of the peer review procedure within the EPC-AWG. Therefore, the legal framework as well as the projection results are updated to this year. As for the starting values, it is worth mentioning that the projecting model utilised in the context of the second round of EPC-AWG common projections did not take into account the revision of GDP time series for the period 2001-2004 communicated by Istat (National Institute of Statistics) on 1st March 2006.

The legal-institutional framework of the Italian public pension system has been heavily reformed since 1992. In particular, four major reforms have been adopted, respectively in 1992 (Law 503/92), 1995 (Law 335/95), 1997 (Law 449/97) and 2004 (Law 243/2004). More specifically, the 1995-reform provides a gradual shift from the earnings-related regime towards a new one called "contribution-based regime"- mainly involving changes in the calculation method. The latest reform has tightened further the eligibility requirements to be entitled to a pension starting from 2008.

In addition to this reform process, we should mention the disability pension reform approved in 1984, (Law 222/84) which significantly reduced the number of newly awarded pensions, and is still producing effects in terms of a steady reduction of the related stock of pensions.

The official projections of the Italian pension system indicate that such reforms tend to curb the effects of demographic trends on the ratio of pension expenditure to GDP, although they cannot avoid an increase of about 1.5 percentage points in the next 30 years. The measures that have contributed most to that result are:

- the elimination of the indexation of pensions to real earnings (Law 503/1992);
- the introduction of the contribution based method, which significantly reduces the size of pensions, especially for the self-employed (Law 335/1995);
- the tightening of the minimum eligibility requirements (Laws 503/1992, 335/1995, 449/1997 and 243/2004);
- the continuing decrease in the number of disability pensions as a consequence of the 1984 reform (Law 22/84).

As of today, the funded part of the pension system is not well developed. The reforms approved in 1993 (Legislative Decree 507/1993) and in 1995 (Law 335/1995) introduced legislation to regulate and foster supplementary, funded schemes with the aim of building a multi-pillar pension system. Since then the number of insured workers to private funds has increased, although its relative weight is still low. More recently, additional measures have been adopted in order to augment such a trend up to the latest pension reform (Law 243/2004) which has provided important novelties in terms of fiscal incentives and the transfer of the employee severance pay (“trattamento di fine rapporto”) to private funds.

## **11.2.2 The public pension system**

### ***11.2.2.1 Calculation rules***

As a result of the reform enacted in 1995, the Italian Pension System is moving gradually to a new regime applied to all labour market entrants after 31 December 1995. The main feature of this regime concerns the method of calculation (see [Table 11 - 1](#)). Unlike the preceding method, this one takes into account both the amount of contribution paid throughout the whole working life and the life expectancy of the pensioner at retirement age, according to actuarial equivalence.

More specifically, under the contribution-based regime the amount of pension is calculated as a product of two factors: the total lifelong contributions, capitalised with the nominal GDP growth rate (five-year geometric average) and the transformation coefficient the calculation of which is mainly based on the probabilities of death, the probabilities of leaving any widow or widower and the number of years that a survivor’s pension will be withdrawn. As a consequence, benefits are strongly related to retirement age - the lower the age, the lower the pension and vice versa.

The transformation coefficients are available for the age bracket 57-65, but workers may not retire earlier than 65 unless they have reached the eligibility requirements stated by the current legislation and an amount of pension not less than 1.2 times the old age allowance (see next paragraph). In all cases, at 65 people will be at least entitled to the old age allowance, as long as they do not possess other incomes (pensions included).

The new regime will be fully phased in after 2030-2035. Meanwhile, there will be a transition period which only affects workers already employed at the end of 1995. In particular, two different calculation methods will be used depending on the years of contribution at the cut-off date.

Workers with at least 18 years of contribution at the end of 1995 will maintain the earnings-related method but, for the contribution years after 1992, the number of years of annual earnings involved in the benefit calculation will increase gradually to reach the last 15 years for the self-employed and the last 10 years for others. Before the 1992 reform, these were 10 years for the self employed, 5 years for private employees and the last monthly salary for public employees.

However, a so-called pro-rata, mixed regime will be applied to workers with less than 18 years of contribution at the end of 1995. Accordingly, the pension is obtained as a sum of two components: the first one, related to the contribution years before 1995, is calculated following the earnings related method with reference wages, for the contribution years between 1993 and 1995, gradually extended to the entire career; the second one is calculated according to the contribution-based method described above.

Acting on the legislation in force before 1992, both groups of workers are provided with an additional, means-tested income as long as the calculated amount of pension is less than a minimum (5,358.34 Euro a year, in 2004).

### **11.2.2.2 Eligibility requirements**

The eligibility requirements required to be entitled to public pensions are described in [Table 11 - 2](#). As shown, they are gradually increasing for all regimes. In order to make clear the effect of the latest reform (Law 243/2004), which provides a significant increase in the eligibility requirements starting from 2008, it is useful to distinguish the legislation in force before and after the cut-off date for the three regimes.

Under the earnings-related and mixed regimes, the age requirement to an old age pension is 65 for men and 60 for women jointly with a minimum contribution period of 20 years. Before 1992, the minimum retirement ages were, respectively, 60 and 55 for the private sector employees and the minimum contribution period was 15 years.

Up to 2007, the following eligibility requirements will be necessary, as far as seniority pensions are concerned<sup>85</sup>:

- for the employed, either 35 years of contribution at the age of 57<sup>86</sup> or 38 years of contribution for the period 2004-2005 increased by 1 year for the period 2006-2007. Before 1992, there was only a contribution requirement of 35 years, for the privately employed, and of 20 years for the publicly employed that could be reduced to 15 for married women with children;

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<sup>85</sup> For the period 2004-2007, Law 243/2004 also provides an intervention aimed at encouraging the postponement of retirement. For details, see Annex 1.

<sup>86</sup> For the period 2004-2005, the age requirement is reduced by 1 year for blue-collar workers.

- for the self-employed, either 40 years of contribution or 35 years of contribution at the age of 58, starting from 2001. Before 1992, there was only a contribution requirement of 35 years.

In 2008, the eligibility requirements to qualify for seniority pensions become either 40 years of contribution or 35 years of contribution in conjunction with an age of 60, for the employed and 61 for the self-employed. The age requirement is subsequently increased by 1 year in 2010 and another one in 2014 thus reaching the final level of 62 for the employed and 63 for the self-employed<sup>87</sup>.

For the period 2008-2015, women are allowed to receive a seniority pension having satisfied the requirements laid down by legislation before Law 243/2004 as long as they choose the less favourable pension treatment calculated according to the contribution-based method.

Under the contribution-based regime seniority pensions are no longer provided. Up to 2007, retirement age for an old age pension ranges from 57 to 65, but workers may not retire earlier than 65 unless they have reached an amount of pension of at least 1.2 times the old age allowance (4,783.61 Euro a year, in 2004). The possibility to retire before 57 is allowed but it is subject to a contribution requirement of at least 40 years.

Beginning in 2008, the possibility to receive a pension at an age lower than 65 for males and 60 for females is allowed to those with 40 or more years of contributions, or to those with no less than 35 years of contributions and of 60 years of age, in the case of the employed, and 61 for the self-employed. The age limit is to rise by a year from 2010 and another year from 2014, thus reaching 62 and 63 years of age for the employed and the self-employed, respectively. Between 60 and 65, women may retire with 5 years of contributions. In any case, the prerequisite of an amount of pension of at least 1.2 times the old age allowance is still necessary to retire before 65, for both genders.

A further postponement of pension payment is envisaged with respect to the moment when the requirements are met, by way of the so-called “exit windows”. Before Law 243/2004, “exit windows” were applied only to seniority pensions, under the earnings-related and mixed regimes. The new legislation has significantly increased the postponement through “exit windows” applying such a rule also to pensions under the contribution-based regime, starting from 2008.

### **11.2.2.3 Indexation, contribution rates and taxation of pension**

Both in the transition and fully phased in period, pensions are indexed to price developments, unlike the scheme applied before 1992, which also provided, for the employed, a link to real wage growth. In particular, the current legislation maintains a differentiated indexation of pensions according to their amount. These are: 100% of the inflation rate for the part of pension up to three times the minimum pension, 90% for the part between three and five times the minimum, and 75% for the part above five times the minimum.

Contribution rates actually paid to the public pension system are differentiated by category of workers according to the following:

- Private and public employees. The contribution rate is 32.7%, of which about 1/3<sup>rd</sup> paid by the employee and 2/3<sup>rd</sup> by the employer;
- The self-employed. As for artisans and shopkeepers, the contribution rate is increasing up to 19% starting from, respectively, 17.2% and 17.6% in 2005. The target level is achieved in 2014 for the former and in 2013 for the latter. As for farmers, the contribution rate is 20%;

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<sup>87</sup> Those who would have satisfied the requirements envisaged by the precedent legislation before the 31st December 2007 would be entitled to a pension under the requirements previously in force (the so-called ‘certezza dei diritti’).

- Atypical workers. The contribution rate is increasing up to 19% starting from 17.5%, in 2005. Such a contribution rate is reduced to 12.5% in case of atypical workers already entitled to a pension and to 10% in case of a contextual contribution to other public pension schemes.

All pensions are taxed as labour-income, allowing for deductions inversely correlated with the income level. Pension income below 7,500 Euro per year is tax-exempt (no tax-area). In 2004, total revenues on pension incomes, provided by the public pension system, accounted for about 14.5% of the total expenditure which, in turn, corresponded to nearly 2.1% of GDP. Contributions paid to the public pension system are fully deductible from income before taxes.

### **11.2.3 Funded component of the pension system**

Reforms establishing funded pension schemes have also been enacted in order to foster a multi-pillar pension system. In particular, the 1992-1993 and 1995 reforms respectively introduced and improved legislation on supplementary, funded schemes. During the 1990's measures have also been progressively introduced with the aim of regulating financial markets (1991, 1996 and 1998) and reforming the taxation of income from financial assets (1997). A further incentive toward a funded system should have come from the reduction in pension coverage as a consequence of the introduction of the contribution-based principle in the public system (see paragraph 13.4.1). Such a reduction will be especially pronounced for younger people (for whom the contribution based-method will be totally or almost integrally applied) and for the self-employed.

Subsequently, additional measures have been approved aiming to increase the amount of savings invested in pension funds (Law 133/99 and related Legislative Decree for fiscal treatment of contributions paid to private funds). Moreover, workers could assign their annual severance pay entitlements to pension funds investing in company stocks, as long as they apply for it.

Despite the legislative intervention mentioned above, the number of worker enrolled in a private pension fund is still low. For this reason, the pension reform recently passed (Law 243/2004 and legislative decree 252/2005) has introduced further measures in order to foster the development of the second pillar. This is done through two kind of intervention, coming into force from 2008: a) higher fiscal incentives and b) silence-as-assent for the transfer of the private severance pay ("trattamento di fine rapporto"). In particular, the latter means that the current severance pay accumulation is supposed to be transferred to private pension funds, unless he/she applies for communicating his/her refusal. However, enrolments in the private pension funds remain on a voluntary basis.

**Table 11 - 1 Calculation method**

	Earnings-related regime (workers with at least 18 years of contribution at the end of 1995)	Mixed regime (workers with less than 18 years of contribution at the end of 1995)	Contribution-based regime (new entrants into the system after 1995)
Old age, early retirement (seniority), late retirement and disability pension <sup>(1)</sup>	<p>The pension (P) is calculated using the earnings related method according to the following formule.</p> <p><b><math>P = 2\% \times (C1 \times W1 + C2 \times W2)</math></b></p> <p>where: W1 and W2 = reference wage C1 e C2 = years of contribution</p> <p>a) for contribution before 1992 (C1), W1 is the last monthly wage for public employees and the average of the last 5 or 10 years, respectively, for private employees and the self- employed<sup>(2)</sup>.</p> <p>b) for contribution after 1992 (C2), W2 is the average of the last 10 years for private and public employees<sup>(3)</sup> and 15 years for the self-employed (starting from 2002)<sup>(4)</sup>.</p> <p>The percentage ratio for each year of contribution is 2% up to a fixed threshold of the reference wage<sup>(5)</sup>. For amounts beyond this limit, such a percentage decreases to 1% in the case of W1 and to 0.9% in the case of W2.</p>	<p>The pension (P) is obtained as a sum of two components (P = PA+ PB). The former (PA) is calculated by using the earning-related method while the latter (PB) the contribution-based method. In particular:</p> <p><b><math>PA = 2\% \times (C1 \times W1 + C2 \times W2)</math></b></p> <p>where: W1 and W2 = reference wage C1 e C2 = years of contribution before 1995</p> <p>a) for contribution before 1992 (C1), W1 is last montly wage for public employees and the average of the last 5 or 10 years, respectively, for private employees and the self- employed<sup>(2)</sup>.</p> <p>b) for contribution between 1993-1995 (C2), W2 is the average wage of the number of last years progressively increasing<sup>(4)</sup>.</p> <p>The percentage ratio for each year of contribution is 2% up to a fixed threshold of the reference wage<sup>(5)</sup>. For amounts beyond this limit, such a percentage decreases to 1% in the case of W1 and to 0.9% in the case of W2.</p> <p><b><math>PB = ct \times M</math></b> (for explanation, see the box in the right hand).</p>	<p>The pension is calculated using the contribution-based method according to the following formule.</p> <p><b><math>P = ct \times M</math></b></p> <p>where: ct = transformation coefficient M = the total of contribution accrued during the whole working life capitalized at the rate of growth of nominal GDP</p> <p>The conversion coefficients range from 4.72% at the age of 57 to 6.14% at the age of 65. Over 65 years of age (late retirement) the conversion coefficients are set equal to the one at 65. Such coefficients are adjusted every 10 years according to changes in life expectancy.</p> <p>The contribution percentage applied to income to calculate the amount of contribution yearly accrued is 33% for the private and public employees and 20% for the self employed.</p> <p>Contributions are due, and therefore accrued, up to a maximum threshold of taxable income<sup>(6)</sup>.</p>
survivors' pensions	<p>- 60% of the pension calculated as above, if a survivor is a widow or widower of an employed;</p> <p>- 60% of the deceased's pension, if a survivor is a widow or widower of a pensioner.</p> <p>The percentage is reduced by 25%, 40% or 50% if the survivor total income exceeds, respectively, 3,4 or 5 times the minimum pension.</p>	<p>- 60% of the pension calculated as above, if a survivor is a widow or widower of an employed;</p> <p>- 60% of the deceased's pension, if a survivor is a widow or widower of a pensioner.</p> <p>The percentage is reduced by 25%, 40% or 50% if the survivor total income exceeds, respectively, 3,4 or 5 times the minimum pension.</p>	<p>- 60% of the pension calculated as above, if a survivor is a widow or widower of an employed;</p> <p>- 60% of the deceased's pension, if a survivor is a widow or widower of a pensioner.</p> <p>The percentage is reduced by 25%, 40% or 50% if the survivor total income exceeds, respectively, 3,4 or 5 times the minimum pension.</p>

(1) Disability pensions include the "assegno ordinario di invalidità" and the "pensione di inabilità". As for the latter, extra contributions are generally accrued (up to the maximum that the pensioner would have been able to reach if he/she had continued to work).

(2) The wages used in the reference wage calculation are indexed to prices.

(3) For the public employees, starting from 2008. In December 2003, the reference salary was calculated on the last 81 monthly salaries.

(4) The wages used in the reference wage calculation are indexed to prices, plus 1%.

(5) This threshold is 38,641 euros in 2005.

(6) This threshold is 84,049 euros in 2005.

**Table 11 - 2 Eligibility requirements**

		Earnings-related and mixed regimes (workers already insured as of 1995)		Contribution-based regime (new entrants into the system after 1995)	
		2004 - 2007	Starting from 2008 (Law 243/2004)	up to 2007	Starting from 2008 (Law 243/2004)
Old age pensions		65 years of age for male, 60 years of age for female and 20 years of contribution for males and females.	as before.	<p>Eligibility requirements range from age 57 to age 65. At least 5 years of contribution are required. A worker is allowed to retire before 65 only if he/she is entitled to a pension of at least 1.2 times the old age allowance.</p> <p>The possibility to retire before 57 is subject to a contribution requirement of 40 years.</p> <p>Incentives to postpone the retirement age are implicitly considered according to the actuarial equivalence of the contribution based method (see Table 1).</p>	<p>For males, the possibility to receive a pension at an age lower than 65 is allowed to those with 40 or more years of contributions, or to those with no less than 35 years of contributions and of 60 years of age, for the employed, and 61 for the self-employed. The age limit is to rise by a year from 2010 and another year from 2014, thus reaching 62 and 63 respectively.</p> <p>For females, the possibility to receive a pension is allowed at 60 with 5 years of contribution or, alternatively, with 40 or more years of contributions regardless of the age.</p> <p>For both males and females, the amount of pension must be at least 1.2 times the old age allowance.</p>
Early retirement (seniority) pensions	Private sector employees	35 years of contribution and 57 years of age <sup>(1)</sup> or, alternatively, 38 years of contribution, in the period 2004 - 2005, and 39 in the period 2006 - 2007 <sup>(2)</sup> .	35 years of contribution and 60 years of age. The age limit is to rise by a year from 2010 and another year from 2014, thus reaching 62 years of age, or 40 years of contribution <sup>(3) (4)</sup> .	no seniority pensions.	no seniority pensions.
	Public sector employees	35 years of contribution and 57 years of age <sup>(1)</sup> or, alternatively, 38 years of contribution, in the period 2004 - 2005, and 39 in the period 2006 - 2007 <sup>(2)</sup> .	35 years of contribution and 60 years of age. The age limit is to rise by a year from 2010 and another year from 2014, thus reaching 62 years of age, or 40 years of contribution <sup>(3) (4)</sup> .		
	Self employed	35 years of contribution and 58 years of age or 40 years of contribution <sup>(2)</sup> .	35 years of contribution and 61 years of age. The age limit is to rise by a year from 2010 and another year from 2014, thus reaching 63 years of age, or 40 years of contribution <sup>(3) (4)</sup> .		
Disability pensions <sup>(5)</sup>		5 years of contribution 3 of which accrued in the last five years. The entitlement of the pension depends only on the amount of disability and not on labour market conditions.	as before.	as before.	as before.
Survivors' pensions		15 years of contribution, or alternative, only 5 years of contribution 3 of which accrued in the last five years.	as before.	as before.	as before.

(1) The age requirement is reduced to 56 for blue-collar workers in the period 2004 - 2005.

(2) A further postponement of the retirement date is provided with the so-called "exit windows". The postponement ranges from 3 to 11 months.

(3) For the period 2008-2015, women are allowed to retire having satisfied the requirements laid down by legislation before Law 243/2004, as long as their pension is calculated according to the contribution-based method.

(4) From 2008, the further postponement through "exit window" is increased ranging from 6 to more than 12 months.

(5) It includes "assegno ordinario di invalidità" and "pensione di inabilità", which are provided to people whose reduction of ability to work was at least 2/3rds for the former and 100% for the latter.

## 11.3 The projection model

### 11.3.1 Updating and Institutional utilization

The RGS pension model has been updated yearly since 1999. The updating procedures have always involved the base year of projection while demographic and macroeconomic scenario assumptions have been changed only depending on the availability of new data and information which called for a revision. Methodological improvements have also been introduced through time. Any changes to the projecting model and the scenario assumptions have been commented in the annual report released by RGS concerning the analysis of the mid-long term trends of health care and pension systems. Since 2002, a standardised set of tables have also been added for reporting analytical data of projections in this way improve comparability through time and amongst different scenario assumptions<sup>88</sup>.

Projections of the Italian pension system, based on EPC-AWG scenario assumptions, are regularly presented within Italy's Stability Programmes, in the section devoted to analysing the mid-long term sustainability of the public finances. Projections based on national scenarios were also reported in special boxes of the Economic and Financial Planning Document (EFPD)<sup>89</sup>.

The RGS pension model has been constantly utilised to assess the financial effects of both pension reform proposals and those actually passed. It has also been utilised, at the national and international levels, within research programmes concerning the analysis of the financial implication of ageing and structural pension reforms as well as within the institutional relations with international organizations such as OECD and IMF.

### 11.3.2 Coverage

The definition of "public pension expenditure" underlying both national and EPC-AWG pension system projections includes the expenditure of the whole compulsory public pension system and that for social pensions (old-age allowances, if awarded after 1995). The first component, which insures workers against old age, disability and survivors' risks, comprises all the pensions awarded on the basis of a contribution requirement that is generally also related to age. The second component, means-tested social pensions paid only to persons over 65, has been included in order to have a complete picture of pensions due to the ageing of the population.

The Eurostat definition of pension expenditure (ESSPROS statistics) includes old-age pensions (both means-tested and not), survivors' pensions, disability pensions whose award is subject to contribution requirements, and social pensions (old-age allowances, if awarded after 1995). These are the same components as those of the public pension expenditure definition described above. However, the Eurostat definition also includes some benefits among survivors' and disability pensions whose award does not depend on the satisfaction of contribution requirements and which, at the same time, are not related to old age (benefits

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<sup>88</sup> See, Ministero dell'economia e delle finanze-RGS (2002-2005), "Le tendenze di medio-lungo periodo del sistema pensionistico e sanitario", Reports no. 4-6. The reports, together with the English versions of the "Summary and conclusions" and the tables of results, can be downloaded from the following website: [http://www.rgs.mef.gov.it/VERSIONE-I/Norme-e-do/Spesa-soci/ATTIVITA--/Presentazione.doc\\_ascl.pdf](http://www.rgs.mef.gov.it/VERSIONE-I/Norme-e-do/Spesa-soci/ATTIVITA--/Presentazione.doc_ascl.pdf).

<sup>89</sup> Such a document is prepared each year by the Ministry of Economy and Finance and presented by the Government to Parliament.



paid to the disabled and the deaf and dumb below 65 years old, war pensions, work injury annuities and merit awards). It also includes supplementary pensions paid by private pension funds, which, of course, are not public pensions.

The additional components referred to above accounted for about 0.8% of GDP in 2002, which corresponds to about 5% of the Eurostat definition of pension expenditure.

<b>Table 11 - 3 Public pension expenditure, as % of GDP, according to Eurostat and National statistics</b>			
	<b>2000</b>	<b>2001</b>	<b>2002</b>
<b>Eurostat pension expenditure<sup>(1)</sup></b>	<b>14.7</b>	<b>14.7</b>	<b>14.9</b>
<b>National pension expenditure</b>	<b>13.8</b>	<b>13.8</b>	<b>14.1</b>
<b>Total difference</b>	<b>0.9</b>	<b>0.9</b>	<b>0.8</b>
<i>1. Benefits paid to the disabled and the deaf and dumb below 65 years old, war pensions, work injury annuities and merit awards</i>	<i>0.6</i>	<i>0.6</i>	<i>0.6</i>
<i>2. Survivors' war pensions and survivors' work injury annuities</i>	<i>0.1</i>	<i>0.1</i>	<i>0.1</i>
<i>3. Supplementary pensions paid by private pension funds</i>	<i>0.1</i>	<i>0.1</i>	<i>0.1</i>

(1) Source: Eurostat (2003-2005), *Social protection: expenditure on pensions*.

According to the decomposition reported above, the benefits under points 1 and 2 of the Table above represent compensatory lump sums because of disability or work injury which bear no relation to pension contributions and, therefore, to the sphere of risks covered by public pension systems. This is the reason why these components can in no way be included in the definition of the public pension expenditure. However, they might be placed under a different area of the welfare system and as such be considered by the AWG for a separate projecting exercise.

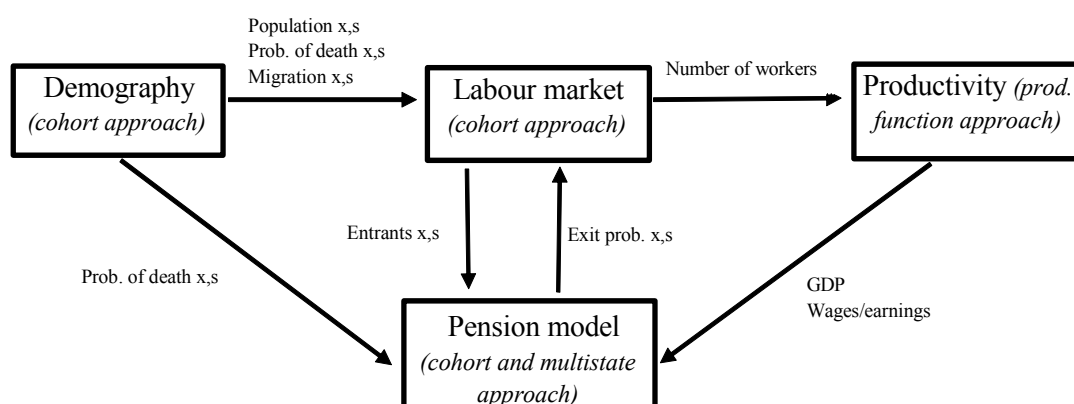
### **11.3.3 The methodology**

#### ***11.3.3.1 The general outline***

The RGS pension model has been devised with the objective to cover the whole public Pension System and to be able to reproduce accurately the main features of the legal and institutional framework. The latter has been assuming an increasing importance in Italy in consideration of the several pension reforms enacted during the last 15 years, which have involved extremely gradual solutions. Furthermore, the model is provided with some methodological solutions finalised to guaranteeing, at the same time, the consistency with demographic and macroeconomic scenario assumptions.

The pension component of the model (hereafter simply “pension model”) is strictly interrelated with three other sub-models referring, respectively, to the demographic, labour market and productivity components, according to the outline reported below:

**Graph 11 - 1 The structure of the pension model**



As can be seen, the pension model receives directly: i) the probabilities of death, by age and sex ( $x, s$ ) from the demographic component; ii) the new entrants into employment, from the labour market component, still by age and sex, and iii) the dynamics of wages/earnings and GDP from the productivity component. In turn, the pension model provides the labour market component with the probabilities of exiting because of retirement.

The interrelation among the three sub-models sees, at the first step, the demographic component providing the labour market with population, probabilities of death and migration flows, all distributed by age and sex. Then the total number of workers are utilised for an estimate of the capital deepening component of productivity growth rates.

The demographic sub-model adopts the traditional cohort component approach according to which the number of people by age and sex are projected on the basis of probabilities of death (or surviving), total fertility rates and net migration flows. The latter, in turn, is obtained as a difference between emigrants (probabilities of emigrating multiplied by population) and the number of immigrants.

The Labour market sub-model is mainly based on a projection of the labour force to which unemployment rates are subsequently applied in order to calculate the corresponding employment rates. The labour force sub-model combines the dimensional effect of the working age population, derived from the demographic projection, and the cohort evolution of the participation rates specific by age and sex. The latter, in turn, is obtained combining the cohort trend in the propensity to enter the labour market on a permanent basis, as extrapolated from the past data on workforce, and the further effects brought about by any endogenous factors which can significantly alter the evolution of participation rates. In this regards, reference is made to the interrelationship of participation rates with the following three factors: i) the direct and indirect effects brought about by the evolution of enrolment rates, the latter through changes in the educational achievements, ii) the fulfilment of the eligibility requirements to be entitled to a pension, taking also into account the evolution of workers distributed by age and contribution years and iii) changes in the labour market equilibrium caused by the dimensional decrease in the working age population.

Unemployment rates, distributed by age and sex, are supposed to change trough time converging to its average target value taking into account the evolution of the working age

population: the higher the labour force reduction the faster the converging process towards a lower average level.

The Productivity sub-model bases its projection on a sum of two components: i) an exogenous assumption of the growth rate of Total Productivity Factors (TPF), which is kept constant to its long term level after an initial adjustment, and ii) the additional contribution due to changes in the ratio of capital stock to workers (capital deepening). Because of the well-known demographic trends in working age population and its effects on employment, the latter component causes the productivity growth rates to increase especially during the first thirty years of the forecasting period.

### 11.3.3.2

### *The pension component of the model*

The pension model adopts a multi-state approach involving a large number of “discriminating” variables, i.e variables which are relevant for the rules of the legal-institutional framework. Such variables are divided into two groups: state and monetary variables.

The first group contains variables that identify the distinct positions within the system. For each segment of the system (fund or specific group of workers), members are distinguished among pensioners, contributors, dormant and pensioner-contributors<sup>90</sup>. Members also differ in terms of their sex, age, category of pension (old age/seniority, disability) and contribution period (annual classes).

All the possible combinations of the variables listed above are kept distinct for the three different regimes provided for people with a contribution period at the end of 1995, respectively, greater or equal to 18 years, between 0 and 18 years, and equal to 0 years (earnings-related, mixed and contribution-based). This distinction was made necessary by the reform measures that provide for different treatments depending on the contribution period matured at that date (see paragraph 1).

<b>State variable</b>	<b>Specifications</b>
Fund	Private sector (10 schemes), public sector (4 schemes)
Sex	Male , female
Age	[15-107]
Type of contributor	Contributor, dormant, pensioner-contributor
Contribution years	[0-49]
Regime	Earnings-related, contribution based, mixed
type of pension	Disability (2 types), old age/seniority (2 types)

At any time it is possible to identify members of the pension system in terms of their belonging to one of the possible combinations of the state variable specifications. The history of each member can be expressed as a sequence of positions. The sequence starts with the person joining the pension system, *i.e.* with the payment of the first contribution; it ends with the death of the member. In the normally long interval between these two events, the person will move from one state to another. Obviously, the number of people belonging to each cohort involved is yearly updated by applying the corresponding probabilities of surviving

<sup>90</sup> Members are pensioners if they are entitled to a direct pension and are not simultaneously contributors. They are contributors or dormant members depending on whether or not they have paid contributions during the reference year. They are pensioner-contributors if they are entitled to a direct pension and simultaneously have paid contributions in the reference year.

underlying the demographic projection. More specifically, the forecast of members is calculated according the following general equation:<sup>91</sup>

$$\underset{\text{members}}{a_{t,s,x,f}} = \underset{\text{members}}{a_{t-1,s,x,f}} \underset{\text{probability of surviving}}{\varphi_{t-1,s,x,f}} \times \underset{\text{transition matrix}}{T_{t-1,s,x,f}} + \underset{\text{entrants}}{e_{t,s,x,f}} \quad \forall s, f, 15 \leq x \leq \omega$$

where, for each sex  $s$ , age  $x$  and fund  $f$ :  $a$  indicates the row vector of the ensured distributed by different states at the end of the year  $t$  ("time  $t$ "),  $\varphi$  is the surviving probability at time  $t$ ,  $e$  indicates the row vector of entrants to the pension system in the year  $t-1/t$  (it contains non-null values only in the first few elements) and  $T$  is the matrix of transition probabilities serving to calculate the changes in the states of members already enrolled at time  $t-1$  and still alive at time  $t$ .<sup>92</sup> The general element  $t_{ij}$  of the transition matrix represents the probability that member belonging to state  $i$  at time  $t-1$  will transit to state  $j$  at time  $t$ .

New entrants, i.e those ensured for the first time in the Pension System, are set equal to the cohort increase of the number of employed people within a year, suitably transformed into new contributors. The former component, in turn, is calculated by applying both participation rates and unemployment rates to a projected population. Afterwards, the number of entrants by age and sex attributed to each fund, or other appropriate aggregation of workers, is determined, by single age and sex, on the basis of specific distributions of probability.

Monetary variables, such as wages/earnings, amounts of pension etc., are associated to each of the possible combinations of the state variable specifications as an average value referring to the corresponding set of people. The combination of the frequency associated with each position and the corresponding average value of the monetary variables makes it possible to calculate the pension expenditure or wage/earnings with the same level of disaggregation as that corresponding to the specifications of the state variables.

It should be noted that many of the algorithms used to update the monetary variables involve the application of a multiplier to the individual amounts, either because prescribed by law or because required by the forecasting technique. Consequently, the updating of the average value coincides exactly with the average of the updating of the corresponding individual values. There are some cases, however, in which the information on the distribution influences the updating of the average value. In these cases, the mean value is supplemented with an index of variability (the variation coefficient) and a distribution function<sup>93</sup>.

<sup>91</sup> Denoting the number of ages by  $n$ , the number of contribution periods by  $k$ , and the number of categories of direct pension by  $z$ , for each fund the line vector of members will have  $6n(3k+z)$  elements and, consequently, the transition matrix will be a square  $(18nk+6nz)$  order matrix. Since the sex and contribution period at the end of 1995 do not change over time, it is possible to decompose the vector of entrants into 6 line vectors with  $n(3k+z)$  elements and the matrix of transition probabilities into 6 square  $(3nk+nz)$  order matrices. Furthermore, since age increases from year to year with a probability of 1, it is possible to divide the vector of members further into  $n$  vectors with  $(3k+z)$  elements. Consequently, the order of the matrix of transition probabilities decreases to  $(3k+z)$ . These matrices, of course, are replicated for each age, sex and regime. In order to simplify the presentation, the latter variable has been omitted.

<sup>92</sup> The entrants and exits owing to death refer to an interval of one year. It is possible to eliminate the dead before applying the transition probability matrix since they constitute a *cul de sac* state, i.e. a state that does not permit transition to other states.

<sup>93</sup> In particular, such an approach makes it possible to give adequate treatment to the mechanism for topping up pensions to the minimum level under the earnings-related and mixed regimes, the indexation of pensions by size bracket, and the eligibility requirement for retirement under the

The adoption of a multistate approach requires that in every period each member should belong to one and only one of the positions identified by the state variables. This clearly cannot be applied in the case of people entitled to a survivors' pension. In fact, the latter may be ensured in the pension system as contributors, dormant members or recipients of a direct pension. In practice, for the purpose of determining survivors' pension expenditure it is usually of no importance whether or not a survivors' pension is paid to a member of the pension system. Similarly, where the beneficiary is a member, his or her position within the system (pensioner, contributor, etc.) is irrelevant. This makes it possible to treat survivors' pensions separately<sup>94</sup>.

The consistency of the model with the legal-institutional framework is guaranteed insofar as people ensured in the pension system are grouped according to the specifications of the state variables devised in order to provide, dynamically, all relevant information to calculate the number of pensions and their amounts. Furthermore, the model is able to take on board all available data concerning workers already ensured in the system at the beginning of the forecasting period including dormant members who are no longer contributing but would be able to claim a pension later, on the basis of past contributions.

Consistency between the pension component of the model and the demographic and occupational ones is surely favoured by the cohort approach coherently adopted for all three components. More specifically, these are the most relevant mechanisms through which such consistency is sought:

- as far as mortality is concerned, the coherence is assured by applying the probability of death to all ensured people (contributors, pensioners etc), i.e. those already within the system at the beginning of the forecasting period and those entering afterwards;
- as regards the Total Fertility Rate (TFR) and net migration flows below 42, consistency is guaranteed through the calculation of the workers entering for the first time into the pension system as new contributors;
- net migration flows from 42 to 60 are also transformed into new contributors according to the employment rates forecast for the corresponding age and sex. Immigrants above 60 are not considered either as contributors or as pensioners entitled to a direct pension;
- consistency with the employment rates is pursued, for ages up to 42, by calculating the new entrants into the pension system, which depend on the cohort profile of participation and unemployment rates. For ages above 42, consistency is assured insofar as the probabilities of exiting from the labour market are endogenously calculated by the pension model itself according to the pension legislation and retirement behaviour estimated on past data.

### **11.3.4 Consistency with the EPC-AWG assumptions**

The methodological approach underlying the RGS pension model allows us embody the demographic and macroeconomic assumptions agreed within the EPC-AWG without relevant

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contribution-based regime since an amount of pension of at least 1.2 times the old-age allowance must be achieved.

<sup>94</sup> In particular, the number of survivors' pensions is determined by adding the newly awarded ones to those of the previous year still being paid out. The newly awarded pensions are calculated by applying the probabilities of death and the probabilities of leaving a survivor to people receiving direct pensions and contributors who have matured the minimum requirement. Lastly, a permutation matrix is applied to attribute an age to the survivor based on the age of the deceased.

alterations to the internal coherence of the model. It can be easily argued from the general outline of the model described above. In fact:

- the projections of population and employment rates adopted within the EPC-AWG (see next paragraph) are based on a cohort approach which represents a binding condition to calculate the new entrants into the pension system according to the methodology underlying the RGS pension model;
- the output of such projections share the same level of disaggregation as that adopted by the pension model, in terms of distribution by sex and individual age;
- the greatest part of demographic and macroeconomic inputs, including some parameters utilised for projections, are exogenous with respect to the pension model, the only exception being the probabilities of exiting from the labour market.

As for the latter, the methodological approach utilised by the Commission does not guarantee in itself the consistency with the probabilities of retiring underlying the pension model. However, through a bilateral consultation, a satisfactory approximation of the exit probabilities was achieved, at least as an order of magnitude, allowing some minor differences in terms of distribution by age, gender and time profile.

As a result, the number of contributors evolves substantially in line with the total employees along the whole forecasting period, allowing minor adjustments by sector. Analogously, the number of pensioners is consistent with the population projections. In this regard, any comparison should be made taking into account the following:

- the definition of population underlying the demographic projections refers to resident people, while pensions are also paid to non-resident people. In 2003, non-resident pensioners of 65 and over accounted for about 4% of the population in the same age bracket;
- a quota of immigration flows concerns people above 60 who do not have the possibility to mature pension rights sufficient to be entitled to an old age pension. Differently, people leaving the country in the same age bracket are likely to take with them a pension entitlement. Only if the number of the two groups of people equalise, is there a sort of compensation: non resident pensioners are counterbalanced by resident people without pension rights because of their entering the country at an old age. In the case of Italy, the latter tend to exceed the former during the forecasting period, accordingly to the assumptions on net migration flows. At the beginning of the forecasting period, however, non-resident pensioners do not have an appraisable compensation as Italy has only recently moved from a net sending country to a net receiving one.

The consistency with other EPC-AWG macroeconomic assumptions is also pursued, through the following:

- the cohort dynamics of income subject to contribution (contribution base) is made to be consistent with the productivity assumptions. As a result, the average contribution base (contribution base divided by the number of contributors) evolves substantially in line with productivity;
- since the number of contributors evolve in line with the number of employees, as recalled above, the contribution base to GDP ratio will remain almost unchanged throughout the forecasting period allowing slight, temporary deviation mainly due to the differences between the probabilities of exiting from the labour market assumed by the Commission and those calculated by the RGS pension model.

## 11.4 The EPC-AWG baseline scenario

### 11.4.1 The results under the baseline scenario

Graph 11 - 2 (bold line) shows the forecast ratio of pension expenditure, (gross of tax revenues on it), to GDP obtained on the basis of the EPC-AWG baseline scenario and in accordance with pension legislation in force at the end of 2004.

After a slight increase with respect to the initial level of 14.2 in 2004, the ratio decreases significantly from 2008 to 2012 mainly because of the tightening of the eligibility requirements introduced by the latest pension reform (see Table 11 - 2) which also contributes to the substantial stability thereafter projected up to 2020. Afterwards, pension expenditure to GDP ratio starts to rise rapidly and reaches the peak of 15.9% in 2040 with an increase of about 1.7 percentage points compared with the initial level. During the last decade, the ratio falls first rather slowly and then much quicker till it reaches the final level of 14.7% in 2050, which is 0.5 percentage points higher than that in 2004.

The decomposition of the ratio of pension expenditure to GDP as the product of the “demographic” component, “pension ratio” (the ratio of pensions to employed people) and the “legal-institutional” component, “benefit ratio” (the ratio of the average pension to labour productivity) makes it possible to analyse better the reasons for the pattern<sup>95</sup>.

The slight rise of pension expenditure to GDP ratio up to 2008 is mainly due to an increase in the benefit ratio because of the low growth of productivity assumed at the beginning of the forecasting period. The reasons for the subsequent decrease up to 2012 and the relatively steadiness until 2020 is to be found partly in the tightening of the eligibility requirements, which contains an increase in the pension ratio, and partly in the progressive improvement in the dynamics of productivity which stop and invert the increasing trend in the benefit ratio.

Starting from 2020, the ratio of pensions to employed people rises more sharply than before because of well known demographic reasons. In that period, the baby boom generations are expected to cross the threshold of 65 moving from the working-age population (denominator of the ratio) to elderly people (numerator of the ratio) while the employment rate stops increasing. At the same time, however, the ratio of the average pension to productivity decreases significantly because of the gradual introduction of the contributions-based regime. In fact, in these years most new pensions are awarded under the mixed regime. However, such an effect is not such to offset the rapid rise in the ratio of pensions to employees.

This will happen in the last decade of the forecasting period when the ratio of pension expenditure to GDP falls very sharply owing to the gradual shift from the mixed regime to the contributions-based one, fully phased in by that date<sup>96</sup>. This time, the effects of the legal

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<sup>95</sup> A decomposition of pension projection results based on a large set of consistent indicators is reported in Annex 3.

<sup>96</sup> Such a decline could give rise to the question of the social and political sustainability of the contributions-based regime. However, it is worthwhile pointing out that such decline is mainly obtained reducing the amount of pension of those workers who would have most benefited of the previous regime in terms of Internal rate of return. In fact:

a) in comparison with benefits calculated exclusively on earnings in the final years before retirement, a system based on life long contributions automatically produces a redistribution of resources in favour of the weakest workers with static and discontinuous careers;

institutional framework are accompanied by a slowdown in the rise of pension ratio which settles on 121% in 2050. The latter mainly results from the progressive elimination of the pensions paid to the baby boom generations and the tendency of employment to stabilise.

As noted above, the reduction of the benefit ratio is mainly due to normative reasons. Besides the fact that pensions are indexed only to inflation (see paragraph 1.2.3)<sup>97</sup>, an important role is played by the gradual shift from the earnings-related to the contribution-based system enforced by the ten-year revision of transformation coefficients in accordance with the mortality assumptions.

The effect brought about by the new calculation rules can be also assessed at a microeconomic level by calculating the gross replacement rate, i.e. the ratio between the initial amount of pension and the last wage, for the whole forecasting period. As expected, the gross replacement rates are almost stable for the first decade of the forecasting period and decreasing afterwards. The reduction up to 2050 accounts for about 26%, in the case of employees, and for about 46%, in the case of the self-employed<sup>98</sup>. In fact, the two differ significantly in terms of notional contribution rate, on the basis of which contributions are accrued (see Table 11 - 1).

Graph 11 - 2 (bold line; 4 latter pictures) helps us understand better the evolution of the ratio of pensions to employees compared with the evolution of the elderly dependency ratio. As emerges from the comparison, the former ratio is expected to grow significantly less than the latter. It depends on both a decrease of the ratio of pensions to people of 65 and over (4<sup>th</sup> picture in Graph 11 - 2) and an increase of the ratio of employees to people in the age bracket 20-64 (5<sup>th</sup> picture in Graph 11 - 2).

The first phenomenon is due to several factors, the most important of which are the following: i) a reduction in disability pensions as a consequence of the reform enacted in 1984, which is still producing its effects; ii) the increase of the eligibility requirements according to the reform process of the last decade; iii) a substantial constancy of the survivors' pensions apart from the effects deriving from the dimension of generations. This is why a higher life expectancy does not raise for the widow or widower the average period of their outliving their spouse; iv) the number of pensions in the starting year comprises direct supplementary pensions<sup>99</sup>. The evolution of all these components is shown in Graph 11 - 3.

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- b) unlike the earnings-based system, the contributions-based system allows workers to increase their own amounts of pensions substantially by delaying retirement. For example, postponing retirement by 5 years increases the pension by more than 30%;
  - c) in the contributions-based system workers must qualify for a minimum benefit (set as equal to 1.2 times the old-age allowance) in order to be able to retire before reaching the age of 65;
  - d) on reaching the age of 65, workers who are in conditions of poverty will be able to obtain an old age allowance.

<sup>97</sup> It is worthwhile pointing out that social pensions and old age allowances have been indexed to nominal GDP, although not stated by the current law, starting from 2006.

<sup>98</sup> The underlying assumptions are consistent with the EPC-WGA baseline scenario and the calculation methodology is the same as that agreed within the Indicator Subgroup of Social Protection Committee. It is worthwhile noting that the reduction of the replacement rate is significantly lower if calculated net of taxes and contributions.

<sup>99</sup> Such pensions, which are calculated also during the transition period, are going to become nil moving towards the end of the forecasting period, when the contributions-based method is fully phased in and entirely applied to new entrants into the system after the starting year.



The second phenomenon is partly due to an increase in the eligibility requirements, as noted above<sup>100</sup>, and partly to the assumptions about the labour market, which provide for an increase of employment rates in the central age bracket, especially for women.

#### **11.4.2 The relevance of 2005-revision of the baseline scenario**

It seems quite interesting to analyse the effects in terms of pension expenditure to GDP brought about by the new set of macroeconomic and demographic assumptions in comparison with those underlying the previous round of projections. However, a simple comparison with the baseline projection released in 2001 would not fit the purpose, as since then there have been relevant changes in the legal and institutional framework besides the yearly update of the starting data. Therefore the 2001 and 2005 baseline projections should be preliminary aligned in terms of legal background and forecasting period before comparing them to assess the effects due to the revision alone of the macroeconomic and demographic assumptions. The updating of the baseline projection included in the 2004 Stability and Convergence Programme of Italy is such to guarantee a good degree of alignment.

In fact, differences between this projection and that made in 2001 mainly depends on changes in pension legislation due to the latest pension reform (Law 243/2004), while differences with the 2005-baseline pension projection measure the impact brought about by the revision of the macroeconomic and demographic assumptions. Graph 11 - 4 (1<sup>st</sup> picture) allows us to disentangle the two driving factors comparing 2001 and 2005 baseline pension projections with the 2001 baseline projection updated to 2004 (hereafter “2004-update” projection).

As can be seen, the revision of macroeconomic and demographic assumptions makes the 2005-ratio settle above the 2004-update ratio during the first 15 years of the forecasting period; thereafter, it settles a bit below in the central part and again above in the last decade. The difference is 0.1 percentage points in the peak and 0.3 percentage points in 2050.

The reasons for the differences are mainly to be found in i) the time profile of GDP growth and its decomposition in terms of productivity and employment (the average growth rate is almost the same, around 1.3% in real terms), and ii) the revision of life expectancies.

As for the former (Graph 11 - 4, 2<sup>nd</sup> picture), it is interesting to notice that the real GDP level implied by the new scenario assumptions is somewhat lower than that implied by the old one, in the first 15 years of the forecasting period, while thereafter they almost overlap. This explains the correspondent higher level of pension expenditure to GDP since the consequent effect of GDP growth on expenditure is significantly delayed. Besides, the initial lower GDP growth is due to the dynamics of productivity only partly compensated for by a higher increase in employment.

It should be noted that the delayed effect of productivity on pension expenditure comes gradually according to the newly awarded pensions (which are in some way related to the final level of earnings) while, in the case of employment, it will take some three decades to occur. For this reason, from 2020 to 2035, the level of GDP being almost the same, the 2005-projection of pension expenditure to GDP settles below that of 2004-update, notwithstanding the increasing push brought about by the higher level of life expectancy.

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<sup>100</sup> A large part of direct pensions are available to people under 65 in the starting year as they have been awarded before the reform process of the pension system.

In the last 15 years of the forecasting period, when pension expenditure has completely absorbed the delayed effect stemming from the initial differences in GDP and its components, the divergence between the two projections is almost entirely explained by the revision of mortality assumptions.

The comparison between 2001 and 2004 pension expenditure projection expresses the saving effects due to the 2004-pension reform consistently with the estimates in the technical report to the law (see annex 1). Specifically, the reform will produce a significant reduction of expenditure to GDP ratio for about 30 years, beginning in 2008. The savings will be at its greatest, of around 0.7 percentage points of GDP, nearly from 2012 to 2020, dropping slightly to 0.6 points in the following fifteen years. It is only in the final years of the forecasting period, during the decreasing phase of the ratio of pension expenditure to GDP, that a worsening of the curve of some 0.3 percentage points is produced.

### 11.4.3 The sensitivity analysis

The sensitivity tests on pension projections agreed within the EPC- AWG can be summarised as follows:

- Demography: higher level of life expectancy (decrease of 15% in age-specific mortality rates by 2050);
- Productivity: annual growth rate increased and lowered by 0.25 p.p. from 2015. Such a change is gradually implemented from 2010 to 2015;
- Labour force: higher employment rates by 5 percentage points in the age bracket 55-64 (older workers) through an increase of participation rates. Such an increase is gradually implemented from 2005 to 2025;
- Unemployment rate: higher employment rates by 1 p.p. through a change in the unemployment rate. Such an increase is gradually implemented from 2005 to 2015;
- Interest rate: higher and lower level by 1 p.p. during the whole forecasting period.

Graph 11 - 2 (1<sup>st</sup> picture) shows the ratios of pension expenditure to GDP obtained on the basis of the high life expectancy scenario produced by Eurostat. As emerges from Graph 11 - 2 (1<sup>st</sup> picture), the latter scenario causes the ratio to increase a bit more rapidly than in the baseline scenario until it settles 0.3 percentage points above, towards the end of the forecasting period. During the last decade, the divergence tends to stabilize insofar as the increasing deviation between the ratios of pensions to employees (Graph 11 - 2, 3rd picture) is compensated for by the effect on the average amount of pension due to the revision of the transformation coefficients. Graph 11 - 2 (4<sup>th</sup> picture), allows us to single out the effect of the sensitivity test under consideration in terms of an increased number of pensions.

The sensitivity analysis on productivity (Graph 11 - 5) concerns two distinct projections that assume, alternatively, an increase and a decrease of 0.25% in the growth rate of productivity compared to the baseline scenario. Such a correction has been gradually implemented from 2010 to 2015 when it becomes 0.25 and is kept constant for the remainder of the forecasting period. As a consequence, the growth rate of GDP will result in a shift in either direction of exactly the same size, given that no change in employment has been envisaged.

Because of the higher (lower) level of growth rate of GDP, the ratio of pension expenditure to GDP is going to be lower (higher) than the baseline one. The deviation increases from 2010 till about 2035. Afterwards the gap remains almost unchanged for some ten years before shrinking slightly towards the end of the forecasting period.

To help us understand such trends, it is useful to recall the following general pattern that is working every time pensions are indexed only to prices, as is the case of Italy. An increase (decrease) in the growth rate of productivity will result in an increase (decrease) in the growth rate of GDP of the same size in the year in which the augmentation is assumed. Differently, as regards pension expenditure, the effect is very slight at the beginning because it only concerns the newly awarded pensions which are in some way related to the final level of earnings and, indirectly, to the growth rate of productivity<sup>101</sup>. It will take 20-30 years until the structural change in the growth rate of productivity is entirely transferred to pension expenditure evolution. That is why for a long period the differences in the growth rates of GDP, which follow changes in productivity assumptions, are higher than the ones of pension expenditure. Yet, as the initial stock of pensions is replaced by the newly awarded ones, the growth rate of both pension expenditure and GDP is going to be the same.

However, the legal framework of the Italian pension system provides a gradual shift from the earnings-related to the contribution-based method. We have to remember that the latter assumes the growth rate of GDP to capitalise the contributions paid. Thus, while final earnings are moving according to labour productivity, the replacement rate is going to move in the opposite direction, although the latter effect is a great deal lower than the former. All this explains why the deviations of the ratio of pension expenditure to GDP, with respect to the baseline scenario, are slightly shrinking approaching the end of the forecasting period<sup>102</sup>. Besides, it is interesting to remark that the deviations from the baseline scenario of the two alternative projections are not perfectly symmetrical. That mainly depends on the fact that replacement rates within the earnings-related method, which will be applied for the whole transition period, are inversely related to the growth rate of productivity<sup>103</sup>.

As expected on the basis of the previous considerations, the differences among the lines of Graph 11 - 5, 1<sup>st</sup> picture) are due to the different evolutions of the ratios of average pension to labour productivity. The ratios of pensions to employees (Graph 11 - 5, 3<sup>rd</sup> picture) and its decompositions (Graph 11 - 5, 4<sup>th</sup>-6<sup>th</sup> pictures) are going to change imperceptibly because of a rule of the contribution system that does not allow workers to retire until they have reached an amount of pension not less than 1.2 times the old age allowance<sup>104</sup>.

The sensitivity test concerning an increase in participation rates among the older workers has raised some concerns in order to guarantee the consistency between pension results and assumptions exogenously given. This is mainly due to the following two reasons:

- The participation rates of older workers mainly depend on their retirement behaviour, which in turn depends on pension legislation. Of course, it is always possible to

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<sup>101</sup> The amount of a pension can always be expressed as a product of final earnings and the replacement rate. The former factor goes according to the growth rate of productivity, the latter one depends on the calculation formula provided by the legal framework.

<sup>102</sup> It is useful to point out that the transformation coefficients of the contribution based method have been calculated assuming a difference of 1.5% between the internal rate of return figuratively accrued on the contribution paid and the annual percentage of indexation. Since the legal framework of the Italian pension system allows indexation only to prices, and the internal rate of return is assumed to be the growth rate of GDP, it follows that the transformation coefficients remain as they were calculated on the basis of 1.5% growth rate of GDP. Thus, the projections based on alternative hypotheses of productivity will not guarantee an internal rate of return equal to the underlying growth rate of GDP, but lower in the case where it is higher than 1.5% and higher in the opposite case.

<sup>103</sup> In fact, the annual earnings involved in the calculation of the reference wage are capitalised with the inflation augmented by a fixed rate of 1% to take into account the growth rate of real wage.

<sup>104</sup> Obviously the number of the workers impelled to put off the retirement age changes in relation to the growth rate of productivity assumed.

assume changes in worker behaviour, aimed at prolonging their working lives, but there is no chance that the effects on participation rates fit exactly, in terms of time profile and age bracket, those assumed exogenously and in a mechanical way, in defining the sensitivity test assumptions. This aspect is of major relevance when, as in the case of Italy, the current legislation provides a tightening of the eligibility requirements just in the middle of the period chosen for the increase in the older worker participation rates.

- Workers can prolong their working lives either postponing retirement or going on working after retirement. The choice depends, once again, on legislation besides personal convenience.

Since it seems logical to assume that changes in the older worker behaviour should be consistent with the legal framework, which is embodied in the model, the projection on the sensitivity test under consideration has been made trying to approximate, as far as possible, to the indication exogenously given, without renouncing to the consistency between older worker retirement choices and pension legislation.

The prolonging of working lives has been achieved partly through a postponement of retirement ages and partly through an increase of pensioner-contributor positions. As for the former, the pension model calculates the corresponding lower number of pensions. In both cases, however, it takes into account the subsequent increase in the average amount of pension because of the higher level of contribution.

Ex-post, the increase in the employment of older workers, brought about by changes in the retirement behaviour, has resulted substantially in line with that provided in 2025 onwards, although some differences remain in the transition phase between 2005 and 2025.

The difference in the projected ratios of pension expenditure to GDP stemming from an increase of older worker's participation rate (continuous thin line, [Graph 11 - 6](#), 1<sup>st</sup> picture), mainly reflects changes in employment (and, this way, in GDP growth rates) and in the number of pensions, during the first two decades of the forecasting period ([Graph 11 - 6](#), 3<sup>rd</sup> picture). Moving towards 2050, these effects tend to be counterbalanced by higher amounts of pensions because of longer working lives and, under the contribution-based system, higher transformation coefficients ([Graph 11 - 6](#), 2<sup>nd</sup> picture). In the last ten years of the forecasting period the latter effect overcome, temporary, that brought about by the reduction in the ratio of pensions to employees.

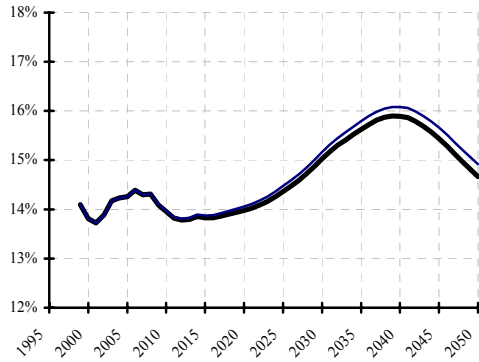
As regards the unemployment rate, the sensitivity analysis proposed by the EPC-AWG consists of applying a correction to the structural level in order to make it fall to 1 percentage point lower than that assumed in the baseline starting from 2005. As the unemployment rate in the baseline scenario is assumed to fall to 6.5% by 2015, the alternative implies a convergence value of 5.5%. As a consequence, the growth rate of GDP is going to increase slightly, coherently with the deviation of the growth rate of employees.

The effects on the ratio of pension expenditure to GDP are illustrated in [Graph 11 - 6](#) (dotted line). As expected, the higher reduction of the unemployment rate causes the ratio to settle just below the baseline one for the thirty-year period between 2010 and 2040. This outcome is mainly due to the higher growth rate of the employees, which is not counterbalanced yet by the corresponding higher number of pensions ([Graph 11 - 6](#), 3<sup>rd</sup> picture). As emerges from [Graph 11 - 6](#) (4<sup>th</sup> and 5<sup>th</sup> pictures), in the year 2050 it is still too early for the lower level of unemployment to result in a corresponding increase in the number of pensions.

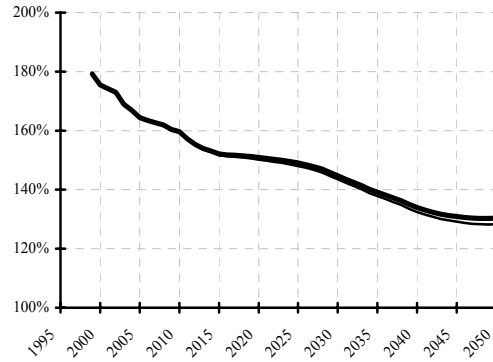
The sensitivity analysis on the interest rate is of major importance for those countries in which the second and third pillars of the pension system are significantly developed, replacing a large part of the pay-as-you-go system. That is not the case of Italy. As already explained (see paragraph 13.2.3.), the funded part of the pension system is very limited at present and, therefore, the interest rate is relevant neither for the equilibrium of the public pension system in itself nor for the impact of its balances on public deficit.

**Graph 11 - 2 Pension expenditure as a share of GDP and its decomposition:  
Baseline (thick line) and higher life expectancy (thin line) scenarios**

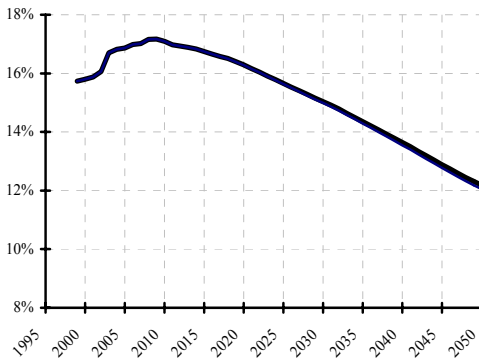
**Percentage ratio of pension expenditure to GDP**



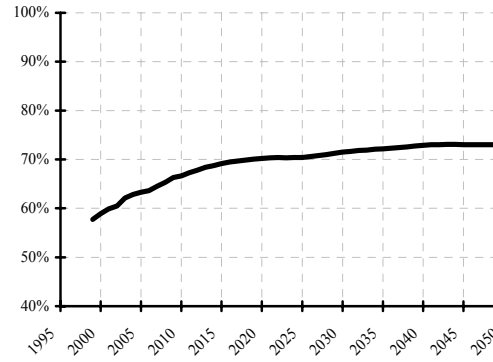
**Percentage ratio of number of pensions to people of 65 and over**



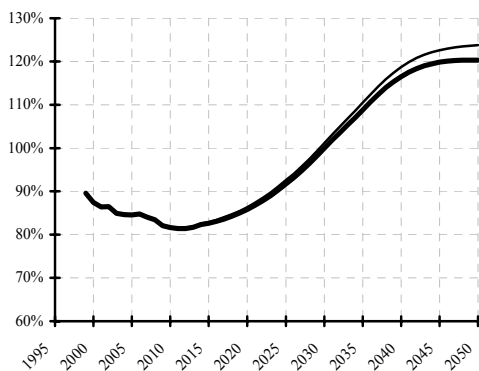
**Percentage ratio of average pension to labour productivity**



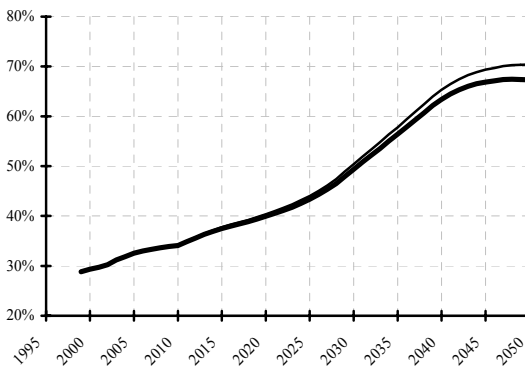
**Percentage ratio of people employed to population aged 20-64**



**Percentage ratio of number of pensions to employees**



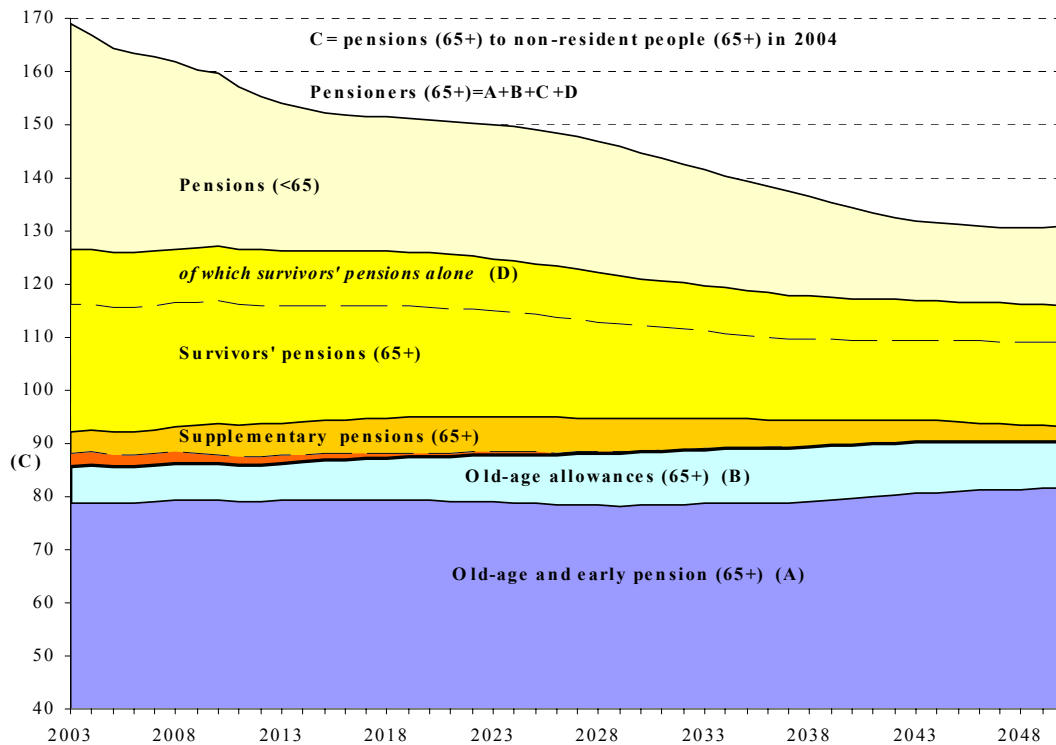
**Percentage ratio of people of 65 and over to population aged 20-64**



— baseline

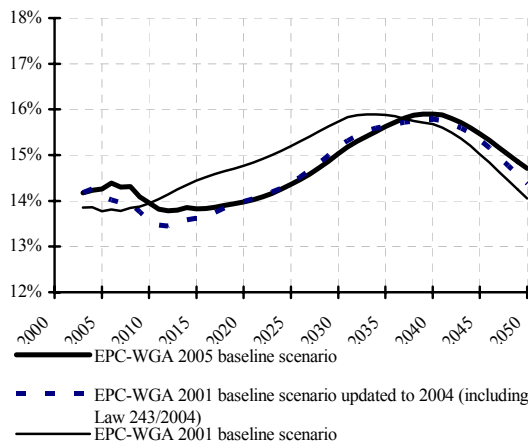
— baseline + higher life expectancy (decrease of 15% in age-specific mortality rates by 2050)

**Graph 11 - 3 Ratio of the number of pensions to people of 65 and over and its decomposition**

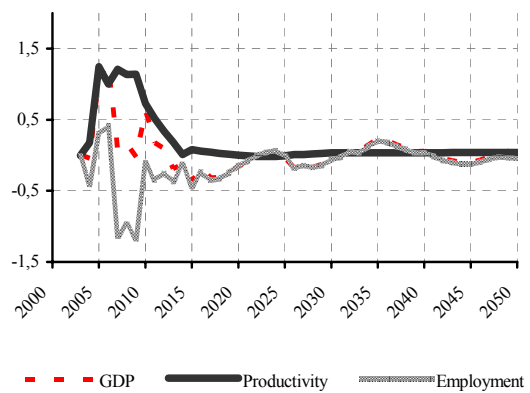


**Graph 11 - 4 Comparison between the EPC-AWG 2001 and 2005 baseline projections: pension expenditure and GDP, employment and productivity growth rates**

**Percentage ratio of pension expenditure to GDP**

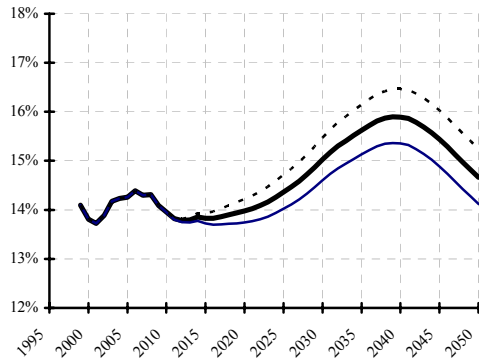


**Differences in growth rates between the 2001 and 2005 projections**

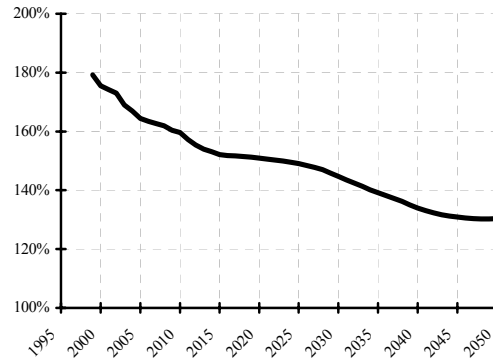


**Graph 11 - 5 Pension expenditure as a share of GDP and its decomposition;  
Baseline, higher productivity and lower productivity scenarios**

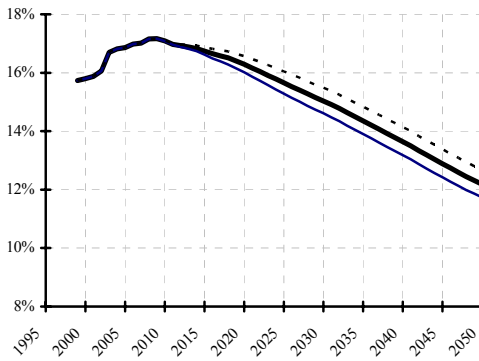
**Percentage ratio of pension expenditure to GDP**



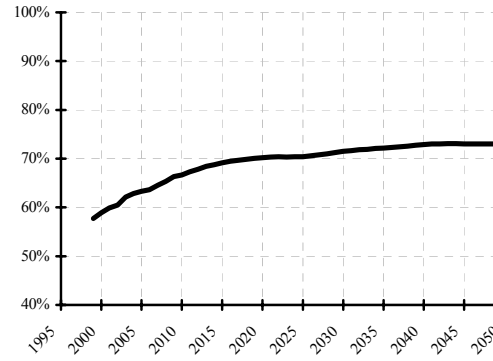
**Percentage ratio of the number of pensions to people of 65 and over**



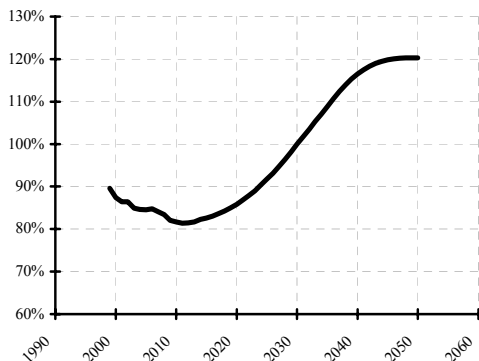
**Percentage ratio of average pension to labour productivity**



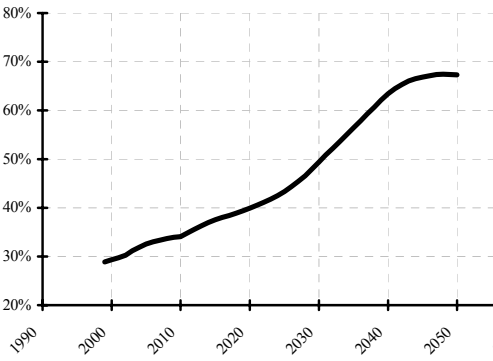
**Percentage ratio of people employed to population aged 20-64**



**Percentage ratio of pensions to employees**



**Percentage ratio of people of 65 and over to population aged 20-64**

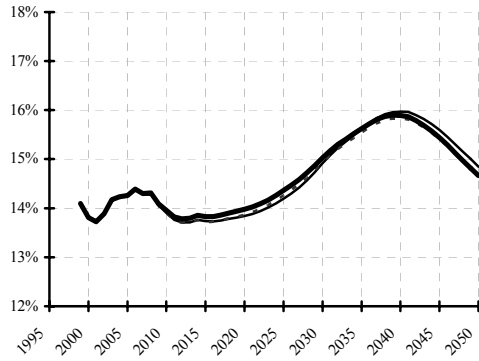


— baseline  
 — baseline + productivity growth increased by 0.25 p.p. from 2015  
 ····· baseline + productivity growth lowered by 0.25 p.p. from 2015

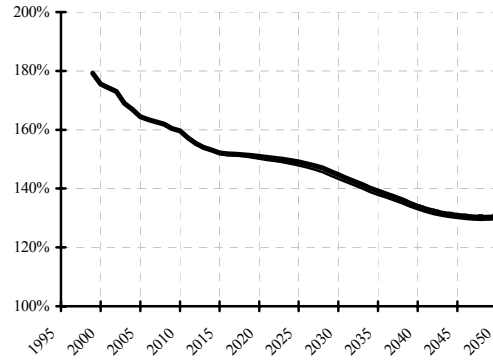


**Graph 11 - 6 Pension expenditure as a share of GDP and its decomposition;  
Baseline, lower overall unemployment and higher employment of older workers  
scenarios**

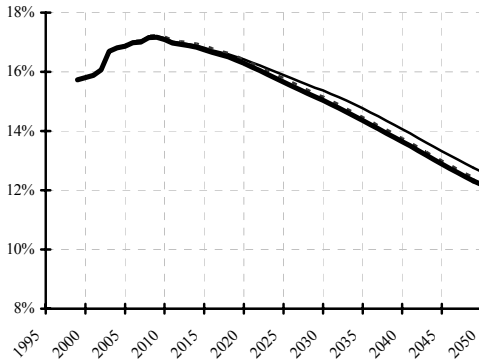
**Percentage ratio of pension expenditure to GDP**



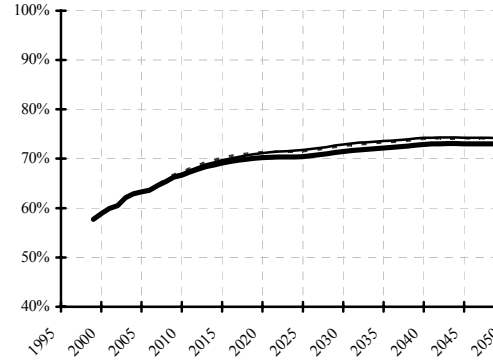
**Percentage ratio of the number of pensions to people of 65 and over**



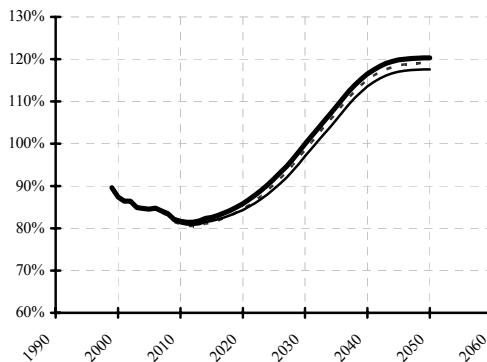
**Percentage ratio of average pension to labour productivity**



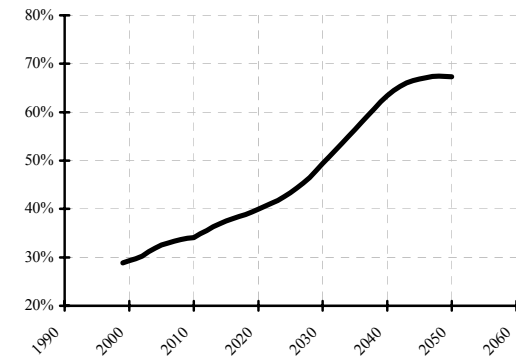
**Percentage ratio of people employed to population aged 20-64**



**Percentage ratio of pensions to employees**



**Percentage ratio of people of 65 and over to population aged 20-64**



- - - - - baseline + unemployment rate lowered by 1 p.p. from 2005 to 2015  
 — baseline + older workers' participation rate increased by 5 p.p. from 2005 to 2025  
 — baseline

## Annex 1: The latest pension reform (Law 243/2004)

The Law 243/2004 envisages two main interventions to the public pension system: one with short-term effects (incentives to put off retiring) and one with structural effects noticeable in the medium-long term (alterations to the requirements for pension entitlement).

The short-term intervention lays down that, for the period 2004-2007, those employed in the private sector who have satisfied the minimum requirements for a seniority pension may opt for a different regime providing:

- an additional pay, corresponding to the whole pension contribution (paid by both the employer and the employee), which is no longer to be paid to the social security system;
- the total tax exemption of this additional income;
- a pension amount calculated according to the contribution years matured at the date of the option and indexed to inflation for the period until retirement.

The intervention with structural effects lays down that:

- those who would have satisfied the requirements envisaged by the current legislation before the 31<sup>st</sup> December 2007 would be entitled to a pension under the requirements currently in force (the so-called ‘certezza dei diritti’);
- beginning in 2008, the possibility to receive a pension at an age lower than 65 for males and 60 for females is allowed to those with 40 or more years of contributions, or to those with no less than 35 years of contributions and of 60 years of age, in the case of the employed, and 61 for the self-employed;
- the age limit is to rise by a year from 2010 and another year from 2014, thus reaching 62 and 63 years of age for the employed and the self-employed, respectively;
- a further postponement of pension payment is envisaged with respect to the moment in which the requirements are met, by way of the so-called ‘finestre’;
- the same postponement is also applied to workers under the contribution-based system;
- for the period 2008-2015, the possibility to receive a seniority pension having satisfied the requirements laid down in the current legislation (that is, at least 35 years of contributions and a minimum age of 57 for the employed and 58 for the self-employed) is provided only for women who choose a pension treatment calculated according to the contribution-based method.

The financial effects of the measure tightening the minimum requirements for pension entitlement are laid out in the table below, which shows mid-long term variations in the ratio of expenditure to GDP.

### Reduction of pension expenditure as a percentage of GDP in the mid-long term

2008	2009	2010	2011	2012	2013	2014	2015	2019	2020	2025	2030	2035	2040	2045	2050
0.0	0.2	0.5	0.6	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.0	-0.3	-0.3

The forecasts have been made using the RGS model and assuming the national baseline scenario. The values shown indicate a reduction in the ratio of pension expenditure to GDP of some 0.7 percentage points from 2012 to 2019 and of 0.6 from 2020 to 2030. The savings effect tends to be nullified in the following decade, whilst in the closing years of the forecasting period it produces a worsening in the ratio of expenditure to GDP of around 0.3 percentage points.

## Annex 2: Transformation coefficients: formula and assumptions

The timing and methodology for the revision of transformation coefficients is governed by paragraph 11 of article 1 of the Law 335/95. This paragraph lays down that the aforesaid coefficients must be determined anew every ten years on the basis of the results of demographic surveys and of the effective performance of GDP in the long term, with reference to the dynamic underlying those incomes subject to the public pension system contributions, as shown by Istat (Italian National Institute of Statistics). The formula used to calculate the transformation coefficients and the values of the underlying parameters are given below. As may be seen from the formula, the transformation coefficients take into account survivors' pensions and are applicable both to males and females. Amongst the parameters utilised is the probability of survival, the updating of which forms the basis of the ten-yearly revision of the transformation coefficients. A discount rate of 1.5% may be noticed which expresses the differential between the yield of the scheme and the percentage of indexation of the pension.

### A. Formula

$$TC_x = \frac{1}{\Delta_x} \sum_{s=m,f} a_{x,s}^{v(t)} + A_{x,s}^{v(t)} - k$$

Average present value of direct pension awards<sup>105</sup>:

$$a_{x,s}^{v(t)} = \sum_{t=0}^{w-x} \frac{l_{x+t,s}}{l_{x,s}} \left( \frac{1+r}{1+\sigma} \right)^{-t}$$

Average present value of reversibility pension awards:

$$A_{x,s}^{v(t)} = \sum_{t=0}^{w-x} \frac{l_{x+t,s}}{l_{x,s}} q_{x,t,s} \left( \frac{1+r}{1+\sigma} \right)^{-t} \Theta_{x+t,s} \eta \delta_s \sum_{\tau=1}^{w-x-t+\varepsilon_s} \frac{l_{x+t+\tau-\varepsilon_s,s}^{ved}}{l_{x+t+1-\varepsilon_s,s}^{ved}} \left( \frac{1+r}{1+\sigma} \right)^{-\tau}$$

Where :

$TC$  = transformation coefficient

$\Delta$  = divisor

$s = m, f$

$\frac{l_{x+t,s}}{l_{x,s}}$  = probability of surviving between ages  $x$  and  $x+t$

$x$  = retirement age

$w$  = maximum age

$q_{x+t,s}$  = probability of death between ages  $x+t$  and  $x+t+1$

$\Theta_{x+t,s}$  = probability of leaving a family of a person at the age  $x+t$

$l_{x+t,s}^{ved}$  = probability for a widow or widower to be eliminated because of death or new marriage.

$k$  = adjustment owing to how pension is withdrawn (one month in advance, two months in advance, a year in advance and so on)

<sup>105</sup> It is worthwhile noting that for  $r = \sigma$  and  $k = 0.5$ ,  $a_{x,s}^{v(t)} - k$  coincides with the life expectancy of the pensioner at the retirement age

$\varepsilon_s$  = difference between the pensioner's age of sex  $s$  and the spouse's age  
 $\eta$  = percentage of reversibility  
 $\delta_s$  = average percentage of reduction of the survivor's pension owing to income requirements.  
 $r$  = internal return rate  
 $\sigma$  = indexation rate  
 $\left(\frac{1+r}{1+\sigma} - 1\right)$  = discount rate

## B. Assumptions

$l_{x,s}, q_{x,s}$  : function of surviving and probabilities of death in 1990 made by Istat (source : *Annuario Statistico Italiano 1994*)

$l_{x,s}^{ved}$  : function of surviving in 1990 made by Istat , and probabilities of new marriage made by INPS (source: Istat, *Annuario Statistico Italiano 1994*; INPS, *Il modello Inps e le prime previsioni al 2010*, 1989)

$\Theta_{x,s}$  : probabilities of leaving a family made by INPS (source : INPS, *Il modello Inps e le prime previsioni al 2010*, 1989)

$x$  = from 57 to 65

$$\varepsilon_s = \begin{cases} +3 & \text{if } s = m \\ -3 & \text{if } s = f \end{cases}$$

$$\eta = 0,6$$

$$\delta_s = \begin{cases} 0,9 & \text{if } s = m \\ 0,7 & \text{if } s = f \end{cases}$$

$$\frac{1+r}{1+\sigma} = 1,015$$

$$k = \frac{1}{2} - \frac{6}{13n} = 0.423 \quad \text{for } n = 6^{106}$$

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<sup>106</sup> The parameter  $n$  indicates the number of monthly awards paid in advance within a year, which was 6 in 1995.

### Annex 3: The decomposition of pension projection results

The ratio between pension expenditure and GDP ( $\psi$ ) can be decomposed as follows:

$$\psi = \frac{P}{\Pi} \frac{V}{E} \frac{E}{L} \frac{R}{V} \quad [1]$$

where:  $P$  stands for the average pension amount,  $\Pi$  for GDP per worker,  $V$  for the old-age population (65 and over),  $E$  for the population in working age (20-64),  $L$  for the number of employees and  $R$  for the number of pensions. Moreover, setting:  $P/\Pi = \lambda$ ,  $V/E = \delta$ ,  $E/L = \alpha$  and  $R/V = \beta$ , the ratio can be rewritten according to following formula:

$$\psi = \lambda \delta \alpha \beta \quad [2]$$

Furthermore,  $\beta$  can be decomposed as follows:

$$\beta = \beta^{dir} + \beta^{sup} + \beta^{sur} + \beta^{less} \quad [3]$$

where:  $\beta^{dir}$  stands for the number of pensioners of 65 and over entitled to a direct pension (any kind of pensions other than survivor's ones) divided by the old-age population;  $\beta^{sup}$  stands for the number of supplementary pensions of 65 and over divided by the old-age population. Supplementary pensions refer to the additional direct pensions entitled to the same person (second, third and so on direct pensions) which are, generally, of a small amount insofar as they are calculated on the contribution years other than those already utilised for the main direct pension;  $\beta^{sur}$  stands for the number of survivor's pensions of 65 and over divided by the old-age population;  $\beta^{less}$  stands for the number of pensions, regardless of the kind, below 65 divided by the old-age population. In turn, the latter can be further decomposed as a product of two factors:

$$\beta^{less} = {}_{norm}\beta^{less} \cdot {}_{dem}\beta^{less} \quad [4]$$

where:  ${}_{norm}\beta^{less}$  is the ratio between the number of pension below 65 and the population in the age bracket (50-64) while  ${}_{dem}\beta^{less}$  is defined as the ratio between the population in the age bracket (50-64) and the old age population. Finally, from equations [2]-[4], we have:

$$\psi = \lambda \delta \alpha \cdot (\beta^{dir} + \beta^{sup} + \beta^{sur} + {}_{dem}\beta^{less} \cdot {}_{norm}\beta^{less}) \quad [5]$$

It is worthwhile pointing out that:

- the indicators:  $\alpha$ ,  $\delta$  and  ${}_{dem}\beta^{less}$  do not depend on pension model results but only on labour market and demographic assumptions agreed within the EPC-AWG;
- the indicator  $\lambda$  reflects the features of the legal framework of pension systems as far as the calculation and indexation rules are concerned. Therefore, the analyses on replacement rates carried out within the Indicator Subgroup of SPC (which are based on the EPC-AWG macroeconomic and demographic assumptions), may represent an useful bench-mark to be used as reference;
- the indicator  ${}_{norm}\beta^{less}$  mainly reflects the effects of changes in the eligibility requirements already legislated;
- the evolution of indicator  $\beta^{sur}$  may be almost entirely explained in terms of demographic drives, namely: the increase in life expectancy for both gender and the mortality rate (number of deaths to population) in the age bracket 65 and over;
- finally, the indicator  $\beta^{dir}$  allows us to assess the consistency between the projection of the elderly and that of the number of pensioners in the same age bracket.

**Table 11 - 4 The 2005 EPC-AWG projections: Break-down of pension expenditure relative to GDP under different scenario assumptions**

	baseline						baseline+ higher life expectancy						baseline+higher productivity growth					
	2004	2010	2020	2030	2040	2050	2004	2010	2020	2030	2040	2050	2004	2010	2020	2030	2040	2050
Pension expenditure / GDP ( $\Psi$ )	14.2%	14.0%	14.0%	15.0%	15.9%	14.7%	14.2%	14.0%	14.1%	15.2%	16.1%	14.9%	14.2%	14.0%	13.7%	14.6%	15.4%	14.1%
Average pension / GDP per worker ( $\lambda$ )	16.8%	17.1%	16.3%	15.0%	13.6%	12.2%	16.8%	17.1%	16.3%	15.0%	13.5%	12.1%	16.8%	17.1%	16.0%	14.6%	13.2%	11.7%
Pension / employees ( $\Psi/\lambda = \alpha \beta \gamma$ )	84.6%	81.7%	85.8%	100.0%	116.5%	120.3%	84.6%	81.7%	86.4%	101.2%	118.7%	123.8%	84.6%	81.7%	85.8%	100.0%	116.5%	120.3%
Old age dependency ratio (pop 65+/pop(20-64)) ( $\delta$ )	31.9%	34.1%	39.9%	49.4%	63.4%	67.3%	31.9%	34.2%	40.4%	50.4%	65.3%	70.4%	31.9%	34.1%	39.9%	49.4%	63.4%	67.3%
Pop(20-64)/employees ( $\alpha$ )	159.1%	150.0%	142.4%	139.9%	137.2%	137.1%	159.1%	150.0%	142.4%	139.9%	137.2%	137.1%	159.1%	150.0%	142.4%	139.9%	137.2%	137.1%
Pensions/pop(65+) ( $\beta = \beta^{dir} + \beta^{sup} + \beta^{sur} + \beta^{less}$ )	166.9%	159.7%	150.9%	144.7%	134.0%	130.4%	166.9%	159.5%	150.2%	143.5%	132.5%	128.3%	166.9%	159.7%	150.9%	144.7%	134.0%	130.4%
Direct pensioners <sup>(1)</sup> (65+) / pop(65+) ( $\beta^{dir}$ )	88.4%	87.9%	88.2%	88.6%	89.7%	90.1%	88.4%	87.9%	88.3%	88.6%	89.8%	90.2%	88.4%	87.9%	88.2%	88.6%	89.7%	90.1%
Direct supplementary pensions <sup>(2)</sup> (65+) / pop(65+) ( $\beta^{sup}$ )	4.1%	5.8%	6.7%	6.2%	4.7%	2.8%	4.1%	5.8%	6.7%	6.2%	4.7%	2.9%	4.1%	5.8%	6.7%	6.2%	4.7%	2.8%
Survivors' pensions (65+) / pop (65+) ( $\beta^{sur}$ )	34.0%	33.6%	30.8%	26.3%	22.8%	22.9%	34.0%	33.5%	30.5%	25.7%	21.9%	21.5%	34.0%	33.6%	30.8%	26.3%	22.8%	22.9%
Pensions (<65) / pop (65+) ( $\beta^{less} = norm \beta^{less} + dem \beta^{less}$ )	40.5%	32.3%	25.1%	23.7%	16.8%	14.5%	40.5%	32.2%	24.7%	23.1%	16.0%	13.6%	40.5%	32.3%	25.1%	23.7%	16.8%	14.5%
Pensions (<65) / pop (50-64) ( $norm \beta^{less}$ )	43.0%	34.9%	26.4%	28.3%	28.2%	26.9%	43.0%	34.9%	26.3%	28.1%	27.7%	26.3%	43.0%	34.9%	26.4%	28.3%	28.2%	26.9%
pop (50-64) / pop (65+) ( $dem \beta^{less}$ )	94.2%	92.7%	94.9%	83.8%	59.4%	54.1%	94.2%	92.5%	93.9%	82.2%	57.8%	51.8%	94.2%	92.7%	94.9%	83.8%	59.4%	54.1%

	baseline+lower productivity growth						baseline+older workers' participation rate						baseline+unemployment rate					
	2004	2010	2020	2030	2040	2050	2004	2010	2020	2030	2040	2050	2004	2010	2020	2030	2040	2050
Pension expenditure / GDP ( $\Psi$ )	14.2%	14.0%	14.2%	15.5%	16.5%	15.2%	14.2%	13.9%	13.8%	14.9%	16.0%	14.8%	14.2%	13.9%	13.9%	14.9%	15.8%	14.7%
Average pension / GDP per worker ( $\lambda$ )	16.8%	17.1%	16.6%	15.5%	14.1%	12.7%	16.8%	17.1%	16.4%	15.4%	14.1%	12.6%	16.8%	17.2%	16.4%	15.2%	13.8%	12.3%
Pension / employees ( $\Psi/\lambda = \alpha \beta \gamma$ )	84.6%	81.7%	85.8%	100.0%	116.5%	120.3%	84.6%	81.2%	84.3%	97.1%	113.6%	117.6%	84.6%	80.9%	84.5%	98.5%	115.1%	119.2%
Old age dependency ratio (pop 65+/pop(20-64)) ( $\delta$ )	31.9%	34.1%	39.9%	49.4%	63.4%	67.3%	31.9%	34.1%	39.9%	49.4%	63.4%	67.3%	31.9%	34.1%	39.9%	49.4%	63.4%	67.3%
Pop(20-64)/employees ( $\alpha$ )	159.1%	150.0%	142.4%	139.9%	137.2%	137.1%	159.1%	149.3%	140.6%	137.1%	134.7%	134.8%	159.1%	148.7%	140.2%	137.7%	135.1%	135.0%
Pensions/pop(65+) ( $\beta = \beta^{dir} + \beta^{sup} + \beta^{sur} + \beta^{less}$ )	166.9%	159.7%	150.9%	144.7%	133.9%	130.4%	166.9%	159.5%	150.2%	143.3%	132.9%	129.6%	166.9%	159.7%	150.9%	144.9%	134.4%	131.1%
Direct pensioners <sup>(1)</sup> (65+) / pop(65+) ( $\beta^{dir}$ )	88.4%	87.9%	88.2%	88.6%	89.7%	90.1%	88.4%	87.9%	88.3%	88.5%	89.7%	90.2%	88.4%	87.9%	88.2%	88.6%	89.9%	90.6%
Direct supplementary pensions <sup>(2)</sup> (65+) / pop(65+) ( $\beta^{sup}$ )	4.1%	5.8%	6.7%	6.2%	4.7%	2.8%	4.1%	5.8%	6.7%	6.1%	4.7%	2.8%	4.1%	5.8%	6.7%	6.2%	4.7%	2.8%
Survivors' pensions (65+) / pop (65+) ( $\beta^{sur}$ )	34.0%	33.6%	30.8%	26.3%	22.8%	22.9%	34.0%	33.6%	30.8%	26.3%	22.9%	22.9%	34.0%	33.6%	30.8%	26.3%	22.9%	23.0%
Pensions (<65) / pop (65+) ( $\beta^{less} = norm \beta^{less} + dem \beta^{less}$ )	40.5%	32.3%	25.1%	23.7%	16.7%	14.5%	40.5%	32.1%	24.4%	22.3%	15.7%	13.6%	40.5%	32.3%	25.1%	23.8%	16.9%	14.7%
Pensions (<65) / pop (50-64) ( $norm \beta^{less}$ )	43.0%	34.9%	26.4%	28.3%	28.2%	26.8%	43.0%	34.7%	25.7%	26.7%	26.4%	25.2%	43.0%	34.9%	26.5%	28.5%	28.5%	27.2%
pop (50-64) / pop (65+) ( $dem \beta^{less}$ )	94.2%	92.7%	94.9%	83.8%	59.4%	54.1%	94.2%	92.7%	94.9%	83.8%	59.4%	54.1%	94.2%	92.7%	94.9%	83.8%	59.4%	54.1%

(1) People entitled to a direct pension (every kind of pension other than survivor's ones).

(2) Number of additional direct pensions entitled to the same person.

## 12. Cyprus

Nayia Pospori, Ministry of Finance

### 12.1 Overview of the Cyprus Pension System

The current pension system in Cyprus comprises:

- The General Social Insurance Scheme
- The Social Pension Scheme
- The Special Allowance to pensioners
- The Government Employees Pension Scheme
- Other Public Sector Employees Pension Schemes
- The Voluntary Provident Funds and other similar collective arrangements.

In 2003 total pension expenditure was estimated to be C£600 million or 8.8% of GDP. Of this amount, around 60% is accounted for by pensions paid under the general Social Insurance Scheme, nearly 30% under earnings-related pension schemes for central government, local government and semi-government employees, and nearly 10% by voluntary provident funds/lump sum retirement payments.

#### 12.1.1 The General Social Insurance Scheme

The General Social Insurance Scheme was introduced in 1957 and since the 1964 reform extends compulsory insurance to every person gainfully employed in Cyprus, including all categories of self-employed. The reform of 1980 introduced an earnings-related insurance scheme, replacing the previous scheme of flat-rate contributions and benefits.

The General Social Insurance Scheme provides very comprehensive benefits which consist of the basic benefit – related to insurable earnings in the lower band - and the supplementary benefit – related to insurable earnings in the upper band. It includes the following benefits:

Short-term benefits:

- Sickness benefit
- Maternity benefit
- Marriage grant

Unemployment benefit

Employment injury benefit (in cash and in kind)

Long-term benefits

- Old age pension
- Invalidity pension
- Survivors' pension
- Orphan's benefit

Old-age pensions under the General Social Insurance Scheme represent the main source of income for retirees. The pensionable age under the Social Insurance Scheme is 65 years for both men and women; however, an insured person is entitled to old age pension at the age of 63 years if: (i) he or she has paid contributions in at least three years and his/her insurable earnings in the lower band are not less than 156 times the weekly basic earnings, and (ii) has a weekly average of insurable earnings (paid or credited) in the lower band at least 70% of the weekly amount of the basic insurable earnings (paid or credited). Retiring before reaching the pensionable age of 65 under the general Social Insurance Scheme is very common. The effective retirement age for the pensioners is 63 years.

The level of old-age pensions in the General Social Insurance Scheme depends on the length of the contribution period and the level of insurable earnings. Pension benefits have two components: a basic pension and a supplementary pension based on the level of insurable earnings. The earnings on which contributions and benefits are calculated (insurable earnings), are divided into a “lower” and an “upper” band, with the “lower band” consisting of earnings up to a certain “basic” level (the amount of the basic insurable earnings changes from year to year and for 2006 is CY£ 79.90 per week or CY£ 4155/year (7099€)). The “upper band,” consists of earnings in excess of the “basic” level up to a maximum limit of six times the threshold of the lower band.

Insured persons are credited each year with “insurance points”. One insurance point is credited for each multiple of the yearly amount of basic earnings of the following year (in 2006, one point is credited for every CY£ 4299).

The weekly amount of the old-age pension is composed of:

- a basic pension equal to 60% of the average weekly insurable earnings<sup>107</sup> in the lower band for a beneficiary without dependants, 80% for a beneficiary with one dependant, 90% for a beneficiary with two dependants and 100% for a beneficiary with three or more dependants and
- a supplementary pension equal to 1/52 of 1.5% multiplied by the number of insurance points in the "upper" band, multiplied by the amount of the basic insurable earnings at the time the payment starts

A minimum pension is paid to insured persons who are eligible for old-age pension and their total basic and supplementary pension is less than that amount of minimum pension. The monthly amount of minimum for 2006 was CY£ 163. The minimum pension is paid 13 times a year and is adjusted every year in the same way as the basic pension.

The basic pension is indexed yearly to annual increase of the average insurable earnings and the supplementary pension is indexed to the consumer price index.

Total contribution rates for the General Social Insurance Scheme differ between the employed and self-employed persons. Contribution rates for employed persons are 12.6% of their insurable earnings, shared equally between the employer and the employee and 11.6% for the self-employed. The central government contributes the equivalent of 4% of insurable earnings. Out of the total 16.6 percent social insurance contribution rate, around 8.6 and 5.6 percentage points are attributed to the long-term benefits of basic and supplementary pensions, respectively. Consequently, with an equilibrium contribution rate<sup>108</sup> of around 9% for the basic lower pension band and 3% for the supplementary upper pension band, the pension system is currently financially covered and produces a surplus. The scheme is at an early stage of its maturity with the number of contributors well in excess of the number of pensioners. Indeed, the surplus in the social insurance funds accounts was CY£ 202 million or 2.6% of GDP in 2005 and resulted in the reserves of the General Social Insurance Scheme accumulating to CY£ 2928 million or 37% of GDP by the end of 2005.

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<sup>107</sup> The average weekly insurable earnings in the lower band is equal to the number of insurance points in the lower band, multiplied by the amount of the basic insurable earnings at the time the payment starts, divided by the number of weeks since 5 October 1964 or the date on which the insured person attained the age of 16.

<sup>108</sup> The equilibrium contribution rate is the rate necessary for each scheme to finance the respective current pension expenditures.



### **12.1.2 The Social Pension Scheme**

The Social Pension Scheme closes the gap in accessibility to pensions by providing non-means tested pensions to those residents, of 65 years or more who, for any reason did not participate in the labour market and as a consequence have no pension income either from the General Social Insurance Scheme or from any other source. In other words, the Social Pension Scheme ensures universality in pension provision.

The beneficiaries are mostly women (about 95%), who were either urban housewives or non-insured wives or unmarried daughters of farmers engaged in family agricultural work.

The rate of the Social Pension is equivalent to 81% of the full basic social insurance pension, and as a consequence, is automatically indexed to earnings. The monthly amount of social pension for 2006 was CY£ 155.33.

### **12.1.3 Special Allowance to pensioners**

A special allowance, currently amounting to up to CY£ 672 per year, is payable to pensioners whose total pension income from the General Social Insurance Scheme and any other pension scheme does not exceed CY£ 6000 per year. It is paid without any test of income from work or other sources and without taking into account the household total pension income, since each pensioner is treated as a member of a single person household.

### **12.1.4 The Government Employees Pension Scheme**

The Government Employees Pension Scheme provides retirement and survivors pensions to civil servants, members of the educational service, the police and the armed forces. It is financed almost entirely by general taxation on a pay-as-you-go basis. The number of persons covered is currently about 30,000.

Participation of the employees in the financing is limited to a share in the cost of survivors' pensions. In 2003 this share was about 40% of the total cost of survivors' pensions or 2.4% of the total of all pensions.

Pensions are calculated on the final salary at an accrual rate that produces a retirement benefit equivalent to two thirds of that salary after 33 1/3 years of service. The pension is 50% of the final salary, but it is reduced by the amount of supplementary Social Insurance pension from the time the retiree is awarded such pension (normally at the age of 63 years). The compulsory retirement age up to July, 2005 was 60 years, with early retirement allowed after 55 years without any actuarial reduction of benefits. In fact, the effective retirement age for central government employees has been significantly below 60 years. As from 1.7.2005 the age of compulsory retirement for civil servants will gradually increase to 63 years by 1.7.2008. The members of the police of the rank of sergeant and below retire compulsorily at 55 years; early retirement is allowed from age 50 years.

### **12.1.5 Other Public Sector Employees Pension Schemes**

There are other occupational pension schemes that provide cover to permanent employees of public utility organizations, local governments and of other public law authorities under the same terms and conditions as for civil servants. It is estimated that the total number of employees covered is around 7500. These pension schemes, which operate under special laws, are financed almost solely by employers and participation of employees is limited to the

part of the cost of survivor's benefits. The benefits and the entitlement conditions are the same as for central government employees.

### **12.1.6 Voluntary Provident Funds**

Provident Funds are arrangements that are agreed within the framework of the system of free collective bargaining. They provide defined contribution lump-sum benefits. However, for certain categories of employees (e.g. bank employees, employees of oil companies, government manual workers), the Provident Fund is combined with a defined benefit lump-sum based on the recent salary and the employee receives the higher of the two amounts.

Provident Funds are financed by contributions from employers and employees. The number of Provident Funds for which returns were made in 2001, was 1484 with a total membership of about 103,000 employees. The average joint contribution was 11.4% of earnings. Industry-based Provident Funds operate for certain categories of employees, like construction workers, hotel employees etc. Trade unions also operate multi-employer Provident Funds. However, most of the Provident Funds operate on an enterprise basis and are small in size. In 2001, 65% of the Provident Funds had less than 20 members (and 51% less than 10 members).

## **12.2 Accessibility to Pensions**

The prime purpose of the pension system in Cyprus is to provide access for all individuals for appropriate pension arrangements, public and/or private, which allow them to earn pension entitlements, enabling the maintenance of a reasonable standard of living after retirement.

Accessibility to pensions is universal for the 65 years and over population and is ensured through the general Social Insurance Scheme and the Social Pension Scheme. The latter is of importance for women, especially of the older generations with the low labour force participation rates and the non-remunerated family work in agriculture.

Accessibility to supplementary pension provisions is encouraged through tax incentives by exemption of contributions, investment income and lump-sum gratuities of pension funds and contributions, investment income and lump sum benefits of Provident Funds.

However, the majority of employees have no supplementary protection at all, or they are covered by provisions, like Provident Funds, with serious weaknesses in terms of their effectiveness as retirement income institutions. This is due to the fact that members usually receive their entitlements at the time of changing of employers. In 2001 about 76% of all payments out of Provident Funds were made for termination of employment and only around 20% was paid in retirement. This situation has led to substantial inequalities within the pension system as a whole, especially between the employees of the broader public sector and the majority of the employees in the private sector. These inequalities are manifested in the financing, the replacement rates and the pensionable age.

In 2003, out of the 334,000 active contributors to the general Social Insurance Scheme, only about 43% had some type of supplementary protection by occupational schemes.

## **12.3 Adequacy of Pensions**

The minimum subsistence level is ensured through the Public Assistance Scheme. In 2003 the basic amount of social assistance for a person without dependants was equivalent to 32% of the net median equivalised income.

The minimum pension is ensured through the general Social Insurance Scheme for every working person, the Social Pension Scheme for the remaining persons and the Special Allowance.

For a single person, the minimum social insurance pension, together with the special allowance, was 9% higher than the amount of public assistance for basic needs. It was equivalent to about 35% of net median equivalised income.

## **12.4 Pension System: Early Retirement and Labour force Participation**

While the general Social Insurance Scheme and the pension schemes for public sector employees encourages early retirement, at the same time they provide incentives for maintenance of the participation of elderly workers in the labour force. Under the general Social Insurance Scheme, the average effective retirement age is 63 years and among public sector employees is around 57 years. Under these schemes, old-age pensioners have the right to continue work and earn income without prejudice to their pension benefits. Indeed, the employment rate among elderly persons (55 to 64 years) is relatively high in Cyprus being 49.9% in 2004 compared with the EU 25 average of 41.0%.

## **12.5 Pension Projections**

### **12.5.1 Basis of Projections**

An actuarial valuation of the Social Security Scheme as of 31 December 2003 that included long-term projections of pension revenues and expenditure was conducted by the international actuarial services of the International Labour Organization in 2004<sup>109</sup>. Assumptions on the actuarial exercise were based on the national population projections and the economic forecasts of the Ministry of Finance. The present pension projections for Cyprus and an assessment of the impact of future pension expenditure and revenue flows on the government finances build upon this actuarial exercise using, however, as required the population projections and macroeconomic assumptions prepared by the European Commission for the Economic Policy Committees' AWG, instead of national assumptions.

The valuation starts with a projection of the population of Cyprus and a projection of the economic variables that will influence the number of contributors and the number of beneficiaries, as well as the level of their wages and the rate of inflation.

Next, projection factors specifically related to the Social Insurance Scheme are other pension schemes such as the distribution of retirement by age are determined and used in combination with the demographic/economic framework.

Pension projections are carried out following a year-by-year cohort methodology. The existing population is aged and gradually replaced by the successive cohorts of participants

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<sup>109</sup> "Actuarial valuation of the Social Security Scheme as of 31 December 2003". Report to the Government of the Republic of Cyprus, International Labour Organization, Geneva, November 2004.

on an annual basis according to the demographic and coverage assumptions. The projection of insurable earnings and benefit expenditure are then performed according to the economic assumptions and the scheme provisions.

Employing population projections and economic assumptions of the Commission, the information and relationships embodied in the actuarial exercise were used to forecast numbers of contributors to and beneficiaries from the general Social Insurance Fund, which in turn were used to generate flows of pension expenditures and revenues.

Similar projections exercises were carried out for the supplementary pension schemes covering civil servants, teachers, other central government employees and local government and semi-government employees. Essentially these exercises involved projections of the number of contributors and numbers of beneficiaries of different types of pension (old-age, widows' and retirement lump sums) and the average levels of such pensions, using the common population and macroeconomic projections of the Commission.

Owing to insufficient, detailed information it was not possible, at this stage, to make projections of payments from private sector provident funds.

### **12.5.2 Assumptions**

Population Projections: projections are in line with those of the Commission which show total population rising by 33% between 2004 and 2050, to 975.071, compared with national estimates, which show a 12% increase to 816.406 by 2050.

The working age population (15-64 years) is projected to rise by 19% to 590.391 in 2050 compared with the increase of 6% in the national estimates. For those aged above 65 years their level is projected to rise by 195% between 2004 and 2050 reaching 261.340 or to over 26% of the total population; national estimates have the old-age population rising by 171% to over 28% of the total population by 2050.

Labour participation rates: male labour force participation rates are projected to rise gradually from of 80% in 2003 to 86% by 2050. Female participation rates are expected to increase steadily over the long-term rising from 62% in 2004 to 75% in 2050. The Commission estimates show total labour force participation rising to 82% by 2020 and remaining at around this level thereafter, whereas national estimates have the total participation rate rising gradually to 71% by 2010 leveling off until 2030, and thereafter increasing to 77% by 2050.

Employment growth: assuming a gradual increase of the employment rate of the working age males and much larger though decelerating rises in the employment rates of working age females and of old age persons, and constant net migration inflows of 5 to 6 thousand per annum, it is estimated that the annual employment growth would rise to 2.3% over the years 2007 to 2011 and to an average of 1.5% in the years to 2016, to 0.4% from 2017 to 2014, to 0.2% over the years 2025 to 2040, and to -0.5% by 2050. Reflecting lower labour participation rates and smaller net immigration flows national estimates show much lower employment growth, up to 2020, and thereafter, similar low rates of growth.

Annual labour productivity: annual productivity increases, provided by the Commission services, are projected to accelerate from 2.4% in the 2005 to 2009 period, to 3.0% until 2021, and thereafter decline gradually to 2.7% by 2030 and to 1.7% by 2050.

Nominal wage and salary incomes: nominal wage and salary earnings are projected to grow broadly in line with the rate of inflation and labour productivity growth.

Real GDP growth: mainly reflecting the projected growth rates of labour productivity, real GDP is projected to grow at an annual rate of 4.3% from 2005 to 2010, then to decelerate to 4.1% by 2020, to 2.9% by 2030 and, further to 1.5% by 2050. National estimates have real GDP rising at lower rates until 2020, but at 3% or higher rates than the Commission thereafter.

Inflation: the annual rate of inflation is projected to average 2.5% in 2005 and 2006 and to decline to 2% per annum in the following years.

Interest rates: these are assumed to average 5% per annum in nominal terms or 3% in real terms over the long-term.

Fiscal Policy: Implicit in these simulations is the assumption that by the end of 2009, based on the current Convergence Programme, the general government deficit will be reduced to 0.6% of GDP. Thereafter, it is implicitly assumed that the underlying fiscal position will not change in either direction, except for age – related revenues and expenditures.

### **12.5.3 Results of Pension Projections Exercise**

The results of the pension projections exercise applying the common EU assumptions to the pension system in Cyprus as of end-2004 are shown in [Table 12 - 1](#) for pension payments. The ageing of the population and maturing of the social insurance scheme, (that began in 1980), result in a distinct upward trend in the ratio of pension payments to GDP, particularly in the period from 2040 to 2050. It is estimated that the ratio of the number of old age pensioners to the number of contributors to the social insurance schemes rises from 26% in 2004 to 41% in 2020, to 52% in 2040 and further to over 64% in 2050. Over this latter period, the sharp projected acceleration in the growth of the old age population and the projected marked slowdown in the growth of real GDP, reflecting falling employment from 2043 onward, largely explain the large increase in pensions.

In contrast, pension revenues in the form of contributions to the social security funds rise rapidly over the period 2005 to 2020 predicated on projected considerable employment growth. Thereafter, contributions to the social security funds level off as a proportion of GDP at around 7.2% ([Table 12 - 2](#)). The acceleration in the growth of pension payments from 2020 onwards leads to the social security funds going into deficit from around 2030, and pension reserve assets falling from 37% of GDP in 2020 to 25% in 2030 and becoming negative after 2040.

Using national assumptions, projections show that the social insurance fund becomes financially unviable by 2020 as the slower growth of social security contributions is surpassed by the growth of pension payments much earlier.

These pension projections were integrated into projections for the overall general government finances to assess long-term fiscal sustainability. The projections in [Table 12 - 2](#) show that the increase in pension payments causes the general government deficit to expand from 2030 onward, leading to higher debt and interest payments and a sharply deteriorating fiscal situation, especially from around 2035 onward. Indeed, the government debt to GDP ratio rises from 53% in 2035 to 70% in 2040 and soars to 144% in 2050 ([Table 12 - 2](#)).

#### 12.5.4

#### Pension Reforms and Simulations

In view of the unsustainable long-term fiscal situation stemming largely from rising pension payments, pension reform is being discussed by the social partners. The introduction of private funded pension schemes has been ruled out. Instead a package of parametric reforms of the existing social insurance scheme is being considered.

The actuarial exercise of 2004 undertook simulations including one involving three parametric reforms, namely:

- increasing the normal retirement age from 63 to 65 years;
- raising the number of years required for obtaining an old-age pension from 10 to 15;
- indexing the lower band of pensions (basic pensions) to the consumer price index instead of wages.

These parametric reforms when applied to the actuarial exercise using Commission assumptions produced a financially viable situation for the Social Insurance Fund, with the growth of pension payments substantially reduced, and the pension reserve assets maintained well above 40 percent of GDP over the long run. (See [Table 12 - 2](#)).

The main driving force in accounting for the reduction in pension payments is the change in the indexing of basic pensions. However, such a measure would greatly reduce the relative level of pensions, especially of poorer persons, lowering the replacement rate and eroding the adequacy of individual pension benefits.

Hence, a further simulation was undertaken raising Social Insurance Fund contribution rates from the current level of 14.3% of insurable earnings in phased increases from 2025 to over 20.3% by 2045. Under this scenario the financial viability of the Social Insurance Fund is considerably improved up to around 2035. But, thereafter, the pension reserves to GDP ratio declines quite precipitously, and the government debt to GDP ratio climbs as well from 38% in 2035 to 73% in 2050 ([Table 12 - 2](#)).

Thus, this scenario needs to be buttressed by at least some of the parametric reforms outlined above. In addition, the reform scenarios above are based on favourable demographic and economic assumptions that may fail to materialize. To safeguard against this risk and to strengthen the more fragile higher contribution rates scenario it would be necessary to introduce, in addition, two of the aforementioned parametric reforms such as raising the retirement age and the years of eligibility required for obtaining an old age pension, while omitting or modifying the more contentious proposal of indexing basic pensions to the consumer prices instead of wage earnings.

Furthermore, to ensure the financial viability of the pension system in Cyprus in view of population ageing it will be necessary to apply parametric reforms to supplementary occupational pension schemes, such as for government employees. Already, the retirement age for civil servants is being raised in phased increases from 60 to 63 years, as from July 1, 2005. Negotiations are proceeding with other government employees and personnel of semi-government organizations on increasing the retirement age as well.

**Table 12 - 1 Pension expenditure as a percentage points of GDP**

**Table 1: Pension Expenditure Projections<sup>1</sup>**

(In per cent of GDP)

	2004		2005	2010	2020	2030	2040	2050
	(C£mn.)	(% of GDP)	( ← )		projections			( → )
Pension Expenditures <sup>2</sup>								
-social insurance scheme outlays	321.0	4.3	4.2	4.8	6.6	8.5	10.1	14.4
-government employees' scheme outlays	167.2	2.4	2.4	2.5	2.7	2.8	3.9	4.4
-social pensions	28.2	0.4	0.4	0.4	0.3	0.3	0.3	0.3
-additional grants to pensioners	5.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1
-local government employees' scheme outlays	9.3	0.1	0.1	0.1	0.2	0.2	0.3	0.3
General Government pension-related expenditures	531.1	7.3	7.2	8.0	9.9	11.9	14.7	19.5
Memorandum item:								
-Semi-government employees' pension scheme outlays	19.4	0.3	0.3	0.3	0.3	0.5	0.6	0.7

1. The greater part of the pension projections, that is, those out of the general Social Insurance Fund are based on the 2004 actuarial exercise, using common demographic projections and macroeconomic assumptions prepared by the European Commission for the Economic Policy Committees' AWG. Expenditures of the central government employees' and local government semi-government employees' pension schemes were based on national assumptions updating an earlier exercise of the Ministry of Labour and Social Services. Projections for social pensions and additional grants to pensioners were assumed to fall slightly as a percentage of GDP over the long term because rising per capita income would reduce the need for such pensions and grants.

2. Consists mainly of old-age pensions, retirement lump-sum payments, survivors', and disability pensions.

**Table 12 - 2 Estimated results of reforms of the social insurance scheme in Cyprus**

	<b>Pension Payments</b> (% of GDP)				<b>Social Security Contributions</b> (% of GDP)			
	<b>2004</b>	<b>2020</b>	<b>2040</b>	<b>2050</b>	<b>2004</b>	<b>2020</b>	<b>2040</b>	<b>2050</b>
Baseline scenario <sup>110</sup>	4,4	6,6	10,1	14,4	5,7	7,1	7,2	7,1
- with parametric reforms <sup>111</sup>	4,4	4,9	7,1	10,0	5,7	7,1	7,2	7,1
- with increased contribution rates <sup>112</sup> ; no parametric reforms	4,4	6,6	10,1	14,4	5,7	7,1	9,9	10,1
	<b>Pension Reserves to Assets Ratio</b> (% of GDP)				<b>Debt to GDP Ratio</b> (% of GDP)			
	<b>2004</b>	<b>2020</b>	<b>2040</b>	<b>2050</b>	<b>2004</b>	<b>2020</b>	<b>2040</b>	<b>2050</b>
Baseline scenario <sup>110</sup>	39,0	37,3	1,9	-4,5	71,3	36,4	70,0	144,0
- with parametric reforms <sup>111</sup>	39,0	53,1	57,2	43,6	71,3	21,7	2,8	15,2
- with increased contribution rates; no parametric reforms	39,0	37,3	24,6	3,4	71,3	36,4	42,6	72,9

<sup>110</sup> Actuarial exercise applying Commission population projections and economic assumptions to the Social Insurance Fund accounts as of 2004.

<sup>111</sup> Include raising retirement age, indexing basic pensions to CPI instead of wage earnings, and increases in years required for eligibility for old age pensions.

<sup>112</sup> Includes increase in social security contribution rates as from 2025 to 2045.



## **13. Latvia**

Sandra Stabiņa, Ministry of Welfare

### **13.1 Pension Reform In Latvia**

The NDC pension scheme is functioning already since 1996, the state mandatory financially defined contribution pension scheme was launched in July 2001, and private pension funds are operating from July 1998.

#### **13.1.1 Old-age pension scheme**

The state old-age pension system comprises notional defined-contribution scheme (NDC) and pay-as-you-go (PAYG) scheme, both of which are included in projections.

The first pillar pension scheme implemented in Latvia in January 1996 is based on insurance principles, as the social insurance contributions, earmarked for old-age pensions (20 percent of wage) are recorded in the notional individual accounts, introduced in 1996, that are given a rate of return until retirement and accumulate (notional) pension capital, while real contributions are used for financing current pension expenditures. Pensions are calculated by dividing the amount accumulated in the notional account by projected cohort unisex life expectancy at retirement.

A benefit can be claimed at any time from the minimum pension age and it is possible to receive full pension while continuing work after the retirement. Working pensioners continue to contribute and accumulate additional notional pension capital. This newly accrued pension capital also yields a rate of return, and the benefit is recalculated upon final retirement to include this new capital. The principle behind this is that it provides an opportunity and support for gradual withdrawal from the labour force.

Minimum insurance record for taking state old age pension is 10 years.

Person who has insurance period less as 10 years and has exceeded the qualifying age for old age pension by 5 years shall be granted the state social security benefit, paid by state budget. (included in projection exercise)

The transition to the retirement age of 62 is carried out on a step-by-step basis, i.e. by six months each year. Men have already reached the retirement age of 62 in January 2003, but women will reach it in 2008 (currently the retirement age for women from July 2005 is 60,5).

Up to mid-2008, the legislation provides for a possibility to retire 2 years before the age of 62 for men and 2 years before the increasing schedule to 62 for women, if persons insurance record are 30 years or more (they receive 80% of normal pension amount (the full pension restored after normal retirement age). Early retirement will be eliminated after this date.

**Table 13 - 1 Changes in the retirement ages in Latvia**

<b>Men</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
Minimum retirement	62	62	62	62	62	62	62	62
						<b>from 1July, 2008</b>		
Early retirement	60	60	60	60	60	-	-	-
<b>Women</b>								
	<b>from 1July, 2003</b>	<b>from 1July, 2004</b>	<b>from 1July, 2005</b>	<b>from 1July, 2006</b>	<b>from 1July, 2007</b>	<b>from 1July, 2008</b>	<b>2009</b>	<b>2010</b>
Minimum retirement	59,5	60	60,5	61	61,5	62	62	62
	<b>from 1July, 2003</b>	<b>from 1July, 2004</b>	<b>from 1July, 2005</b>	<b>from 1July, 2006</b>	<b>from 1July, 2007</b>	<b>from 1July, 2008</b>	<b>2009</b>	<b>2010</b>
Early retirement	57,5	58	58,5	59	59,5	-	-	-

Here is also possibility in transition period to take old age pension from earlier time – for persons in special cases (as disabled for life, Lilliputians, blind persons) and persons who have worked under hazardous and hard conditions.

The average benefit is directly dependent on the actual pension age, number of years worked as well as dynamics of contribution base (growth of the contribution wage sum in the Country), which determines rate of return for the NDC pension capital.

Pensions granted before 1996 were not revised according to the rules of the NDC scheme. Nevertheless the same rules for indexation are applied for both the old-law and new-law pensioners: until 2002 pension indexation was based on the consumer price index and from 2002 – the changes both in consumer price index and contribution wage base are taken into account<sup>113</sup>.

There is a guaranteed pension minimum that establishes the lowest benefit that can be granted. Such guarantees are essential especially during the transition period to the pure NDC scheme. Up to the year 2002 the guaranteed level for the old age pension was of the same amount (30 LVL) as the state social security benefit (available to persons whose insurance records are not sufficient to receive old age pension), provided by residence based social security. From January 2002 the guaranteed amount of state old-age pension has been increased according to the length of the individual's record of insured time, multiplying the amount of state social security benefit by the factor 1.1, 1.3 or 1.5, corresponding to years of service - less than 20 or 30, or more. From January 2006 the amount of the state social security benefit has been increased to 45 LVL, correspondingly increasing the minimum guaranteed level of the old age pension.

### **13.1.2 Disability pensions (included in the projections)**

Those insured persons whose insurance record is not less than three years and they have been recognised as disabled can receive disability pension; excluded persons whose disability has been caused by an accident at work or an occupational disease.

Persons with a disability resulting from an accident at work or an occupational disease shall be granted and paid indemnity (compensation) for the loss of the capacity of work.

<sup>113</sup> According to the legislation the adjustment is differentiated dependently on amount of pension. Small pensions are indexed considering the actual CPI and 50% of the real growth of contribution wage sum. The medium pensions are indexed with CPI.

Disabled persons are divided into three categories. The Health and Working Capacity Medical Expert Commission determines the category of disability as well as the cause and anticipated duration of the disability.

The disabled persons who have reached retirement age shall be granted the old age pension instead of a disability pension (disability pensioners, who reached retirement age before 1996 continue to receive disability pension – until the end of transition period).

If amount of old age pension is smaller than disability pension's amount, person continues to receive bigger amount.

The same rules for indexation are applied for all state pensions.

### **13.1.3 Survivor's pensions (included in the projections)**

If the breadwinner has been an insured person, his/her family members shall be entitled to a survivor's pension irrespective of the cause of death of the breadwinner.

If the cause of death of the breadwinner has been an accident at work or an occupational disease, the insurance indemnity for the loss of the breadwinner shall be granted and paid.

Family members (under the age of 18 ) incapable of work who have been dependent on the deceased breadwinner are entitled to the survivor's pension. The pension shall be granted to the children of the deceased person irrespective of whether they had been dependent on the deceased person.

Persons shall be also considered incapable of work, if at the time of the death of the breadwinner or later they are day department (full-time) students at secondary, vocational or higher educational establishment and are under the age of 24.

Survivors pension for orphans having lost both parents: pension calculated by taking into account the potential old age pension of both parents.

The aggregate amount of the survivor's pension granted shall not fall behind the amount of state social security benefit and not less than 65 per cent (from 2006) of the state social insurance benefit amount for each child.

Widow's, who have pensions according to the old pension system, continue to receive those during the transition period. Widow's pensions shall be paid out from the state pension special budget.

The same rules for indexation are applied for all state pensions.

### **13.1.4 Service pensions (during the transition period), included in the projections**

Starting with January 1, 1999 the determination of insurance record entitling to service pensions shall be terminated. Only for persons, who by January 1, 1999 have worked in the respective above mentioned professions for not less than three fourths of the insurance period required for allocation of the service pension in accordance with special regulations shall retain their entitlement to the service pension. The service pension shall be paid out from the state pension special budget.

For persons who have been granted the service pension in accordance to the special regulations and who have reached the retirement age shall be granted the old age pension instead of the service pension. It must not be smaller in amount than the service pension received prior to the allocation of the old age pension.

The same rules for indexation are applied for all state pensions.

### **13.1.5 The state mandatory funded pension scheme, included in projections**

The FDC pension scheme in Latvia has started operation in July 2001. It is a fully funded statutory pension scheme, where a part of the social insurance contributions within the 20 % contribution rate for old-age pensions are invested in financial assets.

Coverage in the FDC pension scheme is mandatory for persons who were under the age of 30 July 1, 2001, when the State Funded Pension Law came into force. Persons who were at that moment in the age group of 30 – 49 can affiliate to this scheme on a voluntary basis at any time. Participation conditions are simplified to a maximum extent and synchronized with the participation in the NDC PAYG pension scheme. This means that the FDC pension scheme gradually will cover almost all persons covered by the state pension insurance. However, persons who were at the age of 50, when the law came into force, have no option to participate. This scheme is expected to be fully mandatory around the 2035, when cohorts of voluntary participants will gradually vanish.

The share of contributions dedicated for saving in this scheme is scheduled to increase gradually, proportionally reducing contribution rate for the 1st pillar (NDC PAYG). Initially only 2 percent of the contribution wage will be transferred for the investment. Over time, the contributions, designated to the funded pension scheme, will rise gradually to 10 percent in 2010, reaching the same proportion for both pillars (10%+10% = 20%). As the financing of the state mandatory funded pension scheme is in the framework of public pension scheme, all subsidies for the individual, paid by the state budget or other social insurance budgets (in case of child care, military conscription, unemployment etc.) are respectively attributed for both schemes.

The State Social Insurance Agency contracts with the asset managers and insurance providers on behalf of the public sector. Until January 2003, the sole asset manager under the FDC pension scheme was the State Treasury. From January 2003, participants of the FDC pension scheme are able to choose among state or private asset managers. It is possible to change asset manager during the participation period, but not more than once a year.

As the state funded pension scheme is a public scheme, participant's capital, left after the death and prior to retirement, shall be remitted to the state pension budget for financing survivor's benefits for the dependent family members (children) in accordance with the legislation for the 1st pillar. In such a case spouses have no rights for survivor's benefits either in the NDC PAYG or in the FDC pension scheme.

There are two options at retirement - at the participant's choice the accumulated state funded pension capital will be:

- added to the 1st pillar pension capital for calculation of the total old-age pension, based on the NDC scheme formula, or
- transferred to the life insurance company, which subsequently will provide a whole life annuity.

### **13.1.6 Voluntary private pension scheme, not included in projections**

Scheme is operating since 1<sup>st</sup> of July 1998 and the purpose of this scheme is to accumulate and invest the voluntarily made contributions of its participants by means of private pension funds thus ensuring additional pension capital in old age. Pension plan participants may participate directly or with involvement of their employer. The pension plan participant can receive all accumulated pension capital from the age of 55 or continue participating and receive capital in parts.

## 13.2 Financing Of The Social Security System

In 1998 was introducing several significant changes in the area of financing social insurance. Four special social insurance budgets (special budgets) were approved instead of one special insurance budget and expenditures permissible within the given budgetary frame: the state pension special budget; the employment special budget; the occupational accident special budget; the disability, maternity and sickness special budget. Differentiated rate for social insurance contributions was established. Persons were insured and made social insurance contributions against risks which could, in fact, set in.

### Socially insured persons:

- 1) Persons subject to compulsory social insurance:
  - employees;
  - domestic employees working for an employer – foreigner;
  - foreign employees working for an employer – foreigner;
  - self – employed persons;
  - persons insured from the state basic budget;
  - persons insured from the Social Insurance Special Budget.
- 2) Persons who have joined to state pension insurance on voluntary basis (individual who has reached the age of 15 and is not subject to compulsory social insurance):
  - a person who has not been granted the state old age pension, may join to state pension insurance;
  - the spouse of self – employed person who has not yet reached the retirement age, may join to state pension insurance, disability insurance and maternity and sickness insurance.

### Kinds of social insurance:

- state pensions insurance;
- social insurance against unemployment;
- social insurance against work injuries and occupational diseases;
- disability insurance;
- maternity and sickness insurance.

## 13.3 Basis For Calculation Of The Pension(S), Including Information On Wages, Adjustments And Indexations Of Pension Schemes

### 13.3.1 Old-age pension formula during the transition period

$P = (K_s + K) / G$ , where

**P**: annual pension, of which 1/12 is the monthly pension;

**K**: the pension capital of insured person;

**G**: time period (in years), during which pension disbursements are planned, starting from the pension allocation year (projected life expectancy at a certain retirement age);

**K<sub>s</sub>**: starting (credited) capital, calculated according to the following formula:

$K_s = V_i \times A_s \times 0.2$ , where

**As:** the insurance record until the year 1995 (inclusive);

**Vi:** the insured person's average insurance contribution wage of 48 months in the period from 1996 to 2000 (calculated in 1996 prices). If during this period the insurance contributions have been made for less than 48 months, the average insurance contribution wage shall be calculated by dividing the total amount of insurance contribution wage by 48. For persons, who have years of service not less as 30 and contribution wage less as average contribution wage in the state, average wage of the state has used for calculations.

### **13.3.2 Disability pension formula**

The calculation of the disability pension is made according to the following formula

#### **Category I**

$$P = 0.45 \times Vi + (ASi / ASie) \times Vi \times 0.1$$

#### **Category II**

$$P = 0.4 \times Vi + (ASi / ASie) \times Vi \times 0.1, \text{ where}$$

P: pension;

Vi: reference earnings (see below "Reference earnings or calculation basis");

Asi: individual insurance record in years;

ASie: maximum possible insurance record from the age of 15 until legal retirement age;

For disabled persons of category III: the benefit is fixed as the amount of the state social security benefit (45 lats per month).

The amount of the disability pension for Group I and II shall not be less than the amount of the state social security benefit ( 45 lats), as the basis for calculation of the guaranteed pension to which the following coefficient shall be applicable:

in case of Group I disability - 1.6;

in case of Group II disability - 1.4.

### **13.3.3 Survivors pension formula**

Survivor's pension for orphans having lost one parent: the total pension calculated from the potential old age pension of the deceased as follows:

One child:

1) for one child - 50 percent of the pension, but not less than 65 per cent of the state social insurance benefit amount for each child.

2) for two children - 75 percent of the pension, but not less than 65 per cent of the state social insurance benefit amount for each child.

3) for three and more children - 90 per cent of the pension, but not less than 65 per cent of the state social insurance benefit amount for each child.

Survivors pension for orphans having lost both parents: pension calculated by taking into account the potential old age pension of both parents.

The amount of the state pension shall be adjusted annually in accordance with the procedure set by the Cabinet of Ministers, considering the changes in the consumer price index and 50 percent of the real growth index of the social insurance contribution wage base.

## **13.4 Projection Model**

### **13.4.1 The Latvian Social Insurance Budget Model by the Ministry of Welfare**

The model is a microsimulation model and generates long-term projections of the expenditures and revenues of the social insurance budget. The model rests on five pillars:

- A Demographic Model
- A Population Status and Labour-force Participation Model
- An Income Model
- Pension Model
- Benefit Models

The model is presently designed to produce projections for old age, disability, short-term sickness, work injury, unemployment, maternity, survivor, funeral benefits and administration and other important outlays. The most elaborate modules are those that generate disability and old-age pension projections. The model can be expanded to generate projections of other transfers and revenues dependent on demography and/or earnings.

For a specified set of rules for the calculation of benefits, the user steers the projections by choosing parameters that determine scenarios for the development of the population, participation in the labour force, the unemployment rate, the average wage and the degree of participation in the formal economy.

Most of the key assumptions needed to run the model can be varied over the projection period. For example, birth, mortality, unemployment, disability, average wage, and interest rates can develop in various ways specified by the user. Some scenarios are specified by a vector, such as the rate of growth or rate(s) of interest earned by fund reserves. Others are specified as changing age-gender distributions, e.g. survival rates, the distribution of income, and disability, work-injury and unemployment risks. This is done by specifying a set of possible scenarios in the Data Module and then choosing the desired development of parameters and the desired combination of scenarios in the Control panel that steers a run.

The model produces projections on an annual basis through the year 2050, although the projection period can be abridged and in some cases elongated. The year 2050 is presently the limit for the old-age pension projections. It is possible to run the demographic and population status sub-models much longer.

Key assumptions and results are accumulated in standard tables and charts. Other tables and charts may also be chosen at the discretion of the user. The model is programmed in Visual Basic and Excel.

### **13.4.2 Basic data required to run the model(s)**

In accordance with the Law there are the following types of the state pensions distributed by age and gender:

- 1) old age pension;
- 2) disability pension;
- 3) survivor's pension;

- 4) service pensions;
- 5) pensions on special resolutions.

Statistical data for the base year of 2004 are provided by several agencies as follows:

- labour force and wage profiles (if different for technical reasons from assumptions agreed by AWG) by State Social Insurance Agency;
- pensioners and pension profiles by Central Statistical Bureau and State Social Insurance Agency;
- individual pension data for various pension schemes by State Social Insurance Agency.

### **13.4.3 Assumptions and methodology used in the calculation of main variables**

Underlying assumptions agreed by the AWG that have been used in the model(s) and adjustments (if any)

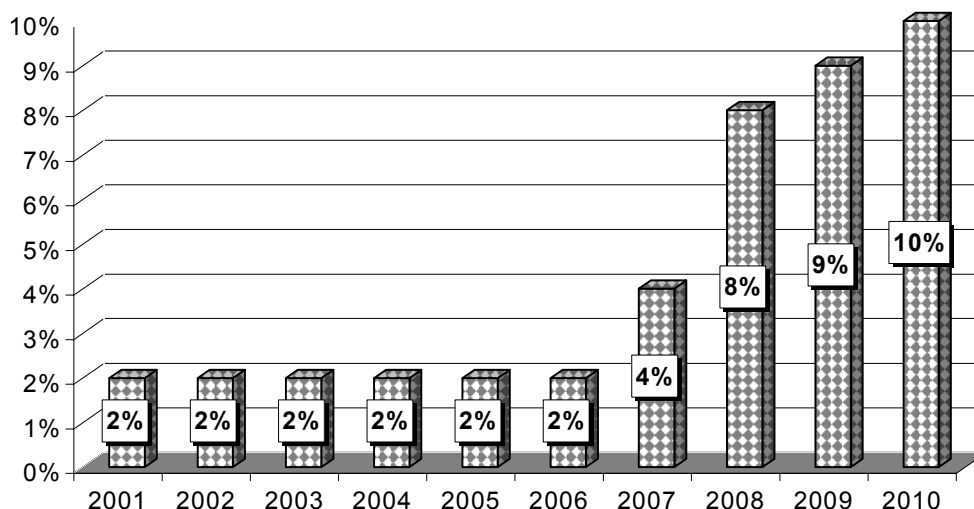
- demographical assumptions;
- participation rates;
- wage growth = productivity;
- unemployment rates;
- interest rates;
- employment rates.

Additional assumptions and methodology used to estimate:

- the number of pensioners, including *inter alia* estimates of the average number of newly retired or part-time pensioners
- Average age of retirement of a birth cohort, for men and women separately (according the law, considering early retirement) has been used in the projections (all cohort of gender take retirement in the same year, except those who has been retired earlier). Early retirement will stop on 1 of July 2008 as well as increasing normal retirement age (62 for both gender) – according to the law.
- pension accrual
- Pension capital for old age pensions has been calculated by age and gender in the model. Accumulated capital until year 2004 distributed by age and gender has been put in input data as base. Growth of social insurance wage base is used for capital indexation until retirement.
- Pension capital to NDC in 2004 – 20% from average wage for persons, who are not participate in the state funded pension scheme.
- Pension capital to NDC in 2004 – 18% from average wage for persons, who participate in the state funded pension scheme.
- As the financing of the state mandatory funded pension scheme is in the framework of public pension scheme, all subsidies for the individual, paid by the state budget or other social insurance budgets (in case of child care, military conscription, unemployment etc.) are respectively attributed for both schemes.
- Over time, the contributions, designated to the funded pension scheme, will rise gradually to 10 percent in 2010, but contributions to NDC will decline and reaching the same proportion for both pillars (10%+10% = 20%).



**Graph 13 - 1 Contribution rate to the state funded pension scheme**



- average pensions: NDC and funded pension amount depends from accumulated contributions, life expectancy and pension indexation. For calculations of other kind of pensions model is making calculations according to the law.
- number of years receiving a pension: Number of years receiving a pension depends from estimation of life expectancy.

#### **13.4.4 Incorporation of future effects of enacted reforms**

- retirement decisions
- According the law – no early retirement from 1 July 2008 and the same retirement age for men and women – 62 years.
- 
- taking-up of early retirement
- According the law – no early retirement from 1 July 2008
- application of indexation rules and adjustments
- The same rules for indexation are applied for both the old-law and new-law pensioners: with consumer price index and 50% contribution wage base.

#### **13.4.5 Calculation of Old age pensions**

##### **Overview**

In principle, the model can be used to compute any defined-benefit or defined contribution pension scheme. The model combines demographic and economic scenarios with user defined rule systems to compute benefits. One of the major uses of the model is to examine the financial development and cohort-benefit profiles of old-age pension benefits over time given different user-specified demographic and economic scenarios. The model is presently programmed to produce calculations to the year 2050, but can be modified to produce calculations over longer time spans.

The model population is specified in terms of birth cohorts and gender. Since the model also contains a function specifying the distribution of income for men and women by age, by first specifying an age

and gender distribution, it is possible to use the model to compute benefit schemes taking into account typical age-earning income profiles.

Together with survival rates, the pension age is instrumental in determining the size of individual benefits and total costs for the pension system(s). The user specifies the average pension age to be employed in the calculations. Since the average pension age may change by either gender or birth cohort or both, do either to legislative or behavioural reasons, the user is responsible for specifying a desired scenario. The effect of this choice on the outcome can be studied in alternative scenarios.

Benefits are calculated according to benefit formulas specified by the user. They reflect assumptions made about the growth and distribution of individual earnings and contributions and the form of benefit indexation. Where appropriate, the user can make assumptions about what happens with survivor's capital, as well as the development of the real rate of return on funded capital.

The output of the model is summarized in a financial accounting structure. The model keeps track of the development of benefits and the number of recipients by birth cohort and gender. This makes it possible to compare and examine the effects of alternative rule systems by gender and birth cohort. The model aggregates cohort and gender data to aggregate annual data on revenues and expenditures, stocks and flows of assets and liabilities, and numbers of beneficiaries and contributors. There are predefined tables and charts, but a user familiar with EXCEL can create his own output tables.

### **Calculation of Survival Rates in the Model**

The point of departure in pension calculations is the age and gender dependent one-year death risk in the population, denoted in the model by  $q$ . This is the probability that, for example, a man of a given age dies in period  $t$ . In computations it is often easier to work with survival probabilities instead of death risks. For this reason, we define the survival probability (rate)

$h = 1 - q$ , e.g. the probability that a man of a given age will survive in period  $i$ .

From the survival probabilities a function

$$1) \quad l_x(\text{age}) = l_x(\text{age}-1) \times h(\text{age})$$

can be constructed for each gender. The initial value is usually set to 1 for the lowest age in the calculations. The next step is to assume the development of age and gender specific survival risks.

In calculations, one usually starts with a "known" set of survival rates. In analyses of pension systems over periods of 50 to 100 years it is important to examine a number of alternatives in order to ascertain the financial stability of the system with regard to demographic fluctuations. Cyclical volatility and trends in birth rates, death risks and net immigration are all important determinants of how well a system will perform in the medium and long-term future.

In the Model the user specifies starting values and long-term trends (scenarios) in these demographic parameters - in the demographic sub-model. The results are fed into the pension calculations in the sub-model for pension calculations.

Note finally that the conditional probability that a person alive at age  $i$  survives to age  $n$  is

$$2) \quad l_x(n)/l_x(i)$$

Where relevant, this probability is used in calculating the present value of an annuity for a person retiring at age  $i$ .

## **The Retirement Age in the Model**

Legislation and behaviour determine the retirement age. Within the scope of the model the user determines the average age of retirement of a birth cohort, for men and women separately. With decreasing death risks and the resultant increase longevity for persons reaching a certain (minimum, mandatory etc.) pension age the average age of retirement may increase, either through legislation or behaviour.

The behaviour of the older work force is influenced by a number of factors. These include the rules for the mandatory social security scheme, incentives connected with individual earnings and job opportunity prospects, the costs of older labour for employers (compared to the advantages in terms of productivity, experience, etc.) health and life expectancy, and the in some occupations by mandatory pension age rules. All of these factors together determine the de facto retirement age of older workers, which is the relevant retirement age to be specified in the model.

For example, persons in a defined benefit system might be required to have 40 years of contribution history for a full benefit, which can be obtained at a specific age, nevertheless it will make a difference when they retire. This will be the case for at least two reasons. First, legislators may want to change the age at which a full benefit can be taken, for example from age 65 to 66 at year  $t$  and from 66 to 67 at year  $t + \tau$ . Second, regardless of the set age for a full benefit, the full-benefit age together with the estimated survival probabilities determine the total cost of the system.

In a defined contribution system, the benefit will be related directly to individual contributions, and in principle, the annuity received upon retirement will automatically reflect the age of retirement and life expectancy. Still, the age at which individuals take their benefits on average will influence the liquidity of the pension system. For example, if people decide to work longer on average as life expectancy increases, the system has to pay less "today", and this process will continue as long as the average age of retirement increases. The opposite phenomenon arises as the average age of retirement decreases in an actuarial fair system, putting a strain on liquidity today, even though the system is solvent in the long run.

In sum, there lies a lot behind thinking about and setting the de facto age of retirement over time, regardless of the system being analyzed. The freedom for the user to set a time and/or birth cohort dependent de facto retirement age is an important "tool" provided in the model.

## **The Calculation of a Defined Benefit**

The exact definition of a defined benefit formula must first be specified in terms of what applies separately to a man and a woman, on average, in a given birth cohort. If the benefit depends on the number of years of contributions, this number will be collected - by gender and birth cohort - from the economic component of the model.

If the benefit is a flat rate benefit, i.e. the same benefit for all, then it is a simple matter to give all surviving persons over a certain age - or in specified birth cohorts - a specified flat rate benefit.

## **The Calculation of an Annuity without Interest**

The model has preprogrammed procedures to calculate an annuity without and with interest. These are calculated as follows:

### A. The Annuity without a Rate of Return

To derive the life expectancy of a person age  $i$  at some given time we sum over the  $lx$  values to the last year of life,  $N$ , in the model presently assumed to be 100, and divide by the  $lx$  value for the year in which we are examining:

$$3) \quad G_i = \frac{\sum_{i=1}^N lx_i}{lx_i}$$

**1**

The result is called the G-value in the model.

Assume that the earliest retirement age we are interested in calculating G-values for is age 55. Then, once the G-value for age 55 has been calculated, it can be shown that the formula for the G-value for a person at age 56 can be written as

$$4) \quad G_{56} = (G_{55} - 1) / h_{56}$$

**2**

Expressing the G-values in this form saves on computations.

The amount of the annuity is calculated by dividing accumulated capital,  $C$ , prior to retirement by the G-value applying when the individual (cohort in the model) retires:

$$5) \quad \text{Annuity} = C/G$$

### B. The Annuity with a Rate of Return

The G-value with a real rate of interest,  $r$ , is calculated as

$$6) \quad G_i^r = \frac{\sum_{i=1}^N r^{-(N-i)} lx_i}{lx_i}$$

**3**

and the corresponding annuity is

$$7) \quad \text{Annuity with } r = C/Gr$$

### C. Inheritance Gains

In a pure old-age insurance system, the capital of those who die before they are able to take out their old-age pension accrues to the surviving participants in the pension scheme. There are several options for the use of these funds. Generally funds freed by premature death could be used to

- 1) create a survivors benefit,
- 2) lessen the contribution needed to generate an annuity of a given size, all other things equal,  
or
- 3) create a higher old-age benefit for the survivors themselves when they become pensioners.

Generally, the inheritance gain to the insurance collective is, on an annual basis.

$$8) \quad l_x(n-1)/l_x(n) = 1/h(n)$$

The inheritance gain can be viewed as an annual extra rate of return. The amount of money this return generates will depend on the number of contributors of various ages each year and is, hence, computed on a yearly basis.

If option 3 is chosen then the resultant amount computed for each cohort will be included in the capital used to compute the annuity.

### The Indexation of Benefits

All calculations in the model are performed in real values. This means that price indexation of benefits is assumed as the default option. In principle, it is a simple matter to choose any relevant form of indexation, including no indexation.

For example, the no indexation option would be specified as a price-related deflator of real-valued benefits.

Wage indexation involves indexing the real-valued benefits with a real-wage index. This can be set equal to varying degrees of full indexation, from zero to full indexation.

## 13.5 Results of Projections

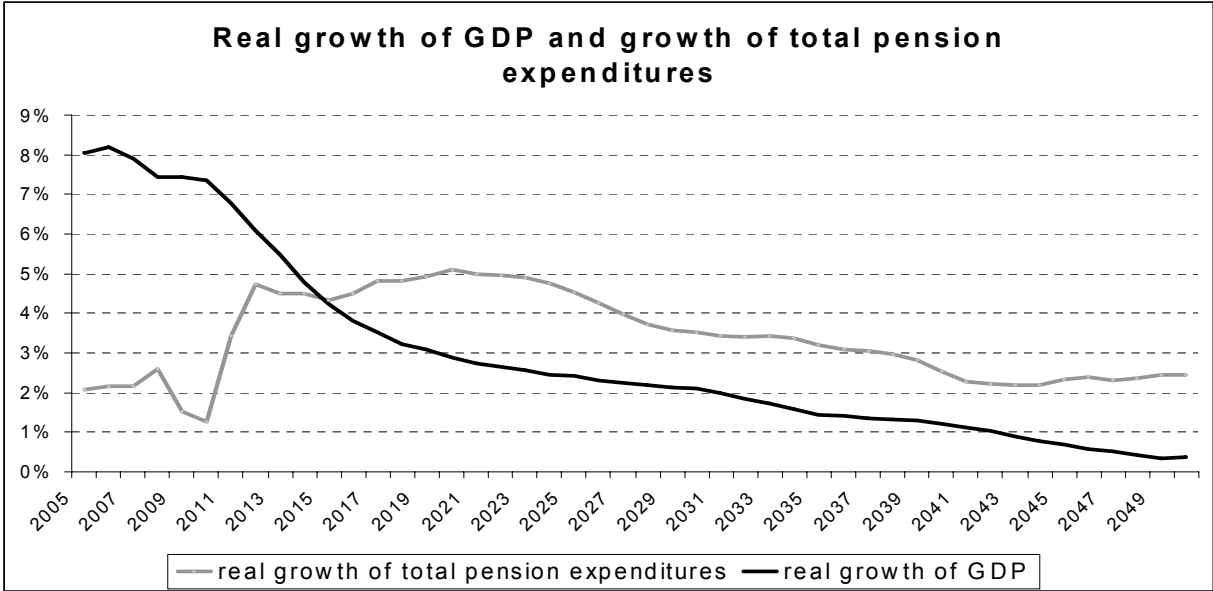
The financial situation of the social insurance system and the expected future risks have been calculated under various demographic and macroeconomic scenarios. The projections for total pension expenditures include the data for public and private statutory pensions. Scenarios with higher labour productivity, higher employment rate and lower interest rate shows slower increase of total pension expenditures as a share of GDP in comparison with baseline scenario. In case of other scenarios the level of pension expenditures is higher as it is in baseline scenario.

**Table 13 - 2 Total pension expenditures (gross) as a share of GDP**

Scenario	2004	2010	2015	2020	2025	2030	2040	2050	Change 2004-2050
Baseline	6,8	4,9	4,6	5,0	5,6	6,0	7,0	8,3	1,5
High life expectancy	6,8	4,9	4,7	5,0	5,6	6,1	7,2	8,4	1,6
Higher labour productivity	6,8	4,9	4,6	4,9	5,5	5,9	6,9	8,0	1,2
Lower labour productivity	6,8	4,9	4,6	5,0	5,6	6,1	7,2	8,6	1,8
Higher employment rate	6,8	4,9	4,6	5,0	5,5	6,0	7,0	8,2	1,4
Higher Older workers employment rate	6,8	4,9	4,6	5,0	5,5	6,0	7,0	8,2	1,4
Lower interest rate	6,8	4,9	4,6	5,0	5,5	6,0	6,8	7,7	0,9
Higher interest rate	6,8	4,9	4,6	5,0	5,6	6,1	7,3	9,0	2,2

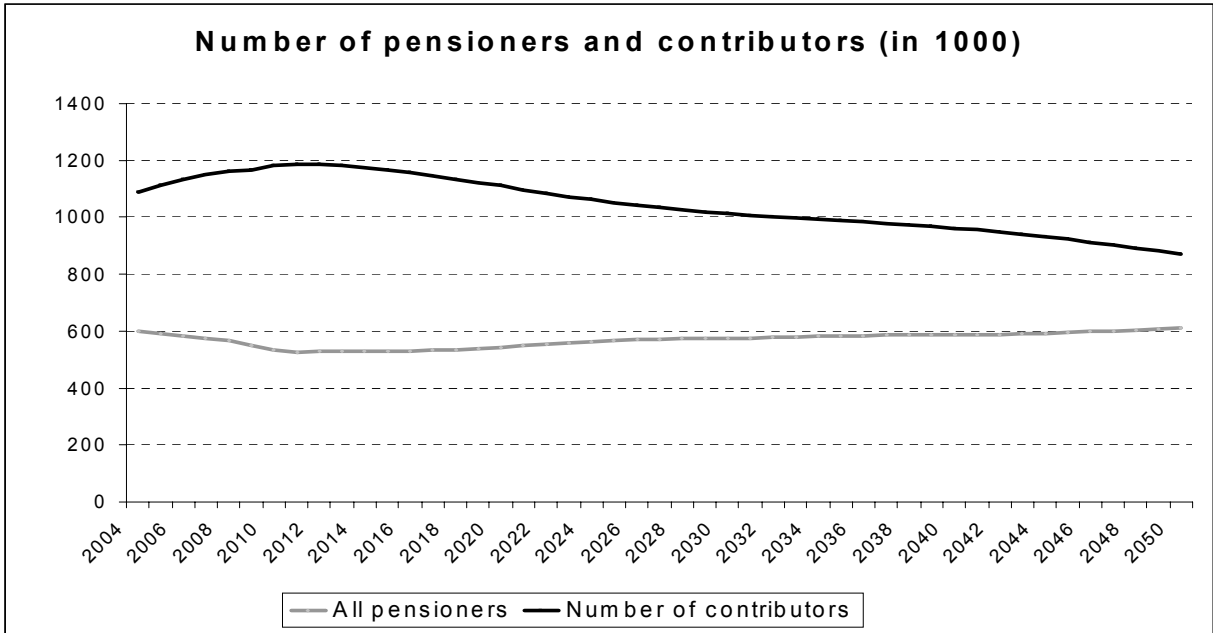
In accordance with the baseline projections the total pension expenditures as a share of GDP will continue to decrease until 2014 and will reach 4,6%, where so fast decrease is explainable by high growth rate of GDP, demographical situation and continuing mandatory increase of the minimum retirement age.

**Graph 13 - 2 Real growth of GDP and total pension expenditure**



Expenditures for pensions as a share of GDP in the period from 2015 to 2050 will increase by 3,7 percentage point (baseline), where the increase of expenditures will be caused mostly by increase of demographic burden and wherewith system burden.

**Graph 13 - 3 Number of pensioners and contributors (in 1000)**



## **14. Lithuania**

Mecislovas Ignatavicius, Ministry of Social Security and Labour

### **14.1 Key Features of the Pension System**

#### **14.1.1 Pension benefits**

##### ***14.1.1.1 The state social insurance pension***

The social insurance system of the Republic of Lithuania awards the insurance pensions and other benefits to the insured inhabitants, as well as in the cases determined by the legislation to the members of the family of the insured.

The social insurance system was formed by the legal acts adopted in 1991-1994 and took over some of the commitments of the Soviet insurance system.

The social insurance system includes periodical payments – pensions - and short-term benefits such as sickness and maternity benefits, lump-sum and periodical benefits due to labour accidents and unemployment insurance benefits.

The social insurance pension system is composed of the old-age and the disability pensions to be awarded to the insured person as well as of the widower's or orphan's pensions to be awarded to his/her relatives in case of the insured person's death. The pension payments awarded up to 1995 and not awarded anew – the long service pensions, the loss of breadwinner pensions and compensations for extraordinary work conditions – are also paid out.

The present pension system based on the PAYG principle became effective in 1995. At that time the retirement age was as follows: 55 years - for female, and 60 years – for male. It was established that the retirement age would be gradually increased until it reached 60 years for female in 2006 and 62.5 years for male in 2003.

The old-age and the disability pensions consist of two parts: the main (basic pension) and the supplementary parts. The basic pension depends only on the social insurance period. The social insurance period for a full basic pension is 30 years but a minimum of 15 years insurance period entitles for a minimum of basic pension, which amounts to 0.5 of the basic pension. The requirements of the minimum and full social insurance period for the basic part of the disability pension depend on the person's age and increase gradually along the person's age.

The supplementary part of the pension shall be awarded only in case when the basic part of the pension has been awarded. The supplementary pension depends on the multiplication of four values:  $0.005 \times S \times K \times DP$ . Here 0.005 – accrual rate, S- social insurance period in years, K – the average of a ratio between person's monthly earnings and the state insured income of that period, DP – the amount of the state insured income on the month of the pension payment.

When awarding the supplementary part of the disability pension, the coefficient K shall be calculated according to the earnings received until the person became disabled, while the length of the social insurance period shall be calculated as a sum of the insurance period until the person became disabled and the period left until the old-age pension age.

After reaching the retirement age, a person can continue working and receive his/her earnings from work together with the old-age pension. If the pension payment is postponed, the pension will be increased by 0.67 % for every month (8% per year).

Since 1 July 2004, there is a possibility to receive an early retirement pension, if less than 5 years are left until the old-age retirement age. However, the pension will be reduced by 0.4 % for every month remaining until the retirement age. The reduced pension is paid for the rest of the life. The mandatory provision to receive the early retirement pension is 30 years of social insurance period and a person must be registered at the Labour Exchange Office as unemployed for the period not less than 12 last months.

Until 1 July 2005, a person who receives the disability pension and reaches the retirement age may choose whether to continue receiving the disability pension or start receiving the old-age pension. The disability system is now under reformation, where the main accent falls on the disability concept. It is envisaged that in future a person will receive the disability pension until retirement age and thereafter the old-age pension.

Family members of deceased insured person are entitled to orphan's and widow's pensions.

The social insurance pension system is financed by social insurance contributions of employers, employees and self-employers.

#### **14.1.1.2** *The state pensions*

The state pension system functions independently from the social insurance pension system. The state pensions are awarded to the signatories of the Lithuanian Declaration of the Independence, the persons for distinguished achievements for the state (I and II degree), officers, military servants, judges, scientists and for deprived persons. Social assistance state pensions are paid to persons who do not have a sufficient social insurance record and they are of the following types: social assistance pensions, orphan's social assistance pensions, targeted compensations for nursing expenses, nursing allowances and relief compensations. The payment of obsolete social assistance benefits such as the social assistance pensions for nursing disabled persons at home is also continued but not awarded anew.

The amount of the state pension for the signatories of the Lithuanian Declaration of Independence – is 50% of the earnings of a Parliament member. The amount of the state pension of the prosecutors, officers, military servants and judges depends on their former earnings.

The amounts of the state pensions of the first and second degree are equal to four and two times the amount of the basic pension, irrespective the former earnings of the person. Also, social assistance, scientist's pensions and pensions of deprived persons are related to the amount of the basic pension only.

State pensions are awarded irrespective of the entitlement to social insurance pensions and may be paid out together with them. However, the maximum sum of pensions of the first and second degree, military servants and judges may not exceed 1.5 of the state's average earnings. The state pension system is financed directly from the State Budget.

#### **14.1.2** **Financing of the pension system**

##### **14.1.2.1** *The social insurance contributions*

The social insurance pension system of Lithuania is based on social insurance contributions which are paid in the following way: in case of labour relations which are based on an employment contract - by the employer and the employee; for self-employed persons – by the person himself/herself. Certain groups of individuals (persons taking care of children under three years or other dependent family members and soldiers in their compulsory primary military service) are insured by the State.



When labour relations are based on an employment contract, the employer pays a social insurance contribution amounting to 31 % of the employee's wage (before income tax payment), while the employee pays 3 % of his/her wage. These contributions are distributed as follows (in 2004):

- Pensions insurance – 23.5 % (employer) + 2.5 % (employee);
- Sickness and maternity insurance – 2.8 % (employer) + 0.5 % (employee);
- Health insurance – 3.0 % (employer);
- Unemployment insurance – 1.4 % (employer);
- Accidents at work insurance – 0.3 % (employer).

The distribution of the contribution is slightly adjusted every year in accordance with the forecasted actual expenses of Social Insurance Fund Budget, approved by the Parliament.

The Lithuanian Labour Exchange administers the unemployment insurance funds, while the funds allocated for health insurance are administered by the State Patients Fund offices.

Certain categories of self-employed persons (4 percent from the number of all the insured) are insured only by pension insurance and pay two types of contributions: a fixed amount for the minimum basic old-age pension and a supplementary contribution of the part (15 %) of the declared income for the supplementary old age pension.

Farmers and their family members working in the farm as well as individuals working on the basis of business licence were earlier insured only for the basic pension and paid fixed amount contributions. Since April 2003, farmers and their family members are not compulsorily insured by social insurance.

The contribution for the pension insurance is allocated between different pensions as follows: the basic part of old-age pensions – 10.5 percentage points, supplementary old-age pension – 10.5 percentage points and the rest (4.9 percentage points) for disability pensions (until the old-age pension age) and widow's and orphan's pensions.

The funded tier of the pension system was established in 2004.

#### **14.1.2.2**

#### ***Financing of the state pensions***

All state pensions are financed from the State Budget by transferring the due means to the institutions or agencies that payout these pensions.

### **14.2 Recent Reforms**

According to the pension system reform which started in 2004, the funded tier of the public pension system (pension accumulation at private funds) was established. Person insured for the full pensions insurance (basic and supplementary parts of the pension) may voluntarily choose to switch to the funded tier and to direct a part of social insurance contributions, dedicated for the supplementary part of old age pension, to a personal account in a chosen privately managed pension fund. The part of the contribution directed to private pension funds is as follows: in 2004 – 2.5 percentage points, in 2005 – 3.5 p.p., 2006 – 4.5 p.p., and as of 2007 – 5.5 p.p. For a person who chooses the participation in private pension accumulation, the supplementary part of social insurance old-age pension is reduced respectively. Other social insurance benefits do not change due to the participation in private pension accumulation. After switching to the funded tier, persons are not allowed to switch back solely to the social insurance pension scheme.

Regarding the financing of the transitional costs of the reform, it is planned that:

- 1) The functioning of the current pension system based on the pay-as-you-go principle will be ensured for the current and future pensioners. However, since a share of the mandatory social insurance pension contributions is transferred to the chosen privately-funded pension fund, the Social Insurance Fund will suffer a deficit of 0.3 to 0.8 per cent of GDP annually during the first decade after the reform (depending on the number of members in privately-funded pension scheme and the wage growth in the economy).
- 2) The shortage of revenues at the Social Insurance Fund will be covered by Privatisation Fund and the state budget. Also, the social insurance budget surplus gained from the favorable demographic situation will be used to cover transitional costs of the reform.

Contributions to private accounts in pension insurance funds are transferred from social insurance contributions paid to the Social Insurance Fund and all pension accumulation contracts are registered in the Social Insurance Fund.

The losses of the Social Insurance Fund are calculated on the basis of current earnings and the forecasts of earnings of members of the pension accumulation scheme. The transitional cost of the 2004 reform was 173 million litas (EUR 50 million) or 0.3 percent of GDP. Furthermore, it is projected that the losses of the Social Insurance Fund will amount to LTL 300 million (EUR 87 million; 0.4% of GDP) in 2005, LTL 497 million (EUR 144 million; 0.6% of GDP) in 2006, LTL 666 million (EUR 193 million; 0.7% of GDP) in 2007. 50 percent of the losses of the Social Insurance Fund 2004 were covered from the State budget and 50 percent from the resources of the Social Insurance Fund. The same financing was planned for the year 2005.

### **14.3 The Basis for Calculations**

As it has already been mentioned the Lithuanian pension system consists of social insurance and state pension systems, the income and expenses thereof are calculated into the consolidated state budget. The pension assets administered by private pension funds of the 2<sup>nd</sup> tier are taken into consideration as well: the contributions received by them, investment increment and payments (lump sum payments and annuities) whereas the III<sup>rd</sup> pillar pension funds and their savings for old-age programs based on individual person decisions – life insurance, private investment or pension accumulation, loan or deposit interest, dividends – are not included in the long-term projections of the EPC.

As functioning and financing of the social insurance pension and the state pension system in Lithuania are different, the income and expenditure forecasts of each pension system are prepared *separately* and only in the last stage they are put together in calculation of public finances income and expenditure. In the preparation of the projections the conditions determined by the AWG were followed – the impact of only those laws adopted before 31 December 2004 was included.

Currently, the automatic indexation of pensions is not established in Lithuania and pensions are increased by the Government decisions each year. In the projection exercise, it is assumed that pensions are indexed according to wage increases.

#### **14.3.1 Projection Models**

The long-term projections on the pension funds income and expenditure of the social insurance system together with its 2<sup>nd</sup> tier were calculated by using the pension system modelling program PRISM (Pension Reform Illustration and Simulation Model), owned by the Ministry of Social Security and Labour. The author of the present model is Patrick Wiese. This model is a universal macro simulation model of the pension system. It allows varying of demographic and economic development data and assumptions of the changes in the social insurance pension system.

The projections of the number of the recipients and pension expenditure of the state pensions are carried out on the basis of the model created by the specialists of the Ministry of Social Security and Labour by using Microsoft Excel software. The state pension system projections are made on the basis of macroeconomic forecasts and the forecasts on the number of the state pensions recipients provided by the institutions responsible for awarding of the state pensions.

### 14.3.2 Basic Data and Assumptions used in the Model

#### 14.3.2.1 Social insurance pension system

Data of the year 2004 or data recalculated into the year 2004 were used as primary data for the modelling of the social insurance pension system, including the following elements:

- the data of the 2001 population census of Lithuania and projections based on this;
- Eurostat demographic scenarios, adopted by the EPC, including fertility rates, mortality rates and migration projections for the period of 2005-2050;
- labour force, employment and unemployment rates – according to the data provided in the 2005-04-15 *AWG Budgetary projections\_ Baseline assumptions LT*;
- the distribution of the number of social insurance pensioners (old-age, disability, widowers and orphans) and pension amounts – according to the data of the Social Insurance Fund for the year 2004.

**Table 14 - 1 Number of pensioners and the average pension by type of pension in 2004**

	Number of pensioners	Average pension, Lt
Retired, Male	196 404	411
Retired, Female	424 321	341
Disabled, Male	101 687	346
Disabled, Female	103 440	313
Survivor, Male	61 641	79
Survivor, Female	201 426	82

The data on the GDP growth for the years 2000-2003 – according to the data provided by Department of Statistics of Lithuania and recalculated to the price level of 2004.

Year	2000	2001	2002	2003
The price index of 2004	1,02485	1,02592	1,02586	1,03299

The following data and assumptions have been used for the projections of 2005-2050:

- The growth rates of GDP, productivity, employment and unemployment according to the 2005-04-15 *AWG Budgetary projections\_ Baseline assumptions LT*;
- The number of the old-age pensioners – according to the demographic rates, taking into consideration the assumptions of the past employment, i.e. the right to receive social insurance old-age pension;
- The number of the recipients of the disability, widowers and orphans pensions – the tendencies existing up to 2004 are extrapolated;
- Collection of social insurance contributions – the current level of collecting social insurance contributions is fixed;
- Due to lack of automatic pension indexation (pensions are increased by Government decisions each year), in this projection the assumption was made that old-age, disability,

- widow's and orphan's pensions would increase in line with the productivity growth (real wages);
- The 3% real interest rate on the assets of the 2nd tier was adopted, as instructed by the AWG guidelines;
  - Part of the social insurance budget loss due to pension accumulation in private funds is remunerated by the transfers from the State Budget (stabilising fund). The amount of remuneration is determined annually when the Parliament approves the Budget. In 2004, 50 % of the loss was remunerated. Unfortunately, in the PRISM pension model it is possible to determine only a fixed remuneration rate as a percent of GDP. The assumption was made that the remuneration will make up 0.5 % of GDP.
  - The number of participants in the funded tier was modelled as an obligatory participation. Therefore, during 20-25 years, the participation rate would increase up to 100 % in the model. Although the number of participants in the funded tier is currently increasing rapidly (10% per year), participation rate in real life may not reach 100 %, due to the reason that the choice of participating is voluntary. It is envisaged to modify the PRISM model for a more accurate reflection of the impact of such important parameters to the social insurance pension budget.
  - According to the Lithuanian legislation, the social insurance old-age and disability pensions are paid regardless to whether the pension recipient works or not. Thus, in this model it is determined that the old-age and disability pensions, as well as annuities from the pension funds of the 2nd tier are calculated up to the statistically established life expectancy for an adequate age and gender group.
  - Annual inflation during the total projected period is equal to 2 %.

#### 14.3.2.2

#### *State pension system*

The data of the Statistics Lithuania and public institutions awarding and paying the state pensions, the distribution of the number of the state pension receivers and pension amounts have been used as the primary data for these projections.

The following assumptions were used as the basis in calculation of the projections of the state pension system for the years 2005-2050:

- The rates of GDP and productivity growth, according to the 2005-04-15 *AWG Budgetary projections\_ Baseline assumptions LT*
- The number of individuals entitled to state pensions for officers, military servants and judges will increase gradually, as currently only a small part of these persons have acquired the right to the social security pension. The average pension amount was calculated by indexing it to the rate of the productivity growth, since the amount of the present type of pensions depends on the earnings the person received before retiring.
- The number of the deprived persons will decrease markedly, as the majority of pension receivers are over the retirement age, and few new members appear. The amount of this pension is related to the amount of the basic pension and the assumption was made that this type of the state pension would be indexed to the inflation rate.
- The number of the receivers of the 1<sup>st</sup> and 2<sup>nd</sup> degree and social assistance pensions was kept stable on the level of 2004. This is based on the assumption that the legal basis will not change. Actually, however, the number of the recipients up to now has been increasing and the new legal acts in 2005 and 2006 replaced the eligibility conditions for these pensions. The amount of social assistance pension is related to the amount of the basic pension and the assumption on its indexation by the inflation rate is made.
- Annual inflation during the whole projected period equals to 2 %.
- The official rate of exchange 1 EUR= 3,4528 LTL was used in transforming the calculations into euros.

## 14.4 Methodology and Main Model Equations

### 14.4.1 Social insurance pension system equations

The social insurance pension system was modelled by using the pension model PRISM. The program is methodologically based on the “average person” parameter modelling. According to earnings, the contributors are divided into five groups, and each of these includes the calculated averages which are used for the calculation of the average pensions of each group. The framework of these groups is made up according to the status of the year 2004. The average contributions and pensions for each type of pensions is multiplied by the number of average persons in each group in order to produce the contribution revenues and pension expenditure at the aggregate level.

The primary program data and assumptions are formed in four blocks:

Assumptions	This input page contains economic assumptions such as GDP growth and inflation, demographic assumptions such as mortality and fertility rates, and financial assumptions such as the interest rate on government debt.
Policy	This input page contains policy options that affect the operation of the pension system, such as contribution rates, benefit formulas, retirement ages, and parameters that can be used to model a funded component.
Age-Sex Data	This input page contains age-sex specific data for the base-year, such as the initial age-sex structure of the population, the initial labour force participation rates and unemployment rates, and the initial age-sex distribution of pensioners.
Basic Data	This input page contains base-year pension expenditure data and base-year economic data such as GDP.

The basic macroeconomic parameters of the model are described by the following equations:

$$GDP (year) = GDP (year-1) * (1+inflation(year)) * (1+ real GDP growth(year));$$

$$Wage (year) = Wage (year-1) * (1+inflation(year)) * (1+ real wage growth(year));$$

$$Real GDP growth (year) = employment growth (year) + real wage growth (year);$$

In the PRISM model, demographic developments can be calculated within the model or external data can be incorporated. In these projections, the AWG data on the demographic parameters were used (*AWG Budgetary projections\_ Baseline assumptions LT, 2005-04-15*). In parallel with the fertility rates, life expectancy and migration rates provided by the AWG (file “The Budgetary Projection Exercise of DG ECFIN and the Ageing Working Group: Detailed Description of Agreed Underlying Assumptions and of Projection Methodologies“), the demographic projections were also calculated in PRISM model. The largest difference in population number between *AWG Budgetary projections\_ Baseline assumptions LT* and calculated in PRISM model were equal to 0,6 %.

The employment parameters are described by these equations:

$$Contributions = Employed * Average Wage * Contributors / Employed * Covered wage / Average Wage * Collection Rate * Contribution Rate;$$

$$Contributors (sex, age) = population (sex, age) * labour force participation rate (age, sex) * (1- unemployment rate (sex, age)) * coverage rate;$$

Coverage rate is the ratio of contributors to the total number of employed persons.

Pension amount can be calculated by establishing the pension indexation terms,

$$Pension (year) = pension (year - 1) * (1 + P1 * consumer price index) * (1 + P2 * real wage growth)$$

or by maintaining the replacement rate values. In the absence of legislative indexation rules, it is assumed that pensions will maintain the replacement rate (average pension to average gross wage) of the year 2004, i.e. the increase of pensions will match the increase of earnings.

#### 14.4.2 The equations of the state pension system

The state pension system consists of 8 types of pensions. The pensions of the President of the Republic of Lithuania and signatories were not included into the projections due to the small number of the recipients at present and in the future. The remaining 6 pension types may be divided into two groups: pensions depending on the former earnings of the pension recipient (officers and military servants, judges) and pensions not depending on the former earnings of the pension recipient (social assistance pensions, scientist's pensions, pensions of deprived persons, the 1st and 2nd degree pensions). In the projections, the pensions of the first group were indexed according to earnings growth

$$Pension (year) = pension (year - 1) * (1 + real wage growth)$$

and the pensions of the second group are indexed by the inflation rate

$$pension (year) = pension (year - 1) * (1 + cpi).$$

The rates of wage growth and inflation rate are taken from the 2005-04-15 *AWG Budgetary projections\_ Baseline assumptions LT*.

The number of pension receivers was calculated for each state pension recipient group separately. The pensions of officers, military servants and judges – according to the number of officers envisaged in these institutions during the period of 2005-2050 and the number of the state pension receivers corresponding thereto. The reduction in the number of the deprived persons regarding life expectancy of the present pension receivers is envisaged, the number of other types of pension receivers is forecasted to be of stable amount on the level of 2004.

### 14.5 The Results

The results cover the Social Insurance and the State Pensions and the 2<sup>nd</sup> tier pension funds, i.e. the mandatory pension system, for the period 2005-2050, with the main result variables of pension (and annuities) expenditure, the number of the recipients, contribution revenues and the number of contributors.

The results of the pension system modelling are provided in the files *Pension expenditure Model scenario LT* and *Pension expenditure Base scenario LT*. Part A of this standard form file prepared by AWG includes the standardised framework data. Part B provides the supplementary data that in Part A was not distinguished (the number of the state pension receivers) or not reflected (the funds of the State Budget intended for financing the state pension system).

These files covers the data on the pension systems: factual data for the years 2000-2003 by the Department of Statistics and projections for the years 2004-2050 that reflect the expenditure of the pension systems, the number of pensioners and contributions into the social insurance pension system. In this table the data on the total number of pensioners for 2003 as compared to the data for 2004 demonstrates a jump in the data. That is related to the fact that in 2000-2003 the factual number of the pension receivers, while in 2005-2050 the number of pensions is presented. The number of pensions is

higher than the number of pensioners because pensioners may receive several types of pensions at the same time. The pension system models used by us do not provide with the possibility to estimate such circumstances: the independent projections of the number of recipients of each pension type are calculated so that double counting of pensioners is excluded.

In the factual data on the number of pensioners and the expenditure, obsolete pension types that previously (before 1995) were awarded and paid for life time of the recipients, are presented. These include pension types such as social insurance loss of breadwinner pensions, long service pensions, compensations for extreme working conditions. In 2003, they amounted to 31,9 thousand LTL. These pensions were assigned to the old-age pension group in modelling the pension expenditure for the period of 2004-2050, disregarding a small bias due to the fact that these pensions are slightly lower than average old-age pensions.

In the social insurance pension system, widow's and orphan's pensions were modelled in relation to the average amount of old-age pensions (slightly lower) and were assigned to a single pension of widow's and orphan's pensions which were distributed to recipients according to the age distribution of recipients in 2004.

In the state pension system, social assistance pensions were modelled disregarding the age distribution of recipients. In the projections, the recipients are divided only into the groups of below and above the retirement age according to this age distribution in 2004.

## **15. Luxembourg**

Tom Dominique, General inspectorate of social security (IGSS)  
Raymond Wagener, General inspectorate of social security (IGSS)

### **15.1 Pension System Overview**

#### **15.1.1 Key features**

Different public instruments have been created in the Grand Duchy of Luxembourg to ensure that older people continue to receive an income. These instruments may be categorised as follows:

- the general scheme for the private sector,
- occupational schemes for the private sector,
- special schemes for the public sector, and
- social assistance.

Social assistance benefits for older people are not considered in the projection exercise. The overall expenditure related to these social assistance benefits is negligible in comparison to expenditures related to the general and special pension scheme benefits.

##### *General scheme*

The general pension scheme in Luxembourg comprises invalidity, retirement and survivor pensions.

The general pension scheme guarantees to its members a minimum personal pension, provided that they have belonged to the scheme for at least 40 years (total membership period). It is reduced by one fortieth of the amount of the personal pension for each missing year, down to an eligibility threshold of 20 years.

##### *Special schemes*

The public sector has two distinct pension schemes: the transitional special pension scheme for civil servants who joined the public sector before 31 December 1998 and the new special pension scheme for employees who entered the public service after 31 December 1998. The new scheme retains the status of a special scheme, but it is based on the same principles as the general scheme for the private sector, with the exception of no income ceiling for the assessment of contributions.

#### **15.1.2 Eligibility conditions**

##### *General scheme*

Any insured person who has reached his or her 65th birthday is entitled to a retirement pension, subject to proof of at least 120 months' compulsory and/or voluntary insurance.

Any insured person who has reached his or her 60th birthday is entitled to an early retirement pension, subject to proof of 480 months' compulsory and/or voluntary insurance, including credited non-contributory periods, provided that compulsory insurance accounts for at least 120 months of this total.

Any insured person who has reached his or her 57th birthday is entitled to an early retirement pension, subject to proof of 480 months' compulsory insurance.



## *Special schemes*

Eligibility conditions for the special schemes are similar to those of the general scheme.

### **15.1.3 Effective retirement ages**

Marked differences in retirement ages are to be found between recipients of invalidity pensions and recipients of normal and early retirement pensions. The average retirement age exceeds 60 for recipients of normal retirement pensions. By contrast, the average retirement age for recipients of invalidity pensions is about 50.

### **15.1.4 Main pension formulas**

#### *Pension levels under the general scheme*

The monthly retirement pension comprises the following main elements (amounts given refer to October 2005):

- one twelfth of the annual pro rata enhancement corresponding to 1.85% of the total of eligible pay and other contributory income,
- one twelfth of the annual incremental enhancement: for each full year of the recipient's life after his or her 55<sup>th</sup> birthday and for each year of contribution in excess of 38 years, the *pro rata* enhancement is increased by 0.01% up to a ceiling of 2.05% of total eligible pay and other contributory income,
- a flat-rate bonus calculated on the basis of the number of qualifying years (€353 for a working lifetime of 40 years), which include not only years for which compulsory contributions have been paid but also credited non-contributory periods such as years of study or years taken off to bring up children; the number of qualifying years is capped at 40, and
- one twelfth of the end-of-year allowance (€582) per annum for a 40-year working lifetime); the periods taken into account are the same as for the flat-rate bonus.

Should the assessed pension be lower than a fixed threshold after a 40-year career, the beneficiary is entitled to the minimum monthly pension of €1 353.

#### *Pension levels under the special schemes*

In the transitional scheme for civil servants and persons treated as such who were in post on 31 December 1998 or had been appointed by that date, the features of the old scheme have been preserved; in other words, the pension is calculated on the basis of the final salary earned by the public servant. For years of service after 1 January 1999, the reference replacement rate is lowered in stages from 83.33% to 72%. However, public servants who have completed a full service career of 40 years when they become eligible for retirement at the age 60 can enhance the value of their pension by 2.31% of their pensionable pay for each year of service beyond that age. In this way, they can obtain, at the age of 65 a pension corresponding to five sixths (83.33%) of their final pay, i.e. the maximum pension available under the old scheme. Pensions awarded prior to the entry into force of the new law were not affected by the 1999 reform.

As regards the amount of pension payable under the new special scheme, this is set in accordance with provisions similar to those that apply to the general pension scheme, the only difference relating to the income ceiling for the assessment of contributions.

### **15.1.5 Indexation of pensions**

Pensions are automatically adjusted to price evolution each time prices increase by more than 2.5%. In addition, pensions are adjusted every two years to the real wage evolution. Whereas price indexation is automatic, the decision on indexing pensions to wage evolution has to be approved by the parliament through a special law.

### **15.1.6 Recent reforms included in the projections**

The pension reform of 2002 led to several modifications to the general pension scheme. Flat-rate enhancements related benefits were increased by 11.9% due to a simultaneous increase of the reference amount (4.8%) and of the percentage of the reference amount forming the flat rate component (from 22% to 23.5%). Pro rata enhancements related benefits went up by 3.9% due to a rise of the accrual rate (from 1.78% to 1.85%). A staggered accrual rate was added, depending on age and the contribution history of the beneficiary beginning at the age of 55 with a contribution history of 38 years. Each additional unit (one per year of age and one per year of contribution) raises the accrual rate by 0.01 up to a maximum limit of 2.05. An extra “end of the year allowance” was added, which is however paid on a monthly basis (48 euros per month). Minimum pensions for widows were increased to the same level as personal minimum pensions.

### **15.1.7 Extent of the coverage of the pension schemes in the projections**

#### *General scheme*

The general pension scheme in Luxembourg is based on a system of compulsory insurance derived from the system introduced by Bismarck in Germany. Apart from civil servants and other employees of the government, local authorities, public institutions and the railways, which have their own statutory schemes, all those who are covered by pension insurance in Luxembourg belong to the general pension scheme.

Those people who belong to a pension scheme by virtue of working for an international body are not subject to the national scheme. The general pension scheme in Luxembourg comprises invalidity, retirement and surviving dependants' pensions.

#### *Special schemes*

The public sector comprises the civil service proper, Luxembourg National Railways, the local authorities and public institutions whose staff are subject to a special pension scheme that differs from the general scheme as defined in the Social Insurance Code.

### **15.1.8 Financing**

#### *General pension scheme*

The funding of the general pension scheme is based on a system of division into seven-year coverage periods with mandatory formation of a reserve fund exceeding one and a half times the total amount of annual expenditure. The contribution rate is set at the start of each seven-year period at such a level as to guarantee the funding of the scheme throughout the period. The rate, half of which is payable by the employer and half by the employee, amounts to 16% of assessable income. The State also makes a contribution, amounting to a further 8% of total assessable income. The State also intervenes in the payment of certain contributions and benefits.

## *Special schemes*

Pensions awarded under the special transitional scheme and the new special scheme are paid by the public treasury. The members of these schemes contribute at the rate of 8% of gross income. Pension funds serve to channel the expenditure and receipts of the special schemes.

## **15.2 Description of the Pension Projection Model and Its Base Data**

### **15.2.1 General description of the model**

A data-processing tool (SOBULUX, Social budget simulating software for Luxembourg) was implemented by the Inspection générale de la sécurité sociale (IGSS) in order to perform the financial projections of the pension schemes (general and special schemes). The model approach places the pensions in the context of the economic and demographic development. The model includes the following components:

- a demographic component projects the number of contributors and pensioners,
- an economic component computes productivity growth, needed to determine the real growth of wages and the adjustment of pensions to the evolution of living standards, and
- a financial component to evaluate receipts and expenditures of the system.

Basic dimensions of the model are age, sex and origin. Additional dimensions allow differentiate employment status (blue collar, white collar or civil servants) and pension type (disability, old age, early old age or survivor pension).

### **15.2.2 Type and structure of the model**

The model is based on a sequential approach.

A first module computes the number of contributors and pensioners. Fertility rate, life expectancy and migration are in line with EUROPOP2004 base scenario (AWG variant). Labour force participation rates are computed by applying entry probabilities to inactive population or exit probabilities to active population. Aging working group labour force participation rates assumptions are proxied for the projections. Due to the specific situation of the composition of the labour market, labour supply cannot be proxied by applying participation rates to resident population. Exogenous labour supply assumptions have to be used in order to compute cross border labour force by differentiation between total labour and national labour. The total number of civil servants is supposed to increase at the rate of 0.5% per year.

A second module computes the wage level. Age specific earning profiles are used to compute total economic wage levels. Some deviation from AWG assumption of identical wage level increase of economy and labour productivity are to be expected.

An additional module computes career elements of future beneficiaries, necessary to compute new pensions. The career module adjusts annually the compulsory periods and the total registered income. The average compulsory contribution period is supposed to increase for all socio-economic agents due to:

- complete careers of migrant and cross border in the long run, and
- increasing participation rates of resident females.

In the financial module pension expenditure is calculated on the basis of average pension. New pensions to be granted are computed on the basis of the available career elements and the pension formula. Pension levels are adjusted to real wage growth each two years.

Receipts are computed by applying actual contribution rates to wages. Rates are not altered over the projection period. The real yield is fixed at 3%. Receipts relating to the assets of the general pension scheme are calculated on the basis of the accumulated reserve of the scheme. Other receipts and expenditures are maintained proportional to the receipts from contributions and expenditures for pension benefits.

### **15.2.3 Data sources**

Projections are based on register data available in the Datawarehouse at the IGSS.

### **15.2.4 Assumptions and methodologies applied**

Due to the specific situation of the composition of the labour market, labour supply cannot be proxied by applying participation rates to resident population. Exogenous labour supply assumptions have to be used in order to compute cross border labour force by differentiation between total labour and national labour.

Age specific earning profiles are used to compute total economic wage levels. Some deviation from AWG assumption of identical wage level increase of economy and labour productivity are to be expected.

### **15.2.5 Adherence of underlying assumptions**

Fertility rate, life expectancy and migration are in line with EUROPOP2004 base scenario (AWG variant).

Ageing working group employment growth assumptions are used for the projections.

Labour force participation rates are computed by applying entry probabilities to inactive population or exit probabilities to active population. Ageing working group labour force participation rates assumptions are proxied for the projections.

Ageing working group labour productivity assumptions are used for the projections.

## **15.3 Results**

### **15.3.1 Brief overview of results**

The number of contributors to the general pension scheme will be around 512 000 in 2050 (29 000 for the special pension schemes) and by the end of the projection period foreign labour will be equal to national labour. Yearly net inflow of new cross-border commuters will decrease from around 6 000 persons in 2005 to below 4 000 during the period 2013-2019 to increase up to about 10 000 persons after 2030.

In 2050 about 315 000 pensions are to be expected for the general pension scheme (20 000 for the special schemes). Effective retirement age will pass on average from 57.1 in 2005 to 58.8 in 2050. The ratio between average gross pension and average gross income will increase from 48.5% in 2005 to 62.9% in 2050 for the general scheme. The general pension scheme's dependency ratio is supposed to pass from 40% in 2005 to 61.5% in 2050.

In the medium term financial surplus is guaranteed for the general pension scheme. On the other hand sustainability of the scheme is not projected to last until the year 2050. By 2024 the balance of the general scheme turns negative and the assets will be exhausted by 2035.

Regarding the special pension schemes, pension expenditure will diminish from around 2.4% of GDP in 2005 down to 1.6% around 2050.

### 15.3.2 Explanation of driving forces for results

Two main driving forces over the projection period can be identified:

- a steep raise in new pension beneficiaries, and
- a sensible increase of individual pension credits.

Up to the 2030 year the number of new pension granted will double. In addition, the levels of pensions granted will increase due to more and more complete careers of migrant and cross-border beneficiaries. Presently a large proportion of pensions is granted to persons with reduced careers in Luxembourg so that their pension level is reduced. Increasing career lengths of migrant and cross-border workers imply rising benefit levels on charge of the national pension system in the future.

### 15.3.3 Changes in comparison with the 2001 projection

The table below gives an overview of the major differences between the assumptions used in the 2001 projection exercise and those used in the 2005 round in order to assess the financial sustainability of the public pension schemes.

Key assumption	2001	2005
total fertility rates	1.8	1.8
life expectancy	80 for males and 85 for females by 2050	81.6 for males and 86.7 for females by 2050
net migration	2000 in the year 2000 to 9500 in the year 2050	2800 over the whole projection period
domestic labour input growth	1.9 in 2020, 1.7 ahead of 2030	0.8 in 2020, 1.3 ahead of 2030
labour productivity growth	2.1 over the whole period	1.7 ahead of 2030
wage increase	2.1 over the whole period	identical to labour productivity
interest rate	5% nominal	3% real
labour share in GDP	constant	constant
participation rates	equal participation rates for male and females ahead of 2025	differentiation by sex
potential growth	4% over the whole period	3% ahead of 2030
system dependency ratio (general scheme)	over 60% in 2034	over 60% in 2037
system replacement rate (general scheme)	between 42 and 45% over the whole projection period	increase from 48.5% in 2005 to 62.9% in 2050

Due to the evident differences in a large number of key assumptions comparison is fairly impossible to achieve. In addition the pension reform in 2002 was not yet reflected in 2001 projection exercise. Finally the 2001 projection did not cover pension expenditure for special schemes.

## 15.4 Differences Between National Projections And AWG Projections

Differences between national projections and AWG projections result mainly from two causes:

- national scenarios are based on more realistic short and medium term labour growth assumptions, and
- national scenarios use more adequate labour exit assumptions.

The AWG exercise is focused on common population projections and macroeconomic assumptions aiming to produce a report assembling comparable results for all Member States. In such framework the specific situation of Luxembourg, characterised by a small open economy with about 40% of non resident labour, is not adequately modelled. The AWG methodology applies a steep reduction in labour growth in the medium term, decreasing from 2.5% in 2006 to 0.7% in 2018, followed by a subsequent increase in labour growth up to 1.3% in 2030. Ahead of 2030, labour growth rate is fixed at 1.3%. National projections are based on a more realistic medium term evolution of labour growth assuming maintaining labour growth rate equal to 2.5% up to the year 2012, followed by a smooth transition to the long term growth of 1.3% in 2030. The national approach is closer to the observed short term development of labour growth. In addition, national assumptions are based on a linear decrease of labour growth between 2012 and 2030 which seems more appropriate, by avoiding the artificial downward trend of in the medium term and by applying identical transition rules as applied in the AWG methodology.

AWG labour exit rules do not adequately take on board the medium and long term dynamics related to the eligibility criteria for pensions of the national pension system. National labour force participation rates are computed by applying entry probabilities to inactive population or exit probabilities to active population. In the long run it is assumed that exit probabilities of the various socio-economic agents converge to those currently observed for the resident male white collar workers by 2050. This choice is justified by the fact that with increasing completeness of the careers, especially for women, migrants and cross-border commuters, and the delayed start of professional activity due to extended schooling periods, withdrawal from the labour market via the mechanism of the early retirement at age 57 (with as condition 40 years of compulsory periods) will be less and less applicable in the future.

## 16. Hungary

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### 16.1 Overview of the Hungarian Pension System

#### 16.1.1 The structure of the pension system

Since the 1997 pension reform the mandatory pension system consists of two pillars. The first pillar is a uniform publicly managed, pay-as-you-go financed, defined-benefit, social security pension scheme. It provides earnings-related old-age, disability and survivors benefits, which are financed mainly from separate pension contributions.

The second pillar of the compulsory pension system is operated by fully-funded, defined contribution, private pension funds (currently 18 in number). The funds accumulate and invest contributions paid by their members onto their individual accounts. At retirement the accumulated sum increased by investment yield is converted into a life annuity, which can be provided by either the fund itself or a life insurance company. Second pillar funds are of a personal rather than occupational nature.

The mandatory system covers all persons who are engaged in any kind of gainful employment (ie. the employed and the self-employed, with almost 100 percent coverage) as well as recipients of unemployment and certain child-care benefits. Persons entering the labour market for the first time are automatically enrolled into the new two-pillar scheme, whereas those who had already acquired pension rights before 1998 could voluntarily opt for the new system at the time of its inception (about 50 percent of the labour force did so). Those who did not join the two-pillar system remained in the pure pas-as-you-go scheme, which is identical with the first pillar of the new system except for the level of contributions and benefits. Currently about 62 percent of the labour force are members of the two-pillar scheme.

The level of total contributions payable to the compulsory system (whether divided between the two pillars or paid only to the first one) is stipulated by law. Members of the two pillar system pay contributions at the same rate as members of the pure PAYG scheme do. However, participants of the two-pillar system pay part of these contributions into the funded pillar (as from 2004, 8% out of the overall 26.5%). The assessment base is entirely the same for both types of contributions. As from 2007 and 2009, the rate of contribution payable by the employer (currently 18 percent) will be reduced by 1 percentage point, respectively, thus bringing down the overall rate to 25.5 and then to 24.5 percent (the share going to the funded pillar will not change).

In accordance with their reduced PAYG contribution, members of the mixed system will only be entitled to a reduced, 75 percent benefit level from the public scheme. In their case, however, social security pensions will be supplemented by benefits from the mandatory private pillar.

The social security pension has a minimum amount which is indexed in January each year in line with general indexation rules (its amount is HUF 25 800 in 2006). Those who have reached the standard retirement age but are not eligible for a social security pension and have no other source of sufficient income can apply for an income-tested old-age social allowance (*időskorúak járadéka*). This allowance is financed from general budget revenues and forms part of the social assistance system.

There exists various forms of voluntary supplementary pension insurance (voluntary mutual pension funds, pension savings accounts, life insurance).

## **16.1.2 Eligibility requirements**

The standard retirement age for men is 62, for women currently 60 but gradually increasing to 62 by 2009. 20 years of service are needed for a full old-age pension and 15 years for a partial old-age pension (to be abolished by 2009). However, women can retire at 57, men at 60 years of age at the earliest if they have at least 33 years of service. The amount of the benefit is only reduced if the claimant has less than 38 years of service. However, as from 2009 this early retirement option will be tightened: 59 years of age and 37 years of service will be needed for a reduced and 40 years of service for a full benefit. Persons employed in certain harmful occupations can gain extra entitlements to earlier retirement. In 2004, the average effective retirement age was 59.7 years in the case of men and 57.3 years in the case of women (for old-age and similar pensions).

## **16.1.3 The method of benefit calculation**

The amount of the social security pension benefit is the product of the reference wage (*nyugdijalap*) and a multiplier reflecting the length of completed service years. For the calculation of the reference wage before 2013, all earnings on which pension contribution was paid from 1988 onwards have to be taken into account (under a ceiling specified for each year.) For each year, gross earnings are reduced with the computed amount of personal income tax (ie. not the amount of tax actually paid), with certain corrections laid out in a government regulation. Earnings net of computed tax have to be revalued with the growth of nationwide net average earnings up to a point two years before retirement.

The amount of average revalued monthly earnings is then corrected by a degressive scale, ie. parts of the average earning that fall into higher income brackets are not considered fully. (In 2006, for example, average earning can only be taken fully into account up to HUF 174 thousand; part of the earning between HUF 174 thousand and 198 thousand can be considered at 90 percent only, between HUF 198 thousand and 223 thousand at 80 percent, etc. This degressivity is gradually being phased out.)

Finally, the reference wage calculated that way is multiplied by a rate pertaining to the number of service years the person has completed (for example, this rate is 80 percent for 40 service years). If someone retires after the standard retirement age and earns further service periods, he will be entitled to a bonus of 0.5 percent of the pension benefit for each additional 30 day periods.

Disability pensions are calculated similarly to old age benefits, but multipliers reflecting the length of service period are higher at age groups where the length of service could not be long enough to ensure a decent benefit level. There exist three disability groups, according to the severity of disability. The amount of disability pension for fully incapacitated people is higher by 5 or 10 percent (depending on whether the person can care for himself or not) than that for those not fully disabled. Survivors' benefits are calculated on the basis of pension that the deceased spouse/parent has received or would have received.

Those who received pension in the previous year are entitled to a so called 13th month benefit, whose amount is 75 per cent of the monthly pension in 2005, and 100 per cent of the monthly pension from 2006 onwards.

## **16.1.4 Indexation**

Pensions granted before the beginning of the year are indexed by 50 per cent net wages and 50 per cent inflation in January each year. A supplementary increase is carried out in November if macroeconomic developments show a diversion from the planned values.



## 16.1.5 Taxation

Currently, social security as well as mandatory private pension benefits are exempt from taxation. Contributions are deducted from the net (after tax) income. As from 2013, however, the method of first pillar benefit calculation will change. From that date on, the pension base will be calculated from gross earnings, ie. no reduction by income tax will be done any more. Accrual rates will change to a linear scale where each additional service year results 1.65 per cent (or in the case of members of the two-pillar scheme, 1.22 per cent) old age benefit. According to plans, pension benefits will simultaneously become taxable (both from public and private mandatory pillar).

## 16.1.6 Calculations for the private mandatory pillar

In the case of mandatory private pension funds, an average of 93.5 per cent of contributions are accredited to the member's individual account, while the remaining part is used up for operational purposes. There is no fee for the conversion of accumulation into annuity since that cost is covered from the operational deductions. Asset management fees are deducted from gross returns and amounted to an average of 0.97 per cent of assets in 2004. Annuities must be indexed in line with benefits from the first pillar. The technical rate shall not exceed the rate of benefit indexation by more than 1.5 percentage points. For the purpose of benefit calculations, unisex mortality tables must be applied. Members can choose from four types of annuities; for the purpose of projections a single life annuity was assumed.

## 16.2 Description of Modelling Techniques and Use of Assumptions

### 16.2.1 Underlying assumptions

The model uses assumptions on demographics, labour force and productivity as agreed in the Ageing Working Group. The demographic assumptions are identical to Eurostat's EUROPOP2004 projections for Hungary. According to that, fertility rates improve over the projection period and will be close to the EU average as from 2030. Hungary will experience the largest increase in both male and female life expectancy in the EU. Furthermore, it is projected that the net flow of immigrants will account for a greater percentage of the Hungarian population and approach the EU average of 2.2 per cent. Taken together, the above assumptions imply that Hungary's population will decline by 12 per cent over the period 2004-2050. The structure of the population will change considerably: the number of elderly as compared to the number of working age population will more than double during this period.

**Table 16 - 1 Demographic assumptions in the Hungarian projection**

		2004	2010	2020	2030	2040	2050
<b>Fertility rate</b>		1.3	1.3	1.5	1.6	1.6	1.6
<b>Life expectancy at birth:</b>	Male	68.5	70.1	72.8	75.2	77.0	78.1
	Female	76.8	78.0	79.8	81.5	82.6	83.4
<b>Net migration as % of population</b>		0.1	0.1	0.1	0.2	0.2	0.2
<b>Total population (mill)</b>		10.1	10.0	9.7	9.5	9.2	8.9
Population (15-64)		6.9	6.9	6.3	6.0	5.7	5.2
Population (65+)		1.6	1.7	2.0	2.1	2.3	2.5
<b>Old age dependancy ratio (%)</b>		22.6	24.3	31.2	35.1	40.3	48.3

With regard to the evolution of the labour force, the projections based on the age-cohort methodology indicate that between 2003-2050, the participation rate will increase by 5.9 per cent which is equal to the EU-wide average change. In the same period, the employment rate will improve by 6.3 percentage points which, however, falls behind the EU average. The reason lies with the methodology of AWG macroeconomic projections which allows for a small decrease in unemployment rate where the starting level of this rate is relatively moderate (as in Hungary, compared to the majority of other

Member States). Estimates on the labour productivity growth based on the 'production function approach' show a steadily decreasing growth rate which is the result of the decelerating dynamics of capital deepening (the ratio of capital stock to labour input) and an initially increasing but later (as from 2030) decreasing TFP growth rate (total factor productivity). Wage growth is assumed to equal productivity growth.

**Table 16 - 2 Macroeconomic assumptions**

	2004	2010	2020	2030	2040	2050
Population growth (15-64)	-0.1	-0.4	-1.2	-0.2	-1.1	-0.6
Employment growth	1.4	0.2	-0.5	-0.6	-1.1	-0.6
Participation rate (15-64)	61.1	63.8	67.5	67.8	65.6	66.4
Employment rate (15-64)	57.7	60.8	64.3	64.6	62.4	63.2
Unemployment rate (15-64)	5.5	4.8	4.8	4.8	4.8	4.8
Real GDP growth rate	3.9	3.3	2.5	2.1	0.8	1.1
Labour input growth rate	0.6	0.2	-0.5	-0.6	-1.1	-0.6
Labour productivity growth rate	3.2	3.1	2.9	2.7	1.9	1.7
Real interest rate	3.0	3.0	3.0	3.0	3.0	3.0
Inflation rate	2.0	2.0	2.0	2.0	2.0	2.0

For a detailed discussion of the underlying assumptions, the reader is referred to the Economic Policy Committee's background note<sup>114</sup>.

## 16.2.2 Coverage of the projections

The following table lists public schemes covered in the pension projections.

**Table 16 - 3 Public pension schemes covered in the projections**

Schemes	Coverage in the calculations
1. all social security pensions (old-age, disability, survivors', from both social security funds: Pension Insurance Fund and Health Insurance Fund)	100 %
2. pensions financed from the central budget (miners' early pensions, pensions for the armed forces, pensions of artists)	100 %
3. early retirement schemes financed partly by the employer up to the standard retirement age	100 %
4. accident allowance [ <i>baleseti járadék</i> ] (financed from the Health Insurance Fund)	100 %
5. pension-like regular social allowances (disability allowance [ <i>rokkantsági járadék</i> ], allowance for persons with reduced working capacity [ <i>megváltozott munkaképességűek járadékai</i> ], allowance for those with impaired health [ <i>egészségkárosodási járadék</i> ], allowance for agricultural workers [ <i>mezőgazdasági járadék</i> ], supplementary allowance for spouses [ <i>házastársi pótlék</i> ])	ca. 70 %

It is important to note that the accident allowance (No. 4 in the table above) and pension-like regular social allowances (No. 5) are not pensions in the strict sense of the word. However, they are granted for an indefinite period and normally paid until death of the recipient and they are often treated similarly to pensions (eg. in the case of regular indexation). Certain types of these regular social allowances (namely, the compensational supplements for politically persecuted persons [*politikai rehabilitációs és más nyugdíjkiegészítések*], handicap support [*fogyatékosági támogatás*] and blind

<sup>114</sup> [http://www.europa.eu.int/comm/economy\\_finance/epc/epc\\_sustainability\\_ageing\\_en.htm](http://www.europa.eu.int/comm/economy_finance/epc/epc_sustainability_ageing_en.htm)

persons' allowance [*vakok személyi járadéka*]) were left out from the projections due to lack of disaggregated data (these items amounted to less than 0.2 percent of GDP in 2004)<sup>115</sup>.

The projection of public revenues covers only pension contributions from employers and employees that go to the public Pension Insurance Fund (*Nyugdíjbiztosítási Alap*). A large part of disability pensions (those paid below standard retirement age to the not fully disabled) are financed from general revenues of the public Health Insurance Fund and there exist no separate contribution for these expenditure items. Therefore, no projection is made for the revenue side of these expenditure items. The same applies to miners' pensions, pensions of the armed forces, artists' pensions and all pension-like regular social allowances since all these are financed from general tax revenues of the central government budget. As a result, spending and revenue projections are incommensurate.

Overall projections for the revenues and expenditures of the private mandatory pillar are included (coverage is 100 %).

### **16.2.3 General characteristics of the model**

The model used for the projections has been constructed by independent actuaries commissioned by the Ministry of Finance. The model performs deterministic calculations with the use of micro-simulation technique. The model is programmed in Visual Basic with input and output in Excel. The base year is 2004.

#### **16.2.3.1 Input data**

Most input data come from the Central Administration of National Pension Insurance (*Országos Nyugdíjbiztosítási Főigazgatóság*) which is in charge of calculating and disbursing social security pensions and some other regular allowances. The following inputs were used in the projections:

- the number of pensioners disaggregated by type of benefit (allowance), age, gender and source of financing;
- the number of newly granted pensions (allowances) broken down by type of benefit, age, gender and source of financing;
- average main benefit and total (ie. main + supplementary) benefit broken down by type of main benefit (allowance), age and gender;
- average newly granted pension broken down by type of benefit, age and gender.

The model uses the following inputs as well:

- number of members of the private mandatory pillar, disaggregated by age and gender (source: Hungarian Financial Supervisory Authority – *Pénzügyi Szervezetek Állami Felügyelete*);
- average accrued contributions of members of the private mandatory pillar, broken down by age and gender (source: HFSA);
- average gross and net wage, broken down by genders (source: Central Statistical Office – *Központi Statisztikai Hivatal*).

#### **16.2.3.2 Method of calculation**

The model creates categories of pensioners with the same characteristics (ie. persons of the same age and gender receiving the same type of benefit) and then calculates the projected number beneficiaries in each category and their average amount of pension benefit. The number of new pensioners of a

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<sup>115</sup> The term 'public pension' in the present note refers hereinafter to all schemes included in the table on this page.

specific age and gender comes from the product of the respective retirement rate and the age and gender specific labour supply in each year. Retirement rates were computed on the basis of past time series disaggregated by type of benefit and brought in line with the AWG labour supply projection year by year (broadly, they are adjusted to ensure consistency with the expected prolongation of labour market withdrawal as it is assumed in the AWG labour prognosis in line with the expected effects of legislated pension reform elements).

The number of completed service years is not taken directly on board in the projections but it is indirectly reflected in the average amount of a new retiree's benefit of a given age (those retiring later in their life generally receive higher benefits due to a longer contributory period).

The calculation of average newly granted benefit is based on past data decomposed by age of retirement and gender. The average level of newly granted benefits grows year by year in line with national average wage increase observed two years earlier (the same rate that is used for the revaluation of past earnings for the purpose of benefit calculation). Benefits granted earlier are indexed according to law (50 % wages + 50 % prices).

In the case of widow(er)s' benefit, the model calculates the number of newly granted benefits, the average age at which the disbursement begins and the average level of the newly granted benefits, all of these broken down by genders. As data are not available on the distribution between temporary and permanent widow(er)s' benefits, the model assumes conservatively that all of these pensions are paid until the death of beneficiary. The calculation of orphans' benefit is similar to that of the widow(er)s' pensions with the exception that it is disbursed until the age 20 on average. The amount of the average newly granted survivors' benefit is linked to a representative value of the average underlying benefit (old age or disability).

The spending of a given category of pensioners is estimated by multiplying the number of pensioners by the average amount of benefit. Number of outflows from the stock of pensioners is based on mortality rates.

Net benefits are calculated from gross benefits, after the deduction of an average 15 per cent tax rate. Taxation of pensions will begin in 2013; up to that date net and gross amounts are equal. In 2005, the average income tax burden was 21.6 per cent, but the assumption of 15 per cent can be considered as prudent given the progressivity of the personal income tax.

The projection of public pension spending is disaggregated for the sake of reporting into two broader categories: old age and early pensions on the one hand, other pensions on the other hand. All beneficiaries who receive pensions that are classified in the Hungarian system as old age benefits are included in the first category, regardless whether the recipient has already attained standard retirement age or not. All other beneficiaries are classified according to their respective age: those above standard retirement age are counted in the line 'old age and early pensions' whereas those below retirement age in the line 'other pensions'.

The calculation of the second pillar benefit is done by dividing the average accumulation of a fund member with given specificities (age, gender, year of retirement) by an annuity factor. In computing the annuity factor, indexing provisions as required by law and prospective mortality rates of EUROSTAT have been taken into account. Technical rate is assumed to be equal to the rate of investment return.

Further features of the model:

- The model calculates number of pensions as well as number of pensioners.
- The gradual introduction of the 13th month benefit has been incorporated in the projections.
- The legislated reduction in the rate of employers' contribution in 2007 and 2009 have been taken into account.

- The number of private funded pillar members grows each year with the number of new labour market entrants as it is mandated by law.

### 16.3 Results of the Pension Projections

Pension expenditure in Hungary is projected to rise significantly over the period 2004-2050. Gross public pension spending will go up by about 60 per cent to reach 17.1 per cent of GDP in 2050. The rise in net expenditures is of a smaller extent but still marked: it will increase to 14.6 per cent of GDP till the end of the projection horizon. The reason of this divergence between net and gross spending is explained by the foreseen change in benefit calculation and the introduction of taxation. As from 2013, social security benefits will be calculated on a gross basis and benefits will become taxable.

The structure of spending is projected to change, with proportions shifting towards old age and early pensions. The expenditure on pensions under standard retirement age ('other pensions') are set to decrease even in absolute terms. Gross benefit expenditure of the private mandatory pillar will amount to 3.1 per cent of GDP in 2050.

**Table 16 - 4 Pension expenditure and contribution revenues in the baseline projection, % of GDP**

	2000	2004	2010	2030	2050
<b>Expenditures (gross)</b>	<b>8.9</b>	<b>10.4</b>	<b>11.1</b>	<b>13.9</b>	<b>20.3</b>
Public pension system	8.9	10.4	11.1	13.5	17.1
Private mandatory pillar	0.0	0.0	0.0	0.5	3.1
<b>Expenditures (net)</b>	<b>8.9</b>	<b>10.4</b>	<b>11.1</b>	<b>12.3</b>	<b>17.3</b>
Public pension system	8.9	10.4	11.1	11.9	14.6
- old age and early pensions	7.1	8.3	9.1	10.8	13.5
- other pensions	1.8	2.1	2.1	1.1	1.1
Private mandatory pillar	0.0	0.0	0.0	0.4	2.7
<b>Revenues</b>	<b>7.4</b>	<b>8.8</b>	<b>8.8</b>	<b>9.3</b>	<b>9.6</b>
- social security pension contributions	6.7	7.7	6.8	6.6	6.8
- private mandatory contributions	0.7	1.0	2.0	2.7	2.8
<b>Assets of private mandatory pillar</b>	<b>1.0</b>	<b>4.0</b>	<b>13.2</b>	<b>50.0</b>	<b>73.7</b>

Decomposing the results further<sup>116</sup> reveals that much of the projected increase in public pension expenditure can be attributed to unfavourable demographic developments. The ratio of population aged over 62 to working age population will more than double in the coming decades. The improved level of employment and the tightened eligibility criteria (eg. the increase of the standard retirement age until 2009 and the tightening of early retirement options) will have some easing effect but will not be able to offset the adverse impacts of demographic trends. Furthermore, the level of average pension benefit will remain more or less stable despite the new indexation rule and the growing share of private scheme beneficiaries who receive a reduced pension from the social security pillar.

<sup>116</sup> The decomposition was carried out using the following equation:

$$\frac{PensExp}{GDP} = \frac{Population(62+)}{Population(15-61)} * \frac{Population(15-61)}{Employed} * \frac{Pensioners}{Population(62+)} * \frac{PensExp / Pensioners}{GDP / Employed}$$

**Table 16 - 5 Factors driving net public pension expenditure**

		<b>2004</b>	<b>2050</b>	<b>Change</b>
<b>Net public pension expenditure / GDP</b>		10,4%	14,6%	40,5%
<b>Dependency effect</b>	Population over 62 / Population between 15-61 years of age	28,6%	59,2%	107,4%
<b>Employment effect</b>	Population between 15-61 years of age / Number of employed persons	164,4%	144,1%	-12,4%
<b>Eligibility effect</b>	Number of pensioners / Population over 62 years of age	162,3%	121,2%	-25,3%
<b>Benefit effect</b>	Average net social security benefit / GDP per employed persons	13,6%	14,1%	3,5%

The rising level of average benefit can be explained by the fact that replacement rates of newly granted benefits went up considerably in recent years (mainly due to the delayed revaluation of past earnings in the calculation of pension base). The composition of pensioners implies that each year the cost of high newly granted benefits outweighs the foregone burden of deceased recipients who had relatively low benefit level and who were less in number. As the following table presents, the level of average old-age benefit level is projected to increase significantly over the projection period. In 2050, the level of average total benefit in the two-pillar system will be approximately the same as that in the pure pay-as-you-go scheme.

**Table 16 - 6 Evolution of the benefit ratio (average net benefit/average nationwide wage), %**

	<b>2004</b>	<b>2050</b>	<b>Change</b>
<b>Public pensions</b>	60.8	60.8	0.0
Old age and early pensions	67.7	63.5	- 6.2
Other pensions	43.1	40.2	- 6.8
<b>Public + mandatory private pillar old age</b>	67.7	76.1	+ 12.4
Members of the pure PAYG	67.7	76.1	+ 12.4
Members of the two pillar scheme	-	76.0	-
PAYG pillar	-	57.1	-
Private pillar	-	19.0	-

Revenue projections indicate that social security pension contribution revenues will decrease by about 1 percentage point in proportion to GDP as a result of the planned reduction of employer's contribution rates in 2007 and 2009, the growing share of private pillar participants and the diminishing number of employed persons. Combined with growing expenditures, this will increase the already existing financing gap.

It is important to note that the results presented in this section do not incorporate the effects of legislative changes that were adopted by the Parliament after 1 December 2005.

## 17. Malta

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### 17.1 Pension System Overview

The current pension scheme in Malta is based on the Social Security Act, Chapter 318 of the Laws of Malta. The Act provides for two basic schemes. One Scheme is known as the Contributory Scheme, and the other as the Non Contributory Scheme. In the Contributory Scheme, the basic requirement for entitlement is that specific contribution conditions are satisfied. In the Non Contributory Scheme, the basic requirement is that the conditions of the means test are satisfied.

The *Non Contributory Scheme* has made possible the allocation of more than one benefit at the same time, thus providing simultaneous coverage in those cases where more than one contingency is present. Through the process of targeting, this scheme has succeeded in the provision of additional assistance to certain specific categories such as, in the case of persons with a disability, in the case of single parents, as well as in the case of the family as a single unit.

The *Contributory Scheme* is universal since it practically covers all strata of the Maltese society. The contributory scheme in Malta is a system where an employee, self-occupied or self-employed person pays a weekly contribution as laid down by the Social Security Act.

Contributions are payable by all gainfully occupied persons between the age of 16 and the age of their retirement. The retirement age under the Social Security Act is 61 years for men and 60 years for women. Employment between the ages of 61 and 65 years is possible without prejudicing one's pensions rights and without the need to pay contributions subject to an earning ceiling pegged to the minimum wage. The minimum wage ceiling is subsequently removed at age 65 and no contributions are due.

The scheme allows for different types of contributions in order to extend coverage to all types of persons in employment. Employed persons pay Class One contributions, while the self-employed pay Class Two contributions. *Class One contributions* imply that any person employed under a contract of service in Malta is considered to be in insurable employment and subject to the payment of these contributions. For each person, a tripartite contribution is payable: the employed person, the employer and the State each pay 10 per cent of the basic salary of the employee; with the contribution capped to a maximum wage ceiling. The rate of *Class Two contributions* is equally shared by the State and self-employed persons, whereby the self-employed pays 15 per cent and the State pays 7.5 per cent of their annual income.

The following categories of persons are statutorily exempt from the payment of a *Class Two contribution*:

- Persons in receipt of full-time education or training.
- Non-gainfully occupied married persons.
- Persons in receipt of a pension in respect of widowhood, invalidity or retirement or persons in receipt of a Parent's Pension.
- Persons in receipt of non-contributory Social Assistance or a non-contributory pension.

Pensions in Malta are determined by a formula based on the average of the best three consecutive calendar years out of the last ten years basic wages in the case of employees; and the average of the last ten years' net income in the case of self-employed persons. The pension amounts to two-thirds of this average wage or income. When a pensionable income is calculated the salaries/net incomes are

taken at value on the date of assessment. The salary for a particular year would be updated with the relative cost of living increases awarded generally after the particular year up to the date of assessment. The pensionable income will be the average of the three 'updated' years. In the case of a self-employed or self-occupied this updating is carried out in the same way for the whole ten years. Each year is 'updated' by cost of living increases as long as the income declared for the year being updated is greater than the previous year by not less than the cost of living increase for the particular year being considered. The full weight of a pension is payable to a person who has paid or has been credited with a yearly average of 50 contributions over a 30 year contributions period. Fewer years of contribution result in linearly reduced pensions, with the minimum years of contributions paid required to collect a pension set at nine years. Following the receipt of the pension, the pension income is subsequently increased by a cost of living increase statutorily provided by Government on an annual basis.

The pension is payable to a person who is not in receipt of a Service Pension from an Employer. The rates applicable are four fifths of the National Minimum Wage in the case of any other person. The maximum rates paid as from 1 January 2005 where a pensioner has an average contribution record of 50, are Lm46.56 per week for a man maintaining a wife, and Lm40.28 per week any other person. This can be considered to be the minimum entitlement of a person who is not in receipt of a service pension as defined by law.

**Crediting of contributions** is allowed during certain contingencies, mainly:

- A widow, where such widow is not gainfully occupied for any period during which she does not remarry.
- An ex-member of the Malta Police Force or the Armed Forces of Malta who retires on a service pension on completion of the full service prior to reaching pension age, for any period during which he or she is not gainfully occupied and has not yet reached pension age.
- A person who goes abroad as a volunteer worker on projects in the areas of human welfare and development and environmental protection for any period he or she is performing such volunteer work and has not yet reached pension age subject to statutory defined criteria.
- A person who is entitled to sickness, injury, or unemployment benefits or to an Invalidity Pension.

Contributory and non-contributory benefits are described as follows.

### Contributory Schemes

<b>1. Short-term Benefits:</b>	
Unemployment benefit	i. Maximum entitlement for 165 days
Special unemployment benefit	ii. As in (i) but at a higher rate. Applicable to persons who would qualify for non-contributory Social Assistance.
Sickness benefit	iii. Entitlement 156 days but may in certain cases be extended to 312 days.
Injury benefit	iv. Payable for injury at work or contraction of industrial disease. Entitlement up to 12 months.
<b>2. Long-term Benefits:</b>	
Disablement Pension	v. Payable if injury or disease caused or contracted whilst at work is considered to cause a loss of physical or mental faculty calculated between 20% and 89%. Rates awarded according to degree of Disability. Where the degree of disablement is assessed at 90% and over, the person concerned is automatically awarded an Invalidity Pension at the full rate.



Invalidity Pension	vi. Payable to persons deemed permanently incapable for suitable full-time or regular part-time employment. Various rates according to different conditions.
Retirement Pension	vii. Payable to persons on reaching pension age (61 in the case of males and 60 for females). There are various rates and types of categories according to various statutory conditions. Rates vary according to different conditions.
Two-Thirds' Pension	viii. Earnings-related pension payable to persons who have retired after January 1979. This scheme basically provides for a pension equivalent to two-thirds of the insured person's pensionable income. There are applicable maximum and minimum rates. The two-thirds proportion may vary where the insured's contribution average is less than 50.
Widows Pension	ix. Payable to widows, irrespective of age, who are not gainfully occupied or who are carrying out gainful activities but have the care and custody of children under 16 years of age. Rates may vary according to conditions outlined in the Social Security Act.
Survivors' Pension	x. Earnings-related pension payable to a widow whose husband was entitled to a Two-Thirds' pension or whose husband would have been entitled to a pension had he reached retiring age at the time of his death.
Widowers' Pension	xi. Payable to Widowers' on the same conditions as that applicable to a female widow for a Widows pension. Rates equivalent to those of Widows' Pension.
Orphans' Allowance	xii. Weekly allowance paid to a guardian of a child or children who are under 16 years of age.
Orphans' Supplementary	xiii. Weekly pension paid to a guardian of a child or children whose age lies between 16 and 21 years and who are unemployed or employed but earning less than the Maltese National Minimum Wage.
Parents' Pension	xiv. Payable to a parent of an employed or self-occupation person, who died as a result of industrial disease or accident at work and whom, prior to death of son or daughter, depended solely on their financial resources for livelihood.
<b>3. Lump-sum Payments:</b>	
Marriage Grant	xv. One-time payment payable upon marriage to persons normally resident in Malta.
Re-Marriage Grant	xvi. Payable to a widow who remarries and hence forfeits her right to a widows' pension payment equivalent to one year's pension.
Disablement Gratuity	xvii. Payable to a person following injury at work and where the degree of disability is estimated as being between 1% and 19%.

## Non-Contributory Schemes

<b>1. Pensions</b>	
Age Pension	xxviii. Payable to citizens of Malta over 60 years of age.
Pension for the Visually Impaired	xix. Payable to a citizen of Malta over 14 years of age whose visual activity has been certified by an ophthalmologist to be so low so as to render such persons unable to perform any work for which eyesight is essential.
Pension for Persons with a Disability	xx. Payable to citizens of Malta over 16 years of age. Various types of handicaps are listed under the Social Security Act.
Carers' Pension	xxi. Payable to single or widowed citizens of Malta who are taking care on a full-time basis of a bed-ridden or wheelchair bound near relative.
Social Assistance	xxii. Payable to heads of households and who is either unemployed or seeking employment and where the relative financial means falls below that established by the Social Security Act. Payable also to single or widowed females who lack financial resources and who are caring for an elderly or physically/mentally handicapped relative on a full-time basis.
Social Assistance Allowance	xxiii. Payable to inmates of Government recognised Centres for the rehabilitation of drug addicts and inmates of state-owned institutions for the elderly who are below the age of 60.
Emergency Assistance	xxiv. Granted to a female who is or has been rendered destitute by the head of household to the extent that she becomes an inmate of any institute for the care and welfare of such persons. This benefit is payable by the Department of Welfare.
Sickness Assistance	xxv. Payable to persons suffering from a chronic disease or condition that requires a special diet.
Tuberculosis Assistance	Payable to head of household or any member of the household suffering from or has, within the last 5 years, suffered from Tuberculosis. This assistance is not subject to a means test.
Leprosy Assistance	xxvi. Payable to head of household or any member of the household who is receiving treatment for leprosy. It is not means tested.
Milk Grant	xxvii. Payable to head of household receiving Social Assistance when he or any member of the household has the care or custody of a child under 40 weeks of age requiring to: <ul style="list-style-type: none"> <li>• either be weaned or,</li> <li>• is losing weight in spite of being breast fed or,</li> <li>• is a member of a household receiving Tuberculosis Assistance.</li> </ul>
Free Medical Aid	Payable to a person who on account of disablement, sickness, or disease (and who is not hospitalised), is in need of medical, surgical or pharmaceutical aid. Means-tested except in cases where the person is suffering from tuberculosis, leprosy, poliomyelitis or diabetes mellitus or other chronic diseases outlined in the Social Security Act.

**Family Allowances & Maternity Benefits  
(Also ‘Non-Contributory’ Benefits)**

Children’s Allowance	xxviii.	Payable to locally residing female citizens of Malta who have the care of children under 16 years of age, and where the household income does not exceed a stipulated amount.
Special Allowance	xxix.	Payable to locally residing female citizens of Malta who have the care of a child who is 16 years of age or over and who is either still at school or registering for employment. This is also means-tested.
Disabled Child Allowance	xxx.	Payable to locally residing citizens of Malta who have the effective custody of a child suffering from cerebral palsy or severe mental subnormality or is severely handicapped or have a child under 14 years of age who is blind. If the two parents are gainfully occupied, only the highest income will be considered as long as this does not exceed a stipulated amount.
Child Raising Allowance	xxxi.	Payable to recognised institutes for the care of children and to foster parents. The children are to be resident at a recognised institute and young persons or living with foster parents.
Maternity Benefit	xxxii.	Payable to local residing pregnant citizens of Malta in respect of the last 8 weeks of pregnancy and the first 5 weeks after childbirth. Only payable if the female is not entitled to maternity leave from her employer, if employed. Not means tested.
Bonus(1)	xxxiii.	Payable to all persons receiving a pension, orphans’ allowance, Social Assistance and Leprosy Assistance under the Social Security Act.
Bonus(2)	xxiv.	Payable to persons receiving a pension for services rendered in Malta, or ex-British Service pensioners, or persons over 75 years of age who receive a service pension from any other source, or persons who were born before the year 1902.
Additional Bonus	xxxv.	Payable to all persons who receive bonus.
Supplementary Allowance	xxvi.	Payable to households where the total income of the members falls below the limits outlined by the Social Security Act from time to time.

**17.2 Description of the Pension Projection Model and its Base Data**

The World Bank's pension reform options simulation toolkit - PROST - models pension contributions, entitlements, system revenues, and system expenditures over a long time frame. The model is designed to promote informed policymaking, bridging the gap between quantitative and qualitative analysis of pension regimes. It is a flexible, computer-based toolkit, easily adapted to wide range of countries' circumstances. Pension experts from the World Bank and other institutions have used PROST in 80 countries around the world.

The Economic Policy Division of the Ministry of Finance has been granted a licence to use PROST to carry out simulations of the development of the current pension system and to analyse various options for pension reform.

PROST is designed to answer the following kinds of question:

- How much will the pension system cost in the future? Is it viable and sustainable?
- What kind of benefits can people expect to receive in the future?

- Is the pension system equitable? Does it provide a decent retirement income to different categories of people?
- How large are the government's implicit pension liabilities?
- How would broadening coverage, changing eligibility, changing benefits, or adjusting contribution rates affect the system? How will costs, expenditures and liabilities change under various reforms?

The model takes country specific data provided by the user. It generates population projections, which, combined with economic assumptions, are used to forecast future numbers of contributors and beneficiaries. These in turn generate flows of revenues and expenditures. The model then projects fiscal balances, taking account of any partial pre-funding of liabilities.

A second PROST module analyses the impact of pensions at an individual level. The user can explore the impact of the system on workers with different income levels, mortality rates, earnings profiles, job entry ages, retirement patterns *etc.* The model can assess anything from 'parametric' reforms of initial pay-as-you-go systems— changing pensionable age, contribution rates, benefits, indexation *etc.*—to fundamental reforms, such as the introduction of individual, funded retirement savings accounts. A shift from a defined benefit pay-as-you-go scheme to one based on notional accounts can also be modeled. PROST can handle provident fund schemes as well as pay-as-you-go systems as the starting point, before reform.

### **Basic data required to run the model**

Data input in PROST is divided into a number of specific sheets. The main input sheet includes general assumptions pertaining to the economy and some parameters of the pension system. Inputs are further subdivided into sheets related to Population, the Labour market, and Pensions. For this exercise data was collected from national sources, including the National Statistics Office, the Inland Revenue Department and the Social Security Department within the Ministry for the Family and Social Solidarity. Four specific beneficiary categories are modeled in PROST and these comprise all pension benefits granted in Malta under the contributory scheme:

- 2/3 retirement pensions (2/3 retirement pension, National Minimum Pension and Increased national minimum.)
- invalids (National Minimum Invalidity Pension )
- survivors (National Minimum Widows Pension, Survivors Pension, Early Survivors Pension)
- top-ups (retirement pension, increased retirement pension, decreased national minimum, invalidity pension, increased invalidity pension, decreased national invalidity pension, widows pension)

For most variables data is entered for the base year (2002) and for the years of the forecast up to 2050. Some input variables require assumptions for each year in the forecast, whilst others are generated in the various output sheets of PROST. Amongst the most important input variables one can include:

- GDP in Nominal terms in the base year
- The contribution ceiling (for employee and government contributions)
- Wage and pension brackets and cumulative distributions
- Demographic trends – sex ratio at birth
- Macroeconomic Growth trends for Real GDP, the inflation rate, the real interest rate, Government bond rate and the discount rate
- The retirement age by sex
- Revenue sources mainly from contributions of employees, employers and Government
- Pension indexation assumptions, minimum and maximum pension indexation, minimum wage indexation and contribution ceiling indexation

- A number of benefit related parameters such as; required years of service for basic replacement rate, the maximum replacement rate, etc.

**The Population worksheet in PROST includes inputs for the following main variables**

- Maltese Population by age and by sex for the base year (2002)
- The age specific fertility rate for the base year and any projections or theories about the way fertility rates are most likely to behave over the simulation horizon.
- Probability of dying males/females: age specific probability of dying for males/females in the base year as well as any projections or theories regarding the most likely behaviour of probability of dying in the future.
- Net migration males/females: age specific net immigration in each age group. Data are required for the base year as well as for future years.

**The Labour worksheet in PROST includes inputs for the following main variables**

- Labour force participation males/females: data are entered for the base year and any projections or theories about the way the labour force participation rates are most likely to behave over the simulation horizon.
- Unemployment rate males/females: data for each age group by gender are entered for the base year and for forecast years
- Earnings profile for males/females in terms of minimum wage: this reflects the average gross wage of individuals relative to the minimum wage.
- Pension profile in terms of the minimum pension: this represents the initial distribution of pensions across pensioners of different ages. Data is only entered for the base year and the model generates data for future years.

**The Pensions worksheet in PROST includes inputs for the following main variables**

Contributors, males/females: data is entered for each age cohort for the base year. Specific pensions category: data is entered for the number of pensioners receiving 2/3 pensions, number of invalids and survivors and top-ups for the base year.

The PROST program produces five output modules, comprising Microsoft Excel tables with graphical summaries. The modules are:

1. **Population projections**, including life tables, population pyramids, population dependency ratios *etc.*
2. **Demographic structure**: labor force and employment, numbers of contributors and beneficiaries, system dependency ratio.
3. **Financial flows**: projections of wages, benefits, revenues and expenditures of the pension system, pension scheme balance and the implicit pension debt. The financial flows module also calculates the adjustments—to benefit levels or contribution rates—that would ‘balance’ the system, *i.e.* bring revenues and expenditures into line.
4. **Fundamental, systemic reform**: this module looks at the effect of a shift to a ‘multipillar’ regime, incorporating both a pay-as-you-go, defined benefit pension and a funded, defined contribution scheme or exclusively one or the other. Again, it measures the impact both on the public finances and on individual’s pension entitlements, including measurements of transition costs. The total pension benefit and the value of each of the pillars are provided separately.
5. **Effects on example individuals**: the model works out contributions and benefits for different example individuals, specified by age, sex, age of labor market entry, retirement age, earnings profile, mortality *etc.*

Following the receipt of a full set of underlying assumptions from the Economic Policy Committee (EPC), the PROST input files were calibrated, where possible to incorporate such assumptions. The following is a list of the main assumptions that have been taken on board in our PROST calculations.

- Real GDP (growth rate)
- Inflation rate
- Population (15-61 years)
- Participation rate (15-61 years)
- Unemployment rate (15-61 years)

It is pertinent to note that Malta has reservations with regards to EPC population projections. The EPC assumption that net migration will increase by an average of around 2,500 annually during the forecast period, leads to a higher influx of immigrants from that assumed under the Pensions Working Group population projections. This influx is leading to a significantly higher growth in Malta's population by the year 2050 under the projections based on the work of the EPC.

Additionally, one notes that a number of variables included in the assumptions as provided by the EPC where not incorporated in our PROST workings, primarily due to the fact that such input variables are not required as PROST inputs.

### 17.3 Results

EPC population projections indicate that total Maltese population is projected to grow to around 487,000 by 2030 and increase further to around 513,000 by 2050. According to this scenario, the share of the sixty-one plus is projected to grow from 15.9 per cent in 2003 to 18.9 per cent in 2010 and then rise persistently to reach 29.6 per cent in 2050. This means that there will be around 152,000 Maltese aged 61 and over in 2050, compared to around 65,000 in 2003. Meanwhile, the share of the population in the 16-61 years bracket will start to decline from 2010, and by 2050 will be 8.9 percentage points lower compared to 2003.

By 2050, the total dependency ratio will amount to 82.2 per cent, which means that every person in the working age population will have to support around 0.8 non-active persons compared to 0.6 non-active persons in 2003. Besides, given this background, the support ratio as from 2005 will steadily decline to 1.9 by 2050. This means that while in 2003 there were around 4 persons in employment for a retired person, by 2050 there will only be around 2 employed persons compensating for a retired person.

Given this scenario, based on contributions of employer and employees only, which is the usual basis for looking at pension systems, the current pensions system in 2003 was running a moderate deficit of 0.6 per cent of GDP. Pension payments in Malta mainly include the two-thirds retirement pension, survivors' pension and the invalids' pension. Occupational pension schemes in Malta are of minor importance. The deficit is projected to increase to 2.6 per cent of GDP by 2010, reach a maximum of 4.9 per cent of GDP by 2020, and thereafter to decline to reach 3.9 per cent of GDP by 2050.

### 17.4 The 2006 Pension Reform

This sub-section summarises the main developments to the pensions regime in Malta enacted in 2006, published on 7 December 2006. The changes outlined below were, however, not reflected in the long-term pension projections for Malta reported above.

The new Social Security Act provides the following main changes:

- **Definition of Pension Age:** The pension age will be gradually raised to sixty-five years of age. However, in the case of a person born on or before the 31 December 1951, pension age shall be sixty-one years; in the case of a person born during the calendar years 1952 to 1955, pension age shall be sixty-two years; for persons born during the period 1956 to 1958, pension age shall be

sixty-three years; for persons born in the period 1959 to 1961, pension age shall be sixty-four years. For women born on or before the 31 December 1951, pension age shall be sixty years.

- ***Disqualification from a Pension in respect of Retirement:*** A person under the age of sixty-five years born on or before the 31 December 1961 shall be disqualified from receiving a pension during any period in which he is gainfully occupied when his earnings from such occupation exceed a weekly average equivalent to the National Minimum Wage. Meanwhile, a person under the age of sixty-five years born on or after the 1 January 1962 shall be disqualified from receiving a pension during any period in which he is gainfully occupied.
- ***Retirement before the Pension Age:*** A person who has attained the age of sixty-one years but has not yet attained pension age may after attaining sixty-one years of age claim a pension in respect of retirement if such person is no longer gainfully occupied.
- ***Full rate of Two-Thirds Pension:*** The full rate of the Two-Thirds Pension is equal to  $\frac{2}{3}$  of the pensionable income of the claimant who has paid or has been credited with a yearly average of 50 contributions over a period of: (a) thirty years in the case of a person born on or before the 31 December 1951; (b) thirtyfive years for a person born during calendar years 1952 to 1961; and (c) forty years in the case of a person born on or after the 1 January 1962. For a person born on or after the 1 January 1962, the yearly average of contributions required for the purposes of awarding a Two-Thirds Pension shall be assessed on any period of 40 years between the first day of his contribution year in which he reaches the age of eighteen and the last day of his last complete contribution year before the beginning of his benefit year which includes the day on which the conditions are required to be satisfied.
- ***Calculations of Pensionable Income:*** For a person born on or after the 1 January 1962, the pension shall be determined by taking the yearly average of the basic wage/salary/net income/net earnings as the case may be, during the best ten calendar years within the last forty years immediately preceding his retirement or invalidity.
- ***The Maximum Pensionable Income:*** In the case of a person born on or before the 31 December 1961, whose retirement occurs on or after the 1 January 2007, the basic wage/salary/net income/net earnings and the resultant pensionable income, shall not exceed Lm 6,958 increased by such sum as the Government may award as a cost of living increase. The following provisions stand: (a) for a person born on or before the 31 December 1951, the resultant pensionable income including any such cost of living increase shall not exceed the sum of Lm 7,500; for a person born during calendar years 1952 to 1961, the resultant pensionable income including any such cost of living increase shall not exceed Lm 9,000.

For a person born on or after the 1 January 1962 whose retirement occurs on or after the 1 January 2007, the resultant pensionable income shall not exceed: (a)Lm 6,958 increased by such sum that the Government awards for the cost of living, in respect of the years 2007 to 2010; Lm 6,958 increased on the 1 January of each year between 2011 and 2013 by one third of the difference between the sum referred to above and Lm 9,000; Lm 9,000 increased annually by 70 per cent of the percentage increase in the national average wage for the previous calendar year, plus 30 per cent of the inflation rate for that same year. This applies as from the 1 January 2014.

- ***The Guaranteed National Minimum Pension:*** A person born on or after the 1 January 1962 who is not entitled to a Service Pension shall be entitled to a Guaranteed National Minimum Pension which shall be payable at a rate that is not less than 60 per cent of the National Median Income. The rate of GNMP cannot be less than that declared for the preceding year.
- ***Crediting of contributions:*** The categories of persons to whom such credit is allowed has been extended to include persons born on or after the 1 January 1962, who have the legal care and

custody of a child who is less than six years old, or ten years old in the case of a child suffering from a serious disability. Crediting of contributions may be claimed for a maximum period of two years in the case of a parent who has stopped working to take care of his/her child, extended to four years in the case of a child suffering from a serious disability. An adoptive parent is also able to claim such credits. Credits may be claimed for every child, with no distinction between employed and self-employed persons. The claimant is bound to have worked a minimum number of years equal to the duration of the crediting period. In the case of a parent's death, this latter binding ceases to apply.

- ***Ministerial Powers and Responsibilities:*** The Minister of Social Security will, within intervals not exceeding five years, prepare a report reviewing the workings of the Retirement Pensions together with recommendations for achieving further adequacy, sustainability and social solidarity. The Minister, in concurrence with the Minister of Finance has the power to make and vary any regulations requiring persons who have not reached pension age and their employers, to make contributions into Mandatory Second Pension Funds. Such regulations may provide for the rate of contribution, method and frequency of payment. The Minister may in conjunction with the Minister for Finance provide exemptions from income tax in respect of contributions made by any person to Third Pension Funds.



## 18. The Netherlands

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### 18.1 Structure of the Dutch pension system<sup>117</sup>

#### 18.1.1 The old age pension system

The mandatory part of the Dutch pension system comprises the government provided basic old age pension scheme (first pillar) and occupational pension schemes (second pillar). The basic old age pension provides an equal income for all residents at a level related to the net minimum wage. In comparison to other EU countries, the state pension in the Netherlands is only a part of the total old age pension system. The second pillar comprises the occupational non-statutory pension schemes. It supplements the state pension. It is also a subject of concern in terms of the increasing systemic risk it faces. The total contributions that plan sponsors and active members paid to the occupational pension funds equalled 6.2% of GDP in 2004. Table 18 - 1 provides an overview of the size of these pensions in 2004, the tax liabilities involved and the pension contributions and pension fund assets.

**Table 18 - 1 Gross pension payments and income tax revenues from pensions, % of GDP**

	2004
<b>I. Gross pension benefits (to people of pensionable age)</b>	
First pillar	4.9
Second pillar	4.1
Total amount of pension payments	9.0
<b>II. Tax revenues from pension benefits</b>	
Direct taxes on pension benefits	2.0
Indirect taxes on pension benefits	2.3
Total amount of taxation on pension benefits	4.3
<b>III. Pension contributions and pension fund capital</b>	
Contributions	6.2
Pension fund capital	135

Source: CPB calculations for the AWG

In the Netherlands there are four types of occupational pension providers:

1. company-specific pension fund providers that administer the pension scheme of a larger enterprise;
2. industry-wide pension fund providers that administer the pension scheme of a whole branch of industry;
3. insurance providers who have to deal with approximately 30,000 group life insurance contracts for separate enterprises;
4. pension funds for professional groups which have to do with self-employed professionals within a particular profession (there are only active members and pensioners and no employer).

<sup>117</sup> This section and the next is based on "The old age pension system in the Netherlands; a brief outline" by the Ministry of Social Affairs and Employment.

**Table 18 - 2 Survey of Dutch pension funds**

	Industry-wide Pension Funds		Company-specific Pension Funds	Pension Funds for Professional Groups
	Mandatory	Non-mandatory		
Number of pension funds on 31 December 2004	80	21	701	11

Source: DNB

The pension sector is also concentrated. The largest fund (The Dutch Civil Servants' Pension Fund ABP), with an invested capital of 170 billion euros, represents 37% of the total assets. The following largest five funds share 57% of the total assets. At present, 813 pension funds are in operation, of which 701 funds are company-specific, 101 are industry-wide and 11 are pension funds for a particular profession. Other than these, 30,000 group pension agreements have been made with insurance providers by companies that do not have a pension fund. All these pension providers are being supervised by the Dutch Central Bank (DNB). Their joint capital is estimated at 480 billion euros.

### **18.1.2 First pillar: the state old age pension (AOW)**

The AOW is the statutory old age pension scheme of the Netherlands. It provides all residents of the Netherlands as from the age of 65 a flat-rate pension benefit that, in net terms, equals 70% of the net minimum wage for singles and 100% for a married couple. There is no means-test for the eligibility of benefits; other forms of income have no effect on the AOW benefit. There are no reforms currently implemented.

All residents of the Netherlands between the ages of 15 and 65 are insured for the AOW. No distinction is made between men and women, between civil servants, employees, self-employed and housewives. During the period of insurance, entitlement is accrued in 2% steps for every insured year. This leads to a 100% entitlement to the relevant pension benefit on reaching the age of 65, provided there are no gaps in the period of insurance. A gap occurs when a person resides outside the Netherlands. People who are not entitled to the full AOW benefit and who have, together with other sources of income, a total income below the subsistence level (i.e. less than 70% of the legal minimum wage) are entitled to receive social assistance.

State old age pensions are financed according to the pay-as-you-go system: today's contributors finance the pension payments made to the pensioners of today. The ageing of the population will put pressure on this system of financing. At the moment there are over 2 million old age pensioners in the Netherlands, but this number will double over the next few decades.

The administrative body for the AOW is the Social Insurance Bank (SVB). The SVB is independent of the government in its day-to-day operations. The Board of Directors manages the Bank in consultation with the Board of Advisors. The Ministry of Social Affairs and Employment (SZW) appoints the members of both the Board of Directors and Board of Advisors and approves its annual plan and budget. The SVB is subject to inspection by the Work and Income Inspectorate (IWI), part of SZW.

### **18.1.3 Second pillar: occupational pensions**

Although there is no obligation for employers to make pension commitments to their employees, the vast majority of those employed in the Netherlands (over 90%) participate in an occupational pension scheme. Occupational pensions are subject to negotiation between the social partners and have to be financed by capital funding. A pension scheme is part of the employment conditions laid down in an agreement (which may be a collective agreement). Characteristically, final salary schemes and average

pay schemes promise a yearly replacement rate of 1.75% to 2% of the final salary or average career salary (including first pillar benefits). If the collective labour agreement lasts for 35 to 40 years, the total pension benefit (first plus second pillar) will be around 70% of the final or average salary. Occupational pension schemes are considered supplementary to the AOW state pension. The AOW benefit is therefore a factor included in most calculations of second pillar pension schemes in order to arrive at the 70% aim referred to above. This is known as the AOW *franchise*.

In recent years many pension funds have switched from final pay schemes to average pay schemes. As of January 1<sup>st</sup> 2004, some 93% of all active members were participating in a defined benefit scheme, of which 3/4 in a career average pay scheme. Usually, the way contributions are divided among social partners varies from one pension scheme to another. According to statistical data of Statistics Netherlands (CBS), the average employer contribution amounts to approximately 70% of all contributions.

#### **18.1.4 Early retirement**

In many sectors voluntary early retirement schemes (VUT) were set up on a pay-as-you-go basis. These schemes came into existence in the early 1980s as a result of collective efforts among social partners to cope with youth unemployment. However, reflecting the generosity of the overall pension system, the rate of early retirement has significantly increased over the years. Because of the increasing costs for employers and the ageing population, reform of the VUT began a few years ago. Some pension funds established pre-funded early retirement schemes. Recent legislation aims at abolishing all early retirement schemes by removing the favourable tax treatment of these schemes. With these measures the government wants to encourage higher labour force participation by older workers.

#### **18.1.5 The financial position of pension funds**

The second pillar of the Dutch pension system is characterised by the legal obligation of full funding for the liabilities of pension funds. Many pension funds have invested in equity and real estate. In order to compensate the higher risks involved in these investments, the supervisor requires that a Dutch pension fund hold additional reserves (buffers).

During the 1990's certain developments took place, including a systemic increase in pension obligations (and costs), a reduction of contributions paid and a continuous drop of the capital market interest rate. These developments caused a reduction of reserves and the erosion of prudence from the pension system itself. The erosion was even deepened by the occurring shift towards high-risk investments. These developments led to a fall of the ratio between the assets and the nominal, i.e. non-indexed, liabilities from approximately 230% in 1990 to 115% in 2004. In terms of the real liabilities this funding ratio is now approximately 95%.

The supervisor subsequently tightened up the regulations for pension funds and intensified their supervision. Pension fund administrators then made arrangements in order to restore their financial positions. Most funds are currently on track to restore the shortfall in reserves.

Simultaneously, the supervision structure is being revised. There is a consensus between the government, social partners, pension fund administrators and the supervising authority that stop-gap regulations aimed at short-term financial stability could be counterproductive to the long-term quality of the pension system. Achieving a balance between short-term exigent requirements and the long-term robustness of the pension system remains to be a challenging task for the regulator, the supervisor and pension fund administrators. Part of the reform within the financial supervision context as a whole is the financial assessment framework (FTK) that is intended to come into force in 2007.

It will be legally required for pension funds to determine a cost-effective contribution rate and a minimum amount of cash in order to guarantee their members a pension benefit. If the amount is less

than this basic limit, pension funds will be compelled to take measures to restore this level. According to the FTK, pension funds have to state in a clear way whether or not they will index the pension rights and under what conditions they intend to do so. The FTK will be assessed every five years.

### **18.1.6 Disability and survivors benefits**

The system of disability pensions is currently undergoing a substantial reform. In 2004 a number of measures were taken that affect the disability schemes. One more follows in 2006. The reform intends to curb the inflow into these schemes. This inflow has always been very high in the Netherlands and has resulted in a stock of beneficiaries that amounted to almost one million. The 2004 measures were threefold. First, it involved the extension from 1 to two years of the duration of the period in which employers have to continue to pay the wages of sick employees, though at a reduced rate of 70% of its previous level (down from 80%). This measure has a direct limiting effect on eligibility which sharply reduced the inflow in 2005. Apart from this, it is also expected to curb the future inflow by raising the incentives for employers to enhance working conditions and to increase the effort to fit the involved employees into the workforce. A further improvement may come from recovery from sickness during the period of the extension and from the incentives of the reduced earnings (to 70%) on employees. The second 2004 measure involves a restriction of eligibility by raising the requirements to qualify for these schemes. Not only the new claimants are submitted to the new, sharpened, criteria, the measure also applies to the existing stock of beneficiaries which undergo a one-off screening on the basis of the revised criteria. The third measure taken in 2004 was the abolition of the, separate, public scheme for the self-employed. These people have to resort to private insurers.

The 2006 measures distinguish between degrees of disability. The effect on in the inflow is expected to be substantial when measured in persons but a lot smaller when measured in full time equivalents. This results from the combination of three effects. The first is a restriction in the eligibility of those who are partially disabled. Especially those with a very low degree of disability can in the future not apply at all. The other two, cost raising, effects involve the increase in benefit level of those with a high degree of disability (from 70% of previous earnings to 75%) and the abolition of a previously successful measure that differentiates the contribution to the scheme by imposing a higher contribution on companies from which there had in the past been a large inflow of employees into the schemes.

Overall, the cost saving effect of the reform results from the lower inflow. On average, benefit levels are only slightly affected. In the period 2003-2006 and over the next decades the stock of persons that benefit from the schemes are expected to decline by around 300 thousand between 2004 and 2030, or by roughly one third. This corresponds to the reduction in the cost for government. Note that this contrasts sharply with the previous projection in 2001 where the number of disabled was expected to *rise* by around 300 thousand in the coming decades. Relative to the 2001 round of projections the current one thus involves a decrease in the stock of claimants that amounts to about 600 thousand persons and a correspondingly lower size of expenditure on this scheme.

The scheme of survivors benefits covers widowers, widows and orphans. The benefit level has a maximum of 70% of minimum wage. This level applies only to individuals with no income from labour. In net terms it equals the social assistance level. In case the involved individual has income from labour the benefit is reduced by a level that equals 50% of minimum wage plus two thirds of the surplus of labour income. Possession of personal wealth or incomes from pensions does not lead to a reduction of the benefit.

## **18.2 The Role of the Government**

Employers and employees organisations are responsible for the arrangement of the occupational pensions. The government's role with respect to these supplementary pensions is confined to providing a legal framework and supervision.

### **18.2.1 Tax legislation**

Tax legislation is very influential in the development of the Dutch pension system. The Taxation of Pensions Act was approved by Parliament in 1999. This Act defined the conditions under which pensions are reasonable pensions. Pension contributions from the employer and employee are, within the limits set by the Taxation of Pensions Act, tax-deductible. Furthermore, the investment returns are exempt from taxation. Pension benefits received are taxed as income. Since, in general the rate at which contribution rates are deducted is higher than the rate at which pension benefits are taxed, this implies a subsidy on retirement saving through pension funds. Note that this tax regime implies that when the baby boomers start to retire, this positively affects direct as well as indirect tax revenues.

### **18.2.2 Pension and Savings Fund Act (PSW)**

Once an employer has made a pension commitment to his employees, this commitment must be implemented in the way prescribed in the PSW. The commitment is therefore subject to the protection of the PSW. The main safeguard is the rule that pension commitments have to be financed on the basis of capital funding, and that the reserves must be placed outside the employer's company either by joining an industry-wide pension fund or by establishing a company pension fund or by entering into an agreement with an insurance provider. This avoids the pension funds going to creditors if the company goes bankrupt.

A number of other measures laid down in the PSW are:

- the legal right of transfer of pension rights in the event of a change from one employer to another;
- the fact that indexation rights applied to pensioners must also be applied to early leavers (indexation itself is customary but not mandatory);
- a ban on surrendering pension rights to the beneficiary (exchanging the entitlement for a lump sum payment would undermine the purpose of accrual safeguarding of pensions);
- as of 2002, participants who are accruing a survivor's pension are entitled to exchange this position on the retirement date for a higher or earlier old age pension. As of 2002, the outcome of these and other optional modules in pension schemes must result in equal benefits for men and women. As of 2005, contributions and benefits in defined contribution schemes must also be equal for men and women.

The PSW also lays down the institutional framework of a pension scheme: conditions concerning statute and rules, the constitution of the Governing and Executive Boards, representation of pensioners in the implementation process of pensions, supervision on schemes and pension providers, information given to participants by pension funds and insurance providers, etc.

### **18.2.3 Mandatory Participation in a Branch Pension Fund Act of 2000 (Wet Bpf 2000)**

When central organisations of employers and employees jointly set up a branch pension fund, they may ask the government to impose an obligation on all employers and employees within their particular industrial sector to participate in the industry-wide fund. In this way, agreements between social partners are made binding for everyone in the sector. For participation in a pension fund to be declared mandatory, however, the employer's organisations supporting the request must employ at least 60% of the employees in their sector. No support percentage is prescribed for the organised employees. In certain defined cases, companies can be exempted from participation in a mandatory pension scheme, for example, when a company already has an individual pension fund or when the performance of investment by the branch pension fund is inadequate.

The mandatory branch pension funds in the Netherlands cover about 80% of the total number of employees in the Netherlands who are in an occupational pension scheme. The Netherlands have 71 mandatory branch pension funds. There are funds not only for health care workers, for example, and construction workers, but also for organ builders. Public servants are under a special statutory obligation to participate in the pension fund for public servants, the ABP fund, and it is one of the largest funds in the world with an invested capital of 170 billion euro.

In recent years branch pension funds have been criticised for offering companies too little room to develop pension schemes of their own. This has led to the question of whether mandatory participation in branch pension funds is compatible with competition law. In particular, it has been alleged that this principle is contrary to the EC Convention that was designed to ensure free competition and prevent the creation of monopolies. Branch pension funds function on the basis of solidarity. Employees are offered the same pension rights on the same conditions irrespective of gender, age or state of health. A solidarity-based system such as this can only function well if participation is mandatory.

The European Court of Justice has endorsed this position. In 1999 the Court ruled that the obligation to participate in a branch pension fund is of general, social and economic importance. Not only because of the solidarity, but also because of the obligation for all employees in the sector to participate enables a good pension scheme to be offered. On these grounds the Court ruled that the compulsory nature of these funds is permitted under EC law and is not contrary to competition law.

#### **18.2.4 Mandatory Participation in a Pension Scheme for Professional Groups Act (Wet Bpr)**

A pension scheme for professional groups is based on an agreement between self-employed professionals in a particular profession. Through a procedure based on the Mandatory Participation in a Pension Scheme for Professional Groups Act (Wet Bpr), the government can make participation in a pension scheme for a professional group mandatory for the profession as a whole. This occurs at the request of an organisation or organisations representing a sufficient majority of the professional concerned. A bill is in preparation which will be stricter for pension schemes for professional groups: medical examinations before entering the fund will not be allowed any more. Also all members have to pay the same percentage of contribution to the fund, irrespective of age, sex or health. Because pension schemes for professional groups are not based on pension commitments made by employers, such a pension scheme is subject only partially to the PSW. At present there are 11 pension funds for professional groups.

#### **18.2.5 The new Pension Act**

A new Act is currently in preparation that gives effect to the modernizing provisions and to a technical review of the Pension and Savings Fund Act (PSW). Since the bill contains new policy proposals, it has been presented to the Social and Economic Council (SER) for advice.

The new policy proposals concern issues relating to:

- the personal scope of the bill (who has to participate in a pension scheme);
- basic criteria for the financial solvency of the pension funds;
- information that must be given to participants by the pension fund and insurance provider.

Increasing transparency in the implementation of pension schemes can increase support for maintenance of the current pension system. A key issue here is to raise the public's pension awareness. The government is promoting the provision of information by pension administrators through the inclusion of relevant regulations in the new Pension Act, encouraging projects and the conclusion of agreements with pension administrators, social partners and senior citizens organisations. The new Act will also include further guarantees that agreed pensions will actually result in pension payments.

Further attention will also be paid to pensioner involvement in administering and managing the implementation of the pension scheme.

## **18.3 Projecting Pensions into the Future**

This section describes the methodology that is used to carry out the long term projections of pensions. The three pillars that form the pension system are treated separately. The projections are made by using the OLG-General Equilibrium model of the Netherlands, GAMMA, developed by the CPB Netherlands Bureau for Economic Policy Analysis.

### **18.3.1 The first pillar**

The flat rate nature of the Dutch system of public pensions entails that a relatively simple methodology suffices to carry out projections. GAMMA relates the development of public pension expenditure to only two factors: the productivity in the economy and the number of people over the age of 65. The dependency on productivity is linear and reflects the fact that the pensions are linked to the (minimum) wage level. In turn, wage levels are assumed to increase in line with productivity. The dependency on the number of over 65 year olds is slightly more complicated. Some age-specificity within this group is introduced to take account of the positive correlation between age and the share of singles. As described above, singles are more expensive than married couples on a per capita basis. It is clear that this system leads to an increase of the ratio of public pensions to GDP that almost exactly coincides with the rise of the old age dependency ratio.

### **18.3.2 The second pillar**

To project the development of contribution rates, pension payments, assets of pension funds etcetera, the 700-plus pension funds in the Netherlands are assembled in a model of a single average pension fund. This average pension fund offers a pre-funded average pay scheme, aiming at a replacement rate of 70% of average pay. Survivors pensions are not modelled explicitly but are taken into account through a surcharge on the old age pension. The existence of the flat rate public pension, the AOW, is taken onto account by the pension fund through a franchise. Only workers with a wage above this franchise are building up an occupational pension. The accumulated assets are invested in a mixed portfolio of bonds and equity. For the baseline case the portfolio mix is 50-50. Furthermore, actuarial cost-effective contribution rates are charged. It should be noted that the contribution rate is cost effective on an aggregate level, i.e. for the whole pension fund. Because building up pension rights is usually linear, e.g. 2% of the pension wage per year worked, the contribution rate is not cost-effective on an individual level. Younger workers pay more than the actuarial value of the additional pension right they receive, older workers pay less. As a result, the occupational pension system gives a positive incentive to the labour force participation of older workers.

Most pension funds in the Netherlands aim at wage or price indexation. It is, however, not guaranteed but conditional on the financial position of the fund (coverage ratio). In recent years many pension funds have constructed more explicit indexation rules, providing no indexation at all if the funding ratio is below a certain lower bound, full indexation if the funding ratio is above an upper bound and a linear cut in indexation in between. Our average pension fund aims therefore at a mixture of wage and price indexation and gives full indexation at a funding ratio of 135% (of the nominal liabilities) or more. No indexation is given if the funding ratio is below 100%. Roughly 70% of the pension funds aim at wage indexation.

The pension fund has to follow the supervision rules of the FTK. These rules prescribe among other things required levels of the funding ratio and which part of the liabilities has to be covered by the cost-effective contribution rate. For our average pension fund, the funding ratio required by the FTK is 130% of the nominal, i.e. non-indexed, liabilities. Since the funding ratio's are currently below the

required levels of the FTK, contribution rates are temporarily above the cost-effective contribution rates. Also indexation to wages or prices is temporarily below full indexation. In the long term, the pension fund aims at full funding of the indexed liabilities. Given the interest rate, inflation rate and real wage growth, this implies a funding ratio of about 145% of the nominal liabilities. Note that, according to the FTK, pension funds do not have to pre-fund their indexation as long as they have a consistent and transparent policy on promises made with respect to indexation.

The pension model, as well as the GAMMA model, contains 99 overlapping generations. For the first year of the projections, the total level of occupational pension liabilities is divided over the different generations. For every subsequent year the liabilities of each generation grow with the additional rights build up through an additional year of work. Of course, only workers build up occupational pension rights. The level of the pension benefit depends on the number of contributing years and the average wage. The assets grow with the contribution rates paid by the workers, the investment returns minus the pension benefits paid to the retirees.

In case shocks occur that affect the funding ratio (e.g. stock market crashes, changes in the interest rate, productivity shocks, etcetera) the pension fund restores the funding ratio by cutting indexation as well as raising contribution rates. Because of the ageing of the population, the wage sum will become much smaller relative to the size of the liabilities. As a result, cutting indexation will become a more important instrument to deal with shocks than increasing contribution rates.

### 18.3.3 The results

Table 18 - 3 presents the results of these projections for both first and second pillar pensions, the tax revenue effects related to these pensions and the expected developments of pension contributions and pension fund assets. All variables are expressed as a percentage of GDP. The (state) first pillar pensions turn out to rise in line with the old age dependency ratio. Given its flat rate nature, this is in line with the fact that no reforms are implemented. The rise is roughly similar to the one in the 2001 projection. In the case of the second pillar the rise slightly exceeds that of the old age dependency ratio. This development is the net result of two counteracting factors. The first one, leading to a additional rise of pensions, is caused by the future rise of the share of pensioners that have fully participated in the occupational pension system during their working years. This reflects the maturing of the system. The second, somewhat smaller one, which reduces occupational pensions, captures the effects of the reforms which involve a decrease of benefit ratios.

**Table 18 - 3 Gross old age pensions and tax revenues from pensions, % of GDP**

	2004	2020	2040
<b>I. Gross pension benefits (to people of pensionable age)</b>			
First pillar	4.9	6.7	9.6
Second pillar	<u>4.1</u>	<u>5.8</u>	<u>8.9</u>
Total amount of pension benefits	9.0	12.5	18.5
<b>II. Tax revenues from pension benefits</b>			
Direct taxes on pension benefits	2.0	2.5	3.7
Indirect taxes on pension benefits	<u>2.3</u>	<u>2.9</u>	<u>4.4</u>
Total amount of taxation on pension benefits	4.3	5.4	8.1
<b>III. Pension contributions and pension fund capital</b>			
Contributions	6.2	7.1	6.1
Pension fund capital	135	196	238

It is important to note that these results reflect our current insights. CPB is currently updating the Ageing in the Netherlands study published in 2000. This update is expected at the beginning of 2006.



This process might lead to a change of some of the assumptions and therefore the results before the final publication of the update of the Dutch Ageing study.

**18.3.4 Disability and survivors benefits**

The disability benefits are extrapolated by imputing the projected decrease of the number of claimants due to the reform. This extrapolation is carried out by a separate analysis. Table 18 - 4 shows how this works out. It shows that expenditure on disability and survivors benefits, expressed as a share of GDP, will decrease from 2,8% in 2004 to 2,3% in 2020 and even to 1.9% in 2040. Over the whole period this implies a decline of 0.9% of GDP. The decline is fully due to the reform of the disability scheme. Demographic developments do not play a role as the relevant age group coincides with the working years. The decline contrasts sharply with the 1% of GDP *rise* of expenditure on these benefits which were projected in 2001. Those projections were carried out by extrapolating the then current inflows into the schemes. These were high and resulted in an estimated increase in the stock of beneficiaries. The reforms that have been taken since have curbed the inflow in recent years and are expected to continue to do so in the years to come.

**Table 18 - 4 Disability and survivors benefits, % of GDP**

	<b>2004</b>	<b>2020</b>	<b>2040</b>
Disability and survivors benefits	2.8	2.3	1.9

## **19. Austria**

Peter Part, Ministry of Finance  
Karin Schönplugg, Ministry of Finance  
Hans Stefanits, Ministry of Social Affairs

### **19.1 Overview of the Pension System**

#### **19.1.1 General Structure of the System**

The Act on the Harmonisation of Austrian Pension Systems came into effect on 1 January 2005. The main element of this Act represented the introduction of a uniform pension system for all employed under 50 years. In consequence, this new pension system will gradually replace the many different pension schemes for private sector employees, self-employed, farmers and civil servants. All public pensions are and will also in future be footed on a pay-as-you-go (PAYG) system. Survivor and disability pensions add up to a considerable proportion (around one third) of total pension benefits. Despite the major reforms undertaken in Austria during the past decade also within the second and third pension pillars, public pensions are still by far the primary source of income for retirees (more than 95%).

Pension entitlements are subject to individual life-time earnings, reaping the maximum benefits of 80 % of average earnings in the case of 45 insurance years<sup>118</sup> at the statutory retirement age of 65 years. The annual accrual rate will be continuously lowered from 2 to 1.78 percentage points until 2009. The basis of average individual earnings will be extended gradually from the best 15 to 40 income years until 2028. An easier achievement of a pension (instead of 15 years only 7 years of contributory economic activity are required, for the remaining 8 years child care periods are sufficient) will affect especially pension entitlements of women with child care periods. A benefit will be granted provided that 7 years of pension contributions in a working life have been established. Pension benefits are adjusted yearly by consumer price inflation. Past contributions and maximum contribution levels are indexed by net wage growth. The statutory retirement age is basically harmonised at 65 years for men and women (with longer phases of fading in for women until 2033). Early retirement will be fully eliminated by 2017. A pension corridor was introduced between 62 and 68 years, but with an actuarially fair discount/bonus of 4.2 % per year before/after 65 years and at minimum when 450 insurance months have been acquired. Pension benefits are subject to personal income taxation and to social security contributions, above all on health care.

Public pension expenditures are financed by contributions and additional public transfers for granting minimum income standards, serving contribution-free benefits, etc. The federal budget covers the deficits in most public pension schemes in the case of their actual emergence. Pension contributions are levied on gross salaries (split up into an employer's and an employee's part) and deducted from gross salaries before personal income taxation.

#### **19.1.2 Recent Reforms**

Pension reforms were already introduced in 1993 and in 1997 as part of the 1996/97 fiscal consolidation package. The reforms in the 90s focused especially on a change in the adjustment formula from gross to net wages, the extension of the benefit assessment period to the best 15 years, new disincentives for early retirement, the introduction of higher incentives to take part-time retirement and the imposition of a "pension security contribution" on civil servants' pensions.

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<sup>118</sup> including pension contributions, equally ranking waiting periods for parental leave and child care, unemployment, military service, etc.

In 2000, 2003 and in 2004 the reform process has been stepped up very ambitiously. The reform of 2000, increased all early retirement ages by 1.5 years until 2003, in the general schemes from 55 to 56.5 years for women and from 60 to 61.5 years for men. The disability early retirement scheme was abolished on 1 July 2000 following a ECJ ruling on equal treatment. The widow(er)s' pensions schemes were tightened by stricter income related ceilings. In case of early retirement, the discount rate was raised further.

The Austrian Pension Reform of 2003 increased statutory (early) retirement ages and implanted strong incentives to work longer into the system (extending the base of average earnings from 15 to 40 years until 2028 in combination with a cap on losses of 10%, raising the deduction in case of early retirement to 4.2% per year). Retiring early shall become an exception to the legal retirement age. But at the same time elderly workers have been made more attractive from employers' point of view, in particular by lowering non-wage labour costs. Part-time retirement was redesigned to prevent this scheme to be used as a possibility for early retirement.

The establishment of harmonised guaranteed pension accounts, effective since 1 January 2005, is a new system of individual transparent pension accounts with the key rule of 45 - 65 - 80 (45 insurance/contribution years, retirement age of 65 years and a public pension amounting to 80% of average life-time earnings). The cap on losses based on the "old" system was modified starting with a 5% cap and accumulating step-wise to 10% until 2024. These accounts will clearly show contributions paid in as well as other credits acquired, such as child care, military service and unemployment times. Child care times, military or civil service or hospice leaves will become effective with a contribution base of 1.350 €. Contribution rates will be uniformly set at 22.8%. For farmers and self employed a contribution rate of 15% and 17.5% is effective, the difference to the standard contribution rate is borne by the federal government. To guarantee the viability of financing, a sustainability factor has been introduced to cope with unforeseen developments, such as adverse future demographic deviations. If work has been in the area of "hard labour" for each year 3 months may be subtracted from the retirement age. A committee elaborates on the criteria of "hard labour" right now. Earliest possible retirement is at the age of 60 years. The discount ratio amounts then to 2.1% per annum instead of the standard rate of 4.2%.

### **19.1.3 Second and third pension pillars (occupational and private voluntary pensions)**

The second pillar (firm-related benefits) has turned to be now partly mandatory. But it is still of much less quantitative importance than the public pay-as-you-go system, though their volumes have increased rapidly in recent years. While in 2000 about 284,000 persons had earned entitlements to occupational pensions (excl. the "new severance pay"), this number increased to 413,000 in 2004 (of which 44,000 persons were receiving benefits). This corresponds to 13% of all employees. Currently, there are 15 occupational and six supra-plant pension funds in Austria administering total funds of 10 bil. €. Moreover, some employers pay premiums towards a life insurance bought for staff members. Since 1 July 2002, the Occupational Staff Provision Act – better known as “new severance pay” – has been in force in Austria. Every employer has to transfer 1.53% of the monthly salary of an employee to a staff provision fund ("Mitarbeitervorsorgekasse") set up especially for this purpose. The new severance pay and thus also the staff provision funds have shown a very dynamic development, already more than 1.200,000 employees are in this new system. When benefits become eventually due employees may choose between receiving the entire severance pay or a life-long pension.

Concrete arrangements for private pension plans (third pillar) are made by the individual. Traditionally, life insurance has already played a major role, and life insurance contracts have continued to show a significant upward trend over the past years. In 2004, life insurance contracts grew by 8.5%, which resulted in a volume of premiums of 6.19 bil. €. While private life insurance generally leads to a one-time payment, private pension insurance contracts are usually concluded for the purpose of obtaining a life-long pension. The income from current premium payments made in respect of this type of pension insurance increased by 8.3% to about 474 mill. € in 2004. The new

premium-aided pension savings scheme ("Zukunftsvorsorge"), available since early 2003, has, thereby, been successfully established as a predominant old-age provision product of the third pillar and not as a simple finance investment tool. This scheme has been recording strong growth since its 2003 launch. In 2004, the number of contracts surged by 68% to 456,485. 68% of the contracts have a stipulated term of at least 20 years, 42% of at least 30 years.

## **19.2 Description of the Projection Model and its Base Data**

### **19.2.1 Official Long-Term Pension Projections in Austria**

Traditionally, medium-term pension projections, covering at least five future years, are contained in the yearly opinion submitted by the Austrian Pension Advising Council (PAC) to the federal government in preparation of annual pension adjustments. This consultative body represents the main forum for periodic policy discussions. It is composed of experts, academics, government and social partner representatives.

Initially, these medium-term projections which are limited to the private sector schemes ("gesetzliche Sozialversicherung") have been the central policy instrument for assessing pension developments. However, the tendency towards a more frequent use of quantitative analyses and external advice was intensified during past reform efforts. As a result, long-term pension projections based on demographics by Statistics Austria were presented as a complementary tool to clarify the need of adjustment and to assess the impacts of the major reform efforts initiated by the federal government. This has proven to be a very helpful and transparent instrument. This is why, with the aim to have long-term pension projections constantly available and to safeguard long-term financial sustainability of the Austrian pension system, the federal government set up a permanent monitoring mechanism as of 2007. An expert committee will then review financial developments in the pension system every three years and in particular with regard to the sustainability factor newly established in 2005. This sustainability factor will have to be applied, if the trend deviates upwardly from the assumed (demographic) path c.f. because life expectancy has risen more strongly. As a result, higher pension expenditures will have to be matched by equal burden sharing through lower benefits, higher contributions and the federal budget. While no automatic adjustment enters into force, the committee is obliged to put forward respective proposals affecting the retirement age, the contribution rate and the pension adjustment to the government.

### **19.2.2 Description of the Applied Projection Models within the EU Framework**

The Austrian pension projections within the given EU framework are based on two autonomous models, covering the private sector and the civil service schemes, respectively. They include all benefits and contributions to old-age, early-retirement, disability and survivor schemes. The pension projections, therefore, include all public pension expenditure, amounting to 14.3% of GDP in total, but do not cover additional social assistance benefits of roughly 0.4% of GDP. Total pension spending is defined as the outlays before taxation and before social contributions, health care contributions in particular. In addition, administrative costs of around 0.2% of GDP are included in total pension spending as well as certain outlays for health prevention and rehabilitation, and World War II pensions. The pension projections contain the effects of all existing major pension reforms. This implies that the most recent 2005 reform has already been built completely into the pension projections. The cut-off date for measures included, therefore, is 1 October 2005.

Both models consist of partial equilibrium models and comprise deterministic elements only. In order to achieve consistency in the results, the two basic models for the private and the public sectors are consolidated, both as to macroeconomic developments and to expected shifts of contributors from one to the other category of schemes. For instance, the developments in public sector employment are captured by the private sector model, vice versa the macro scenario of the private sector schemes

forms an important input into the civil service projections. Hence, though the two models are fully autonomous, they have been made fully consistent with regard to employment and wage developments.

The private sector model, accounting for nearly three quarters of total public pension expenditure is central to simulate the financial effects of population ageing. It covers all relevant social insurance schemes, for blue and white collar employees (ASVG), self-employed and farmers, among others. The model is composed of two major blocs that are intimately linked together. The macro part is made up of ten modules, reflecting economic, labour market, public finance and pension insurance developments. In effect, most single parameters are endogenously determined with the exception of participation and inflation rates, which fit in as exogenous inputs. The pension-specific micro part relies on inputs from the macro side on employment and on the payroll, from demographics and from age-related time series describing past pension contributions and benefits. These micro modules are designed so as to incorporate already enacted reforms with their effects in the near and distant future and to simulate reform options. These pension modules permit to calculate the great bulk of already existing pensions, the number of new pensions and of exits, average pension benefits and replacement rates as well as aggregate figures in a given (future) year. In the opposite direction, pension contribution rates and the level of the social insurance pension deficit covered by the federal budget feed back into the macro modules.

Secondly, the civil service model takes into proper consideration the fact that these pension benefits are fully financed out of the federal, Länder and the various communal budgets. The federal sector clearly dominates by size. In this vein, the federal segment comprises all pension and survivor benefit payments to civil service retirees of the federal government, the postal, telecom and railway services and specific groups of regional governments, such as primary and secondary school teachers. However, the model also takes account of all vital developments at the other government levels. With respect to these numerous schemes and some differing features and evolutions in these schemes, a number of rough approximations had to be incorporated into the model, especially for pension payments of the Länder and municipalities. This also applies to ongoing structural reforms in the public sector which aim at enhanced application of private-sector-based labour contracts to their employees. As a general trend, civil service developments are assumed to be much more exposed to the present age-structure in the civil service and the future internal reforms rather than to demographics and economic developments, which are nonetheless taken into adequate consideration. These reform measures will dwell upon the comprehensive efforts to harmonise private and public sector pension systems, raising effective retirement ages and contribution rates as well as pursuing restrictive recruitment in the public sector in general and into the civil service status in particular. In the long run, while gradually phasing in, it is presumed that around 130,000 employees (of about 307,000 civil servants in 2004) in the public sector will shift from civil service to private sector contracts. This goes together with the assumption of restrictive public sector recruitment until 2015, including in the postal, telecom and railway services. As a result, the number of civil service pensions will fall markedly in the long run.

## **19.3 Demographic and Macroeconomic Scenarios until 2050**

### **19.3.1 Demographics and labour force developments until 2050 (based on EUROSTAT)<sup>119</sup>**

The Austrian population is expected to remain rather stable at a number of 8.2 million persons, with even a slight increase until 2030 before starting to decline. While there is almost no change in the size of population, the effects of the changes in the age profiles will be markedly more dynamic. The old-age dependency ratio (the ratio of persons 65+ years to the age cohort 15-64 years), however, more

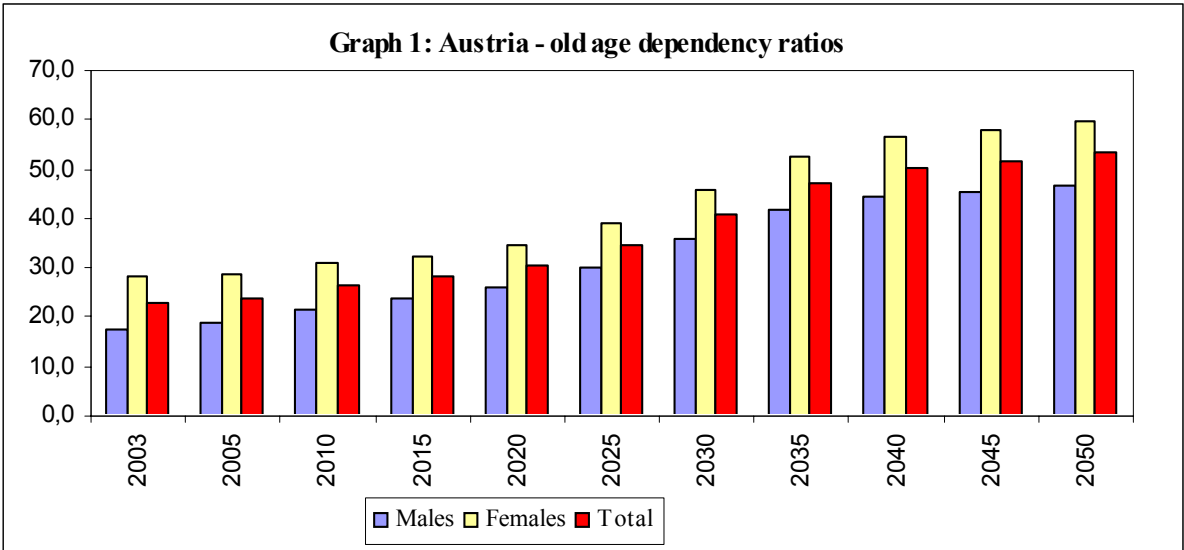
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<sup>119</sup> The Eurostat demographics deviate to a certain extent from the demographic scenario very recently provided by the Austrian Statistical Office in 2005. Here, the old-age dependency ratio will rise only to 46% in 2050 due to higher net immigration until 2015, slightly higher fertility rates and lower increase in life expectancies.

than doubles from 23% at present to 53% due to the baby-boom generation reaching the retirement age and markedly higher longevity (by approximately 7 years for females and 8 years for males respectively). The male old-age dependency ratio, thus, will accelerate more dynamically than the female one. The economic dependency ratio (i.e. the young and old age cohorts together) will step up from 100% to closely above 120%, as the fall in the young population in consequence of low fertility rates will not compensate for the much stronger rise of older people.

The labour force population 15-64 years will continue to expand modestly from 5.5 to 5.6. million people until 2015 before commencing to go down fairly rapidly. The labour force potential is then presumed to amount to 4.8 million persons in 2050, which is, despite continuous positive net immigration, projected to be reduced by 15% compared to the present number, also in combination with a, in general, rising average age of the labour force. In total, however, the Austrian trends resemble very closely aggregate EU developments.

**Graph 19 - 1 Projection of the old-age dependency ratio in Austria**



Source: Eurostat (2004)

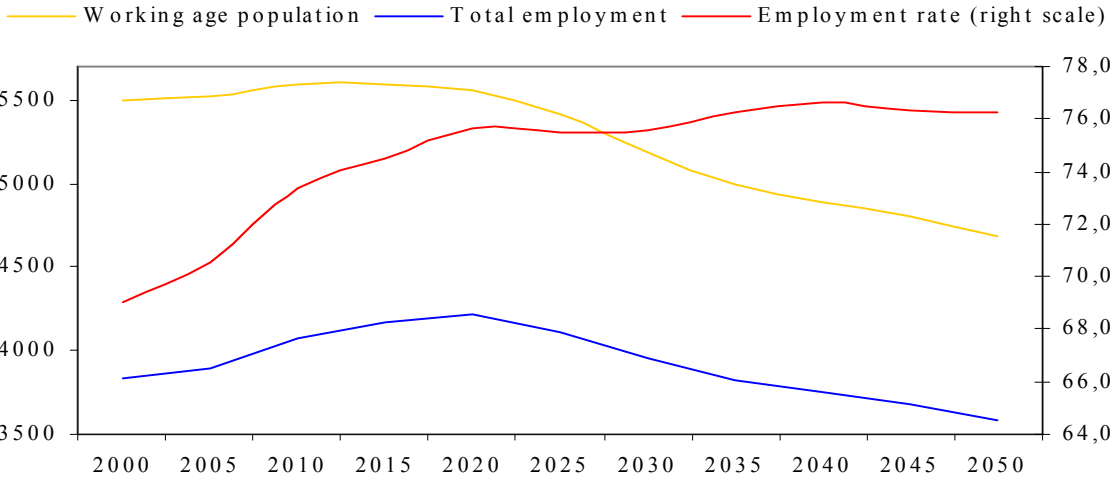
**19.3.2 Labour force and employment developments**

Since the common macroeconomic projections of the AWG already account for the pension reforms of the last years, in particular the effects of raising and harmonising legal retirement ages and enhancing financial incentives to remain longer at work, their effects on employment are reflected by the Commission macro assumptions accordingly. In addition, unemployment rates are expected to converge to their structural level of 3.4% (NAIRU) until 2008. For Austria, overall, these assumptions imply a long run increase of the employment rate of approximately 6.5 percentage points until 2035 (from 69.5 in 2004 to just above 76%), staying at this level thereafter. The old-age employment rate is expected to double from the internationally very low level of 30% at present to around 60% in 2050. This relates to the effective increase of the retirement age by about 3 years. Women's employment is expected to increase by nearly 10 percentage points from 62% to approximately 72%, to a large degree coupled with the applied OECD cohort approach, prescribing higher current labour force participation of younger females into the future.

This increase of overall employment rates is assumed to result in a further slight rise of employment in the period from 2012 to 2020 despite the already ongoing reduction of the labour force. Then employment will start to decline rather swiftly by around 0.5% per year on average until 2050, thereby steadily contributing negatively to potential GDP growth. For Austria, therefore, there is only a limited

medium-run window of opportunity to counteract sinking employment figures already from about 2012 on. An ensuing increase of the employment rate until 2020 could, at least in part, offset further the effects of the ageing population on overall employment and GDP growth (see graph below).

**Graph 19 - 2 Projection of labour force and employment developments**



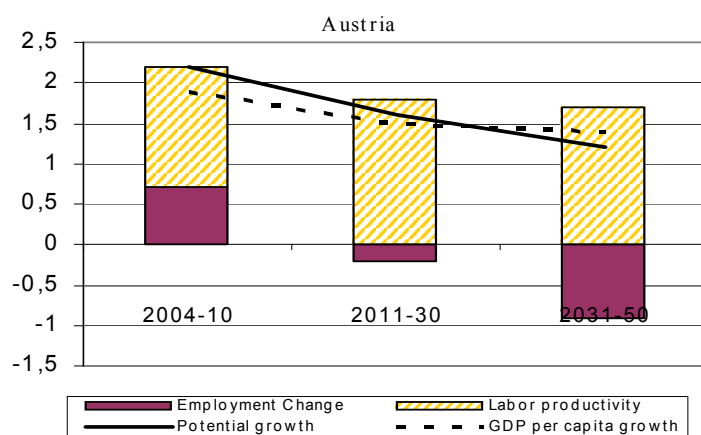
Source: EC, AWG (2005)

**19.3.3 Long run growth in Austria**

The economic and employment growth up to 2050 is strongly influenced by shrinking labour supply due to the ageing population. The European Commission projects a reduction in per capita growth for Austria to 1.4% from 1.9% today, while the EU-25 figures are 2.2% and 1.4%, respectively. Potential growth is projected to decline even more from 2.2% to 1.4% (see GDP per capita and potential growth rates in graph below). In the long run the average growth rates in Austria will, thus, cease to relate to nowadays potential growth in the absence of any measures. The developments for Austria in this regard are mostly in accordance with the average EU-15 and EU-25 developments. Particular moderate potential growth rates of around 1% are projected around the year 2030 because of accelerating falling employment. After 2035 a small rebound of potential growth to 1.4% on average is presumed to occur in line with higher female employment. Economic welfare in Austria increases slightly less than for the EU-15. Nevertheless, for the relative position of Austria in a welfare comparison within the EU-15, nothing much is expected to change.

The assumptions of the projections include that productivity rates (GDP per employed) of all Member States are in the long run converging to an average rate of 1.75%. This makes productivity growth from 2020 the sole source of economic growth. Productivity growth in the model depends on constant investment in relationship to GDP and on technological progress, which approximately reflects the development in the US. This precludes that the Austria, together with its EU partners, manages to become a more knowledge based and innovative society in the sense of the Lisbon strategy.

**Graph 19 - 3 Driving factors of future GDP growth**



Source: EC, AWG (2005)

Compared to the EU-25 and EU-15 averages, the most striking features in the Austrian case are the weaker employment growth until 2010 and the stronger decrease of employment from 2011 onwards than in most other EU countries. The same holds for labour productivity growth, even compared to the EU-15, average productivity is assumed to be slightly less dynamic in Austria. Nevertheless, the growth of GDP per capita declines less rapidly in Austria, the downward movement of the Austrian curve exhibits a more pronounced kink in the period 2011 to 2030 and is nearly horizontal in the remainder of the projection period.

## 19.4 Public Pensions: Projection Results

### 19.4.1 Overall results

Population ageing represents a major financial challenge for the Austrian public pension systems, which are predominantly PAYG based. The higher old-age dependency ratio will also show up eventually in a marked increase in the number of pensions by one fourth. Overall public pension expenditures in Austria are, thus, projected to rise from 13.4% of GDP in the year 2004 to a high of 14.2% of GDP in 2032, then a decline to 12.0% of GDP in 2050 will follow. Including other pension expenditures (c.f. for rehabilitation, administrative costs) the figures for total pension expenditures will peak in an increase to 15.1% of GDP in 2035, from a starting level of 14.3% in 2004. Expenditure dynamics are presumed to be dampened considerably by recent reforms inaugurating higher legal retirement ages, stricter eligibility conditions, to a much larger extent actuarially fair pension benefits, pension adjustment to consumer price developments and the harmonisation of the various public pension systems. These factors will even reinforce in the long run, as the cap of 10% on pension losses will gradually phase off, in particular after 2033 when the harmonisation of public pension systems will be fully effective. Consequently, the Austrian projections manifest even an apparent drop in public pension expenditures below their initial value from 2035 to 2050 to 12% in terms of GDP (to 13.1% incl. other pension expenditures). Net public pension expenditures, with its initial level of 11.5% of GDP in 2004, follow roughly similar long-term trends as gross public pension expenditures.

This underlying dynamism is driven mainly by spending developments in the social insurance schemes by the private sector (i.e. employees, self-employed, farmers). The pension expenditures of the social insurance system will rise by 20%, from 10.5% of GDP to a peak of 12.5% in the year 2035, then levelling off around 12% of GDP thereafter. The increase is mainly based on the increased number of pensions all together. Pension reforms are noticeably slowing down the expenditure

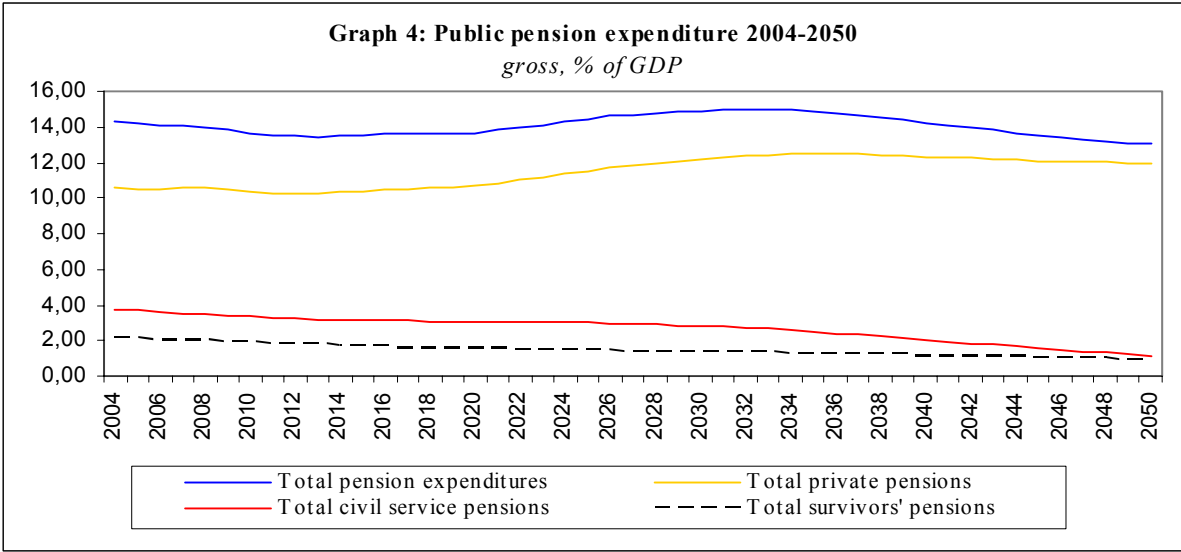


dynamics due to a higher effective retirement age through the rise of legal (female) retirement ages and major disincentives for early retirement as well as the dampening effects on the benefit ratio. This trend exhibits also the assumption that a larger proportion of public sector employees will be transferred from the civil service to the ASVG scheme. The comparison of the different areas of pension spending reveals most clearly the trade off between spending on civil servants and them being transferred to the ASVG system in the medium and long run. Spending on civil servants goes down, while the social insurance spending compensates this decrease.

For this reason, pension expenditures for the federal and local governments and communities are projected to steadily decline to 1.2% of GDP, starting from a level of 3.8% in 2004. The assumption that a large number of public sector employees will be insured in the ASVG system in future is the reason for this decline as well as the future replacement rates with newly and gradually harmonised civil servants' pensions.

The overall revenues (in particular from social security contributions from the social security and the civil service schemes) will remain constant until 2020 at a level of 9%, as these are intimately linked to the developments of the wage sum, after this they will slowly recede to a level of 8.5% of GDP in 2050. Based on the projections 2005 to 2050 the Austrian pension system appears to be sustainable in the long run, as the total deficit in terms of GDP will not rise over the long run. Nevertheless, possible risks shall not be omitted from expectations, as also the sensitivity analyses demonstrate below.

**Graph 19 - 4 Public pension expenditure 2004-2050**



Source: BMSG, BMF (2005)

**19.4.2 Number of pensions and their future development**

In 2004, as a total, 2.34 million public pensions has been accounted for, 2.04 million in social pensions and 295,000 pensions for civil servants (13% of all pensions). Approximately 750,000 pensions were awarded to people aged under 65, this relates to around 970,000 people in that age cohort and makes up for a high percentage of 32% of all pensions. In comparison: the employment rate for people aged 55-65 is only 30%, which is one of the lowest quotes in all EU Member States. The number of survivors' pensions amounted to around 610,000 in 2004, which is a share of approximately 26%.

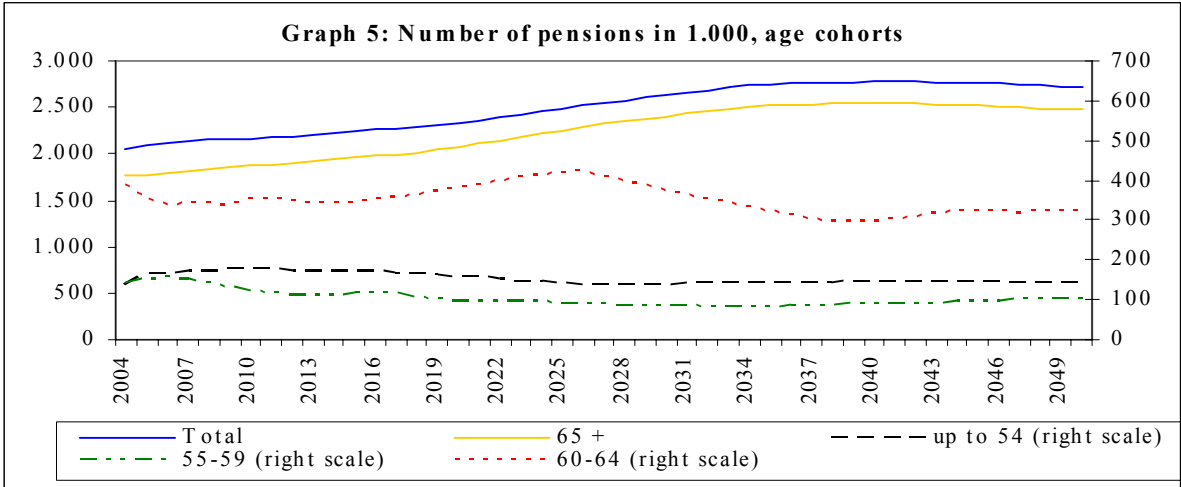
Due to the ageing population the number of pensions will significantly rise until 2050. In the Austrian projections, it will increase by about 24% to nearly 2.9 million pensions. The peak level of around 3

million pensions will be reached in 2035. This is nevertheless a markedly lower increase than the overall increase of the share of the older population (65+ years) of the working population (increase of 92% until 2050). This is due to

- an increase of the employment rate because of the (long rung) amplification of the legal retirement age leads to a noticeable turnaround in the number of pensions in the age cohort 55-64: a reduction of pensions by 24% from around 750,000 to 570,000 in accordance with the increased employment is projected. The share of early pensions of total pensions is, thus, reduced from 32% to 20% until 2050.
- the number of widowers' and widows' pensions remains constant at about 600,000 until 2050, in essence, as a percentage it will be reduced to 22%. This is because of modelling the contemporary change in family structures and also because life expectancies of women and men are expected to converge more and more.
- fewer double pensions are being awarded; for example pensions for WWII victims or veterans are fading out.

The Austrian projections are also based on the assumption that because of an abolishment of tenure in the public sector and consequently pensions for civil servants are being replaced by social security pensions. Linked with a restrictive policy in new public hiring (based on today's reforms until 2015), the number of pension benefits will be reduced by more than 40% from nearly 300,000 to around 175,000. This causes the projections to rise by 147,000 additional social security pensions until 2050.

**Graph 19 - 5 Number of pensions by age cohorts, in 1000**



Source: BMSG, BMF (2005)

The most obvious observation to be made from the analysis of the number of pensions is the marked drop in early pensions as of 2025. This is the time when the female legal retirement age will commence to converge to the male age. All pensions for retirees older than 65 years continually rise, whereas pensions up to 59 years are assumed to remain relatively constant especially after 2020.

**19.4.3 Average pensions and their future developments**

Overall, Austrian pension systems are characteristic for fairly high gross and net replacement rates by international comparison in combination with long contribution periods. The average old age pension (gross) in the social security system, however, amounted to 946.5 Euro (males: 1,239.4 Euro; females: 725.7 Euro) per month (14 times a year) in 2004. Moderate pension adjustments in the last few years and the newly introduced deductions have dampened average pensions though already during past

years. Also in the medium and long run it is to be expected that average pensions will increase less in comparison to active wage earnings.

This is due to

- the change of indexing pensions from net wages to consumer prices
- considerably higher deductions for earlier retiring of 4.2 percentage points per year, if a retirement occurs before the age of 65
- significantly longer insurance times are preconditions for the maximum replacement ratio of 80 % (45 years)
- steep income curves are no longer advantaged
- the replacement rates are depending on life-long incomes and not on the last incomes of a person insured.

These dampening effects on average benefits will in particular materialise after 2033 when the overall ceiling on pension losses by 10% will fade out ultimately. Moreover, lower benefit ratios are especially concerning the benefits for civil servants. This will result in a significant overall drop in the benefit ratio by close to 5 percentage points of GDP in relation to wage developments (as highlighted in the EPC Ageing Report).

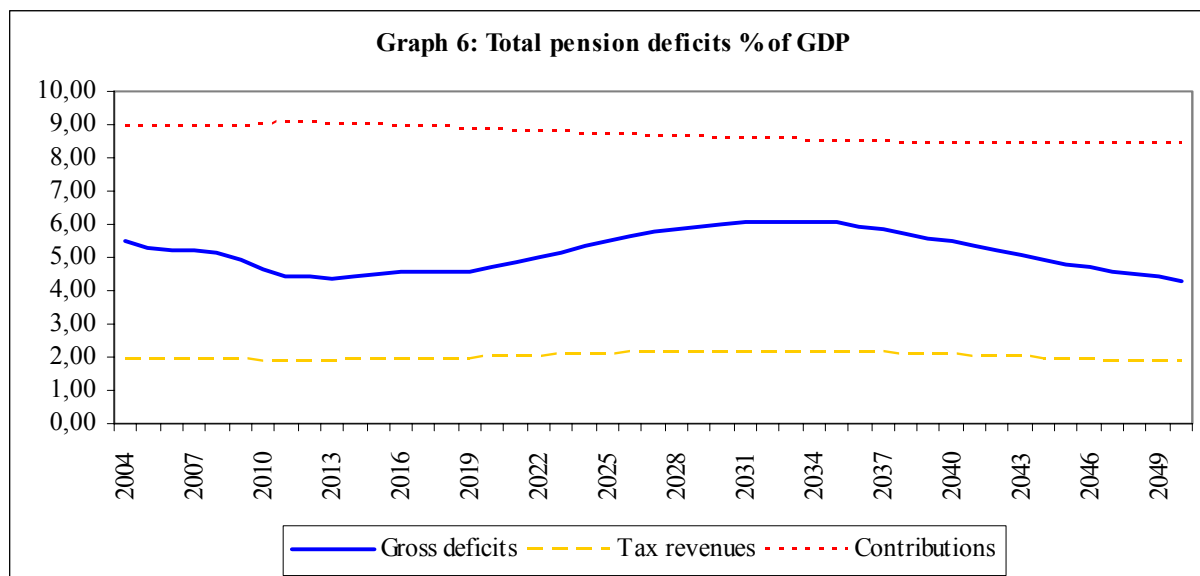
#### **19.4.4 Social security contributions and the overall pension deficit**

Pension contributions in Austria are closely linked to the development of contribution bases, mostly gross earnings. It can, therefore, be assumed that also in the future their level will move in accordance with gross wage earnings. In this way, contributions are projected relatively constant in the social security system with a little over 7% of GDP. The structural shift from public servants into the social security system will cause a noticeable decrease in contribution payments of those former employed in the civil servants' scheme by approximately 0.6 percentage points of GDP. In total, a marginal decrease of contributions (and other revenues) from 8.8% of GDP to 8.5% of GDP until 2050 is projected.

Approximations for tax revenues of pension incomes for 2004 result in a total value of 1.9% of GDP. The projections assume that until 2050 tax revenues will only decrease marginally (to 1.8% of GDP). As a result, the increase in the number of pensions would generate higher tax revenues in future, but this will be offset by comparably lower average pensions combined with reduced tax progressivism, above all in the sector of civil servants.

The latest reforms will reduce the deficit in the pension system by approximately 1 percentage point of GDP until 2015. According to projections the deficit in the pension area increases rapidly from 2015 onwards due to the enlargement of public pension expenditures, by 1.5 percentage points a peak level of about 6% of GDP will be reached in 2035. After that mark the deficit will constantly fall, but at a slower pace than expenditures, since revenues are also declining. According to medium and long run projections and accounting for tax revenues to remain relatively constant and for contributions slowly to decline, overall government debt does not pose severe financial sustainability problems. The development of total pension deficits exhibits the through-peak development of the s-shaped expenditure curve which is caused by the pension reform being gradually implemented.

## Graph 19 - 6 Total pension deficits, % of GDP



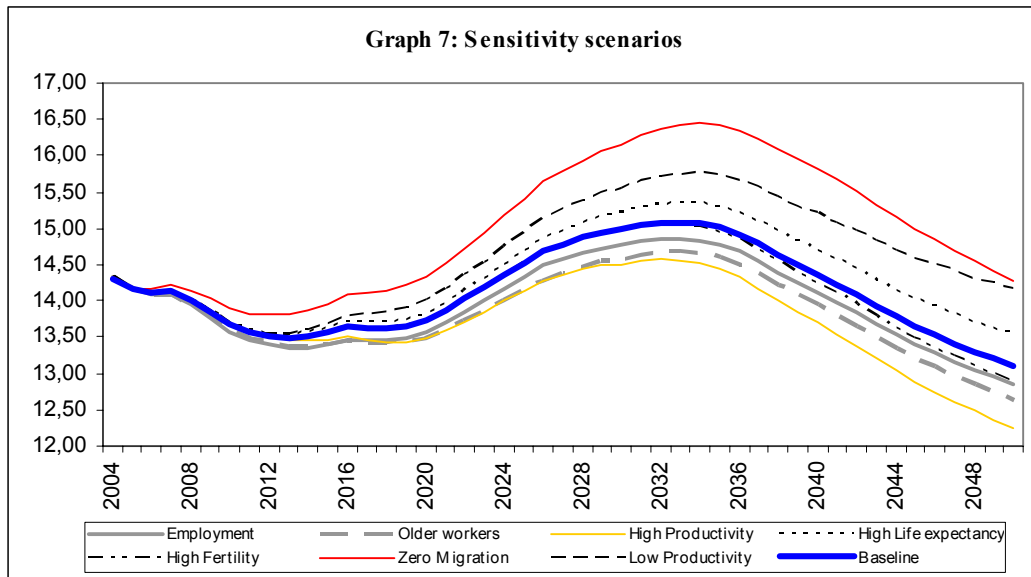
Source: BMSG, BMF (2005)

### 19.4.5 Sensitivity analysis

The sensitivity analyses explain the risks of projected developments of public pension spending:

- The expenditure projections react strongly to changes in demographic parameters, old age dependency ratios are immediately reflected, a higher birth rate only functions as an inbuilt time lag.
- An increase/decrease of the employment rate by 1 percentage points in relation to the baseline scenario results in changed pension expenditures of +/- ¼ percentage points of GDP until the end of the projection period. This implies labour market reforms, especially concerning a reduction of unemployment and increased women's participation.
- An increase/decrease of the old age employment ratios (between 55 and 64 years) by 5 percentage points as compared to the baseline scenario results in changes of pension expenditures of +/- ½ percentage points of GDP at the end of the projection period. The baseline projections assume that the employment rate of older workers will increase from 30% to nearly 60% due to the pension reforms and the harmonisation of gender specific retirement ages.
- If the average productivity growth will change by +/- ¼ percentage points, public pension expenditures will change by +/- 1 percentage point of GDP. Since employment also goes down due to the reduction in labour supply, future growth will be dependent of productivity increases. Structural reforms aiming for a knowledge based society and increased competition are a necessary anticipation for that matter.

Graph 19 - 7 Sensitivity scenarios



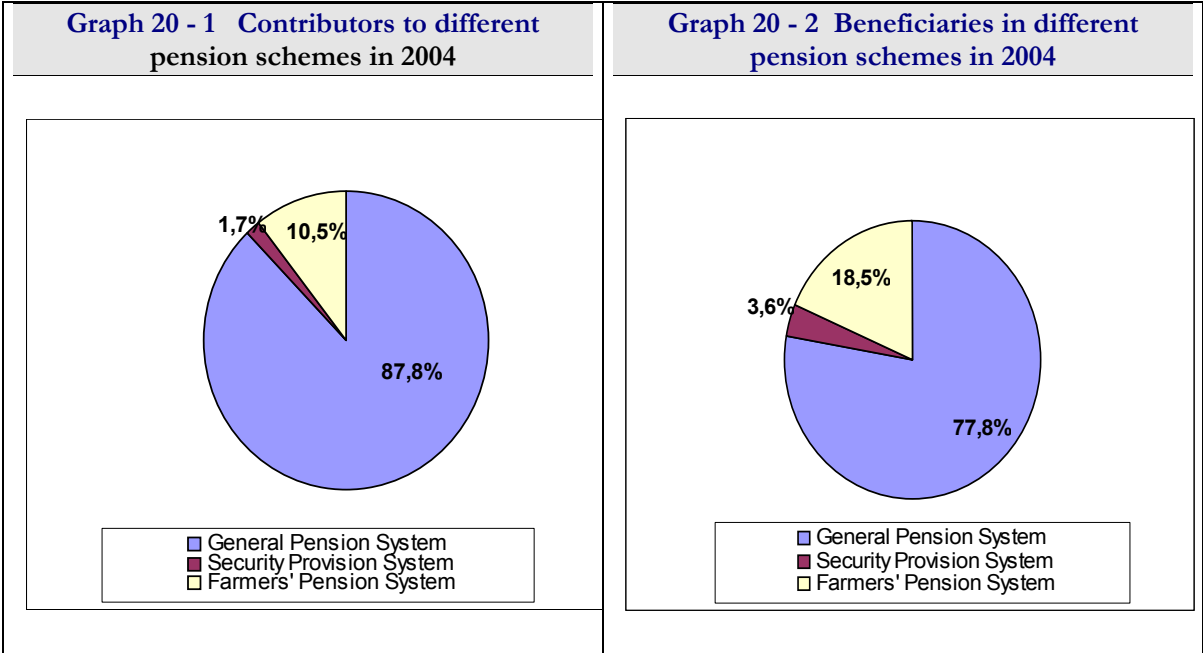
The sensitivity analysis shows for the Austrian case, that the highest risks for public pension expenditures are in the case of the zero migration scenario, the lowest risk is related to the scenario with higher productivity. The low productivity scenario is the second highest risk scenario for the pension projection exercise in the Austrian case. All other scenarios do not diverge much from the base line results.

## 20. Poland

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### 20.1 The Polish Pension System

In Poland, pensions are paid out from two insurance systems: general covering employees and self-employed and pension system for farmers. Security provision systems for military forces, police and similar services as well as judges and prosecutors function separately. Each of those systems operates under separate rules and concerns another group of people. The largest, general pension system, pays out old-age, survivor and disability pensions for nearly 77.8% of all pensioners. Benefits for 18.5% of pensioners are paid out from the farmers system. Other pensioners receive their benefits from the security provision systems (Graph 20 - 2). The systems are based on different rules for paying contributions and receiving benefits. The benefit indexation rules, however, are the same.



In the case of farmers pension system there is a larger number of beneficiaries than contributors. This stems from the ongoing restructuring of the Polish agriculture. It is forecasted that in the future the number of persons employed in the agriculture will be decreasing.

The higher number of the beneficiaries over the insured in case of the security provision is caused mainly by the retirement age lower than the one, which is obligatory in the general pension system (Graph 20 - 1 and Graph 20 - 2 present the shares in respective pensions systems in Poland).

### 20.1.1

### General Pension System

Social insurance in Poland includes insurance against old age, sickness, maternity, inability to work, loss of the bread winner, work injury and professional diseases. The general social insurance system in 2004 covered 13 million people. From this system benefits have been paid out to 7.2 million old-age, survivor and disability pensioners. In 2004, benefit expenses amounted to 104.4 billion PLN (11.8% of GDP), out of which 96.3 billion PLN (9.2% GDP) was for old-age, survivor and disability benefits. State budget supplementary subsidy covering deficit for the system in 2004 amounted to 19.4 billion PLN.

The roots of current of social security system in Poland date back to 1918. After WW II and until 1999, the system's rules were close to those of traditional systems on the European continent. It was a pay-as-you-go system, operating on the basis of a defined benefit formula. According to the forecasts prepared in 1998, the pension system deficit would have been increasing on average by 1% GDP (about 8 billion PLN) every 10 years to reach over 2% of GDP in 2030 and nearly 4% in 2050. Financing such a large deficit would have involved the considerable increase of social security contributions or taxes.

The pension reform that was launched on January 1, 1999, has fundamentally changed the system's construction, aiming at significant reduction of pension system's insolvency risk in the long term (it limited the implicit debt of public finance which resulted from the large scale accrual of pension liabilities). The basic reason for the reconstruction of the system was to adjust it to demographic changes and to facilitate the economic growth of the country. The main goal was to create the pension system that provides appropriate level of benefits (with special consideration to the minimum benefits), is financially stable and encourages the participants to extend their working lives. The reform is also designed to contribute to a higher level of savings in the economy.

The system hitherto, which was based on the defined benefit rule, was transformed into a system based on a defined contribution. The mandatory part of the system was divided into two parts: non-financial and financial. The former is managed by a public institution – Social Insurance Institution (ZUS), the latter – by private institutions, i.e. general pension fund societies. For each insured person in this system two accounts are kept. The first account (non-financial) is kept by ZUS forming the so-called notional defined-contribution (NDC) scheme, the other is kept in an open pension fund, forming a funded defined-contribution (FDC) scheme. The statutory retirement age has been preserved at the level of 60 years of age for women and 65 for men. However, the system does not allow for early retirement, which should lead to a rise in the effective retirement age. In 2004, the average actual retirement age in the general system was 56.8 years (58.7 for men and 56 years for women).

Old-age pension contribution amounts to 19.52 per cent of gross wage and are payable in equal parts by the employer and by the employee. In the case of a member of an open pension fund, part of the contribution in the amount of 7.3 per cent of the wage is transferred by ZUS to the fund of member's choice. The remaining part, i.e. 12.22 per cent stays in ZUS. Contributions for the remaining insurance risks are also paid to ZUS including contribution to disability and survivor pension insurance amounting to 13 per cent of the wage, (paid in equal parts by employee and employer).<sup>120</sup> The mandatory system should be supplemented with voluntary saving in the framework of Employee Pension Plans and Individual Retirement Accounts.

The contributions registered on the individual account of the insured with ZUS are indexed. The indexation can be considered as a sort of rate of return on pension savings. Indexation factor is equal to consumer price index increased by the real growth of the contribution revenue, measured on contribution due. Indexation cannot be lower than the Consumer Price Index. The funds transferred to

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<sup>120</sup> Additionally the employee finances the sickness insurance contribution equal to 2.45 per cent and the employer work injury contribution, which depends on the work injury risk in a given branch of industry and company and varies between 0.97 and 3.86 per cent.

the Open Pension Funds (OPF) are converted into settlement units. Their value depends on investment performance.

The benefits paid from the system are indexed at least with the price index.

In 1999, people who were subject to insurance were divided into three groups:

1. those born before 1 January 1949 retire according to the old pension system rules (defined benefit principle);
2. those born after 31 December 1948 and before 1 January 1969 will retire according to the new system rules (defined contribution principle); to this end, their pension rights acquired before the implementation of the new system were converted into initial capital and were registered on the account with ZUS; after the implementation of the new system they could choose either staying only in the NDC scheme or join a funded scheme (two account option) ;
3. those born after 31 December 1968 will retire in accordance with the new rules and obligatorily have two accounts (full defined contribution principle).

The reform had impact on the general system's income due to the transfer of part of pension contributions to the OPF. Pensions financed from savings in OPF, will be paid out in the future, as people who are covered by the reform, will retire. The first old-age pensions in the new system will be paid out from 2009. Therefore, when assessing the new system, we can now rely only on the projections of the amounts of future benefits.

In the new NDC pension system, the pension formula composed of three parts:

- A flat component, equal to 24 per cent of the base amount (economy-wide average wage);
- An earnings-related component, equal to 1.3 per cent of the applicant's assessment base<sup>121</sup> for each year of contributions paid;
- A supplement of 0.7 per cent of the applicant's assessment base for each year of non-contribution during the career. Other eligible years (e.g. bringing up children, university education) may not exceed one third of contribution years.

In the new pension system, the old-age pension is an equivalent of amount of contributions after indexation collected after 31 December 1998 and amount of the so called initial capital after indexation divided by the average life expectancy, expressed in months, for persons in the age equal to the retirement age of a given person applying for the pension. Life expectancy is averaged for men and women. This formula concerns funds collected only in ZUS. There are ongoing work on the Act on annuities that would define the institutional arrangement for pension payments in the financial part of the system..

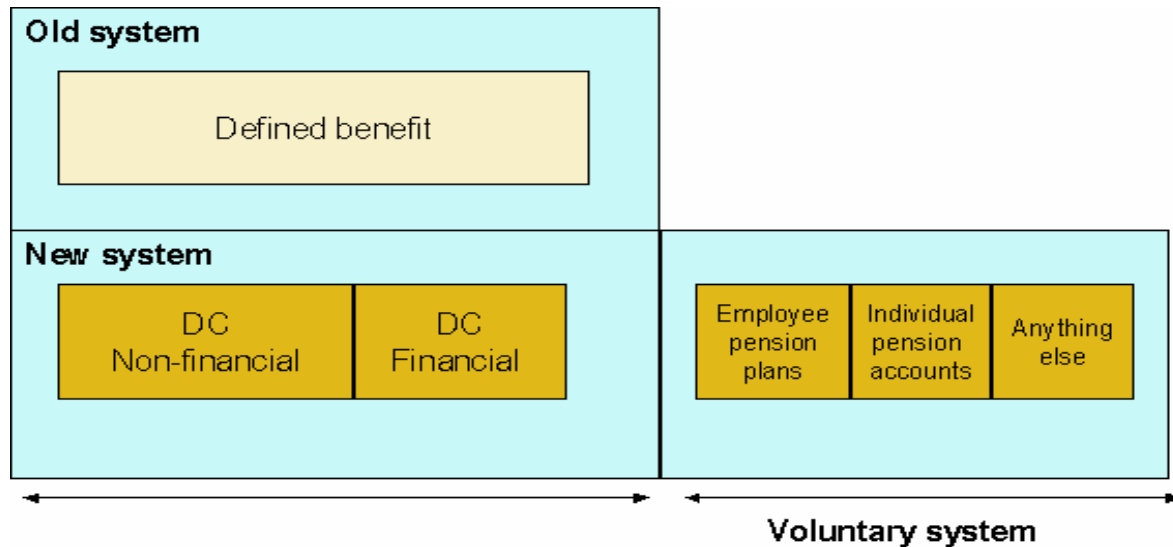
The initial capital expresses the part of old-age pension accrued under the old pension system until the end of 1998. The calculation of the initial capital is based on the old pension system formula, with adjustment for the age and working period. The amount of pension calculated for the end of 1998 is multiplied by life expectancy of a person aged 62 in 1998 and registered on notional account.

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<sup>121</sup> The assessment base equals to individual's average earnings over period of 10 consecutive years chosen from last 20 years indexed for wage inflation. The averaging period was gradually increased from 3 years in 1993 to 10 years from 1999 on. Additionally, there is a maximum cap on assessment base equal to 250 per cent of average salary.



Graph 20 - 3 The structure of the General Pension System



### 20.1.2 Farmers' Pension System

Since 1977, farmers and their families are subject to compulsory social insurance. Until 1991 that system was managed by ZUS, and since 1991 – by the new established institution: Agricultural Social Insurance Fund (Kasa Rolniczego Ubezpieczenia Społecznego – KRUS). The separate administration is connected with the implementation of specific solutions, addressed to that population group, in particular preventive activities, rehabilitation treatment, separate medical assessment system, different manner of paying contributions and calculating benefits since 1991. At the end of 2004, there were 1.5 million people insured, while old-age, survivor or disability pension benefits were received by 1.7 million beneficiaries.

Pension insurance for farmers is financed from the Pension Fund (Fundusz Emerytalno-Rentowy – FER), whose expenses in 2004 amounted to 16.5 billion PLN. FER's revenues, meanwhile, derive primarily from the state budget subsidies (in 2004, 15.1 billion PLN) and partly from the contributions from active farmers (in 2004, 1.1 billion PLN). The contribution for old-age, disability and survivor pension insurance is payable quarterly and amounts to 30% of minimum old-age pension (that pension in 2005 amounted to PLN 562.58). The revenue from contributions for old-age and disability pension insurance covers only 6% of the expenses for the old-age and disability pension insurance. Such a share of revenues from contributions in the financing of the old-age pension costs is associated, first of all, with the initial assumption that this system would be receiving subsidies from the state as well as with an unfavourable relation of the number of the insured to the number of beneficiaries. Furthermore, the contribution burden is spread very unevenly as the contributions form quite a considerable burden on small farms, while for the larger ones contributions are almost negligible.

An insured farmer is entitled to a farmer's old-age pension upon meeting the following conditions:

- he/she attained retirement age (60 years for a woman, 65 years for a man),
- he/she was subject to the old-age and disability pension insurance for at least 25 years.

A farmer's old-age pension is calculated in relation to the amount of minimum old-age pension and consists of a contribution part and a supplementary party. The contribution part depends on how long the farmer was subject to insurance and it is determined by an assumption of 1% of the minimum old-age pension for each year of being subject to old-age and disability pension insurance. This part of the

farmer's old-age pension is paid out regardless of cessation of agricultural activities, i.e. transfer of the farm. The supplementary part is between 95% and 85% of the minimum old-age pension and decreases with the period of insurance. The supplementary part of the benefit is payable after the transfer of the farm. As a result of such rules for calculation of the old-age pension amount, the distribution of old-age pension amounts is highly concentrated.

### **20.1.3 Security Provision Systems**

Security provision systems are entirely financed by the state budget. They include benefits for the police, army, fire-fighters, officers of the Government Protection Bureau (BOR), Internal Security Agency, Foreign Intelligence Agency, Polish Border Guard, prison guards, judges and prosecutors. In comparison with the general system, it has two distinguishable features:

- the acquisition of retirement rights depends on the work service period – one can retire as soon as after 15 years of service, which means that those systems have relatively the youngest retirees;
- the amount of benefit is determined in the basis of the amount of final salary or wages, so in a different manner than in the general system<sup>122</sup>.

In 2004 a total of 329 thousand old-age and disability pension benefits is paid out from this system (which was about 3.6 per cent of all beneficiaries). The expenditure for security provision system amounted to 8.3 billion PLN, which was about 7 per cent of all Polish expenditure on pensions (it was also 4.2% of the state budget expenses<sup>123</sup>)

## **20.2 Assumptions**

### **20.2.1 Demographic assumptions of the AWG projection for Poland.**

The Polish AWG projection is based on the EUROPOP2004 population projection prepared by EUROSTAT, in which the following assumptions were applied:

- 1) The TFR (total fertility rate) indicator will increase from 1.21 in 2004 to 1.60 in 2050
- 2) The average life expectancy of men will increase from 70.5 years in 2004 up to 76.8 years in 2030 and 79.1 years in 2050. The average life expectancy of women will increase from 78.5 years in 2004 up to 82.8 years in 2030 and 84.4 years in 2050.
- 3) It is assumed that the net migration between 2004 and 2050 will fluctuate. At first the negative balance will grow from 28 thousands in 2004 up to 50 thousands in 2015, which can be explained by the increase in outmigration resulting from opening of EU labor markets. After 2015 the negative balance will decrease and starting from 2021 it will turn positive stabilizing at the level of 34-36 thousands annually between 2030 and 2050.

The assumptions of the projection prepared by EUROSTAT differ from those on which the Polish Central Statistical Office's (GUS) projection for 2003-2030 prepared in 2003 is based. The GUS assumptions for baseline scenario are following:

- 1) The TFR (total fertility ratio) indicator will decrease from the level observed in 2002 – 1.25 down to 1.1 in 2010 and then it will recover stabilizing in 2020 – 2030 at the level of 1.2. Despite that assumptions are different from the ones applied by EUROSTAT, these differences will not translate into differences in forecasted values until 2020-2030.

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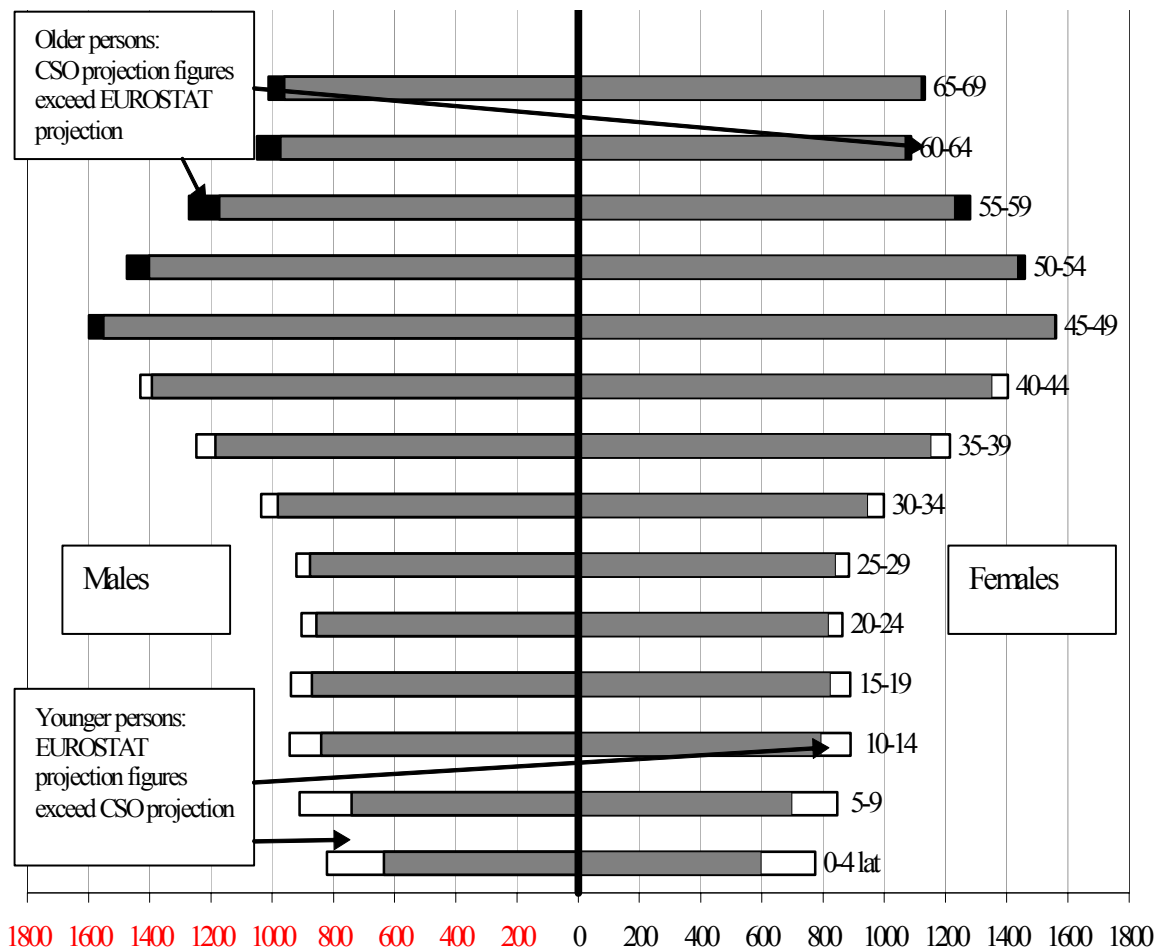
<sup>122</sup> Old-age pension for soldiers may be granted after 15 years of performing duty, no matter of age, it is equal to 2.6 per cent of the final remuneration, for each year of service, but no more than 75% of the final remuneration.

<sup>123</sup> State budget expenditure on pensions from security provision.

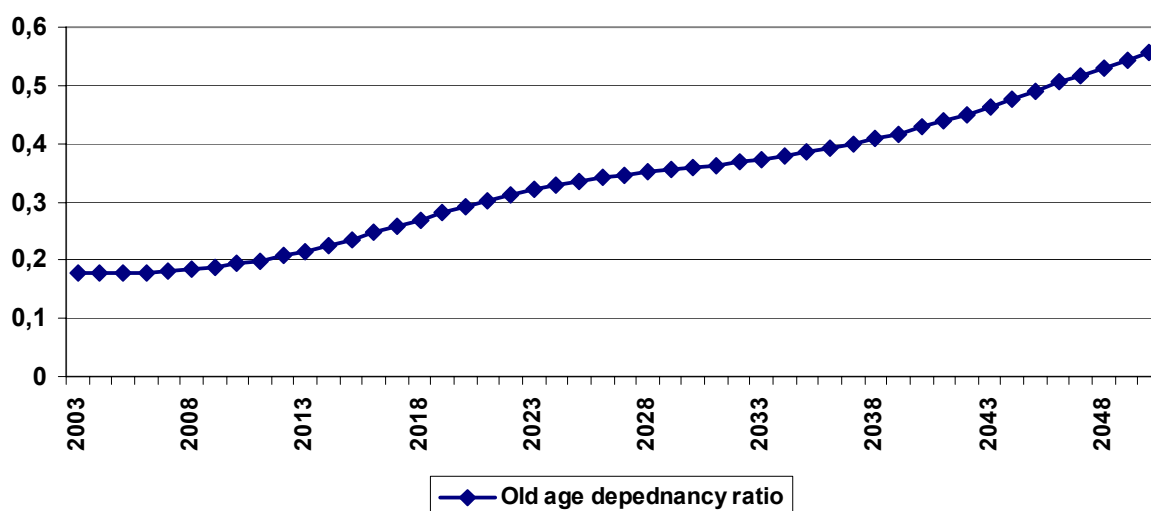
- 2) The average life expectancy is projected to increase to 77.9 years in for men and 83.3 years for women in 2030.
- 3) The migration balance will follow the downward trend stabilizing in 2020-2030 at the level of 24 thousands.

The differentials between the assumptions of both forecasts are connected with the fact, that the projection of GUS assumes greater pace rate of the ageing process than the projection of EUROSTAT, both due to the lower fertility and longer average life expectancy. The projection horizon of GUS is shorter than the one adopted in the EUROPOP2004 and therefore the gap between the respective numbers of the working age population is not substantial.

**Graph 20 - 4 Differences in 2030 between the population projections of Eurostat and the Polish Central Statistical Office**



Graph 20 - 5 Evolution of the old-age dependency ratio



One of the most important indicators describing changes of the demographic structure is the old-age dependency ratio, that is the relation of the number of old-age group (people aged 65 years and over) to 100 persons in the working-age group. It is forecasted that this ratio will rise from 18 in 2004 to 56 in 2050.

### 20.2.2 Macroeconomic assumptions of the AWG projection

The forecast of public expenditure is based on the assumptions concerning basic macroeconomic indicators prepared by the Commission according to the standard methodology applied to all member states.

Table 20 - 1 Macroeconomic assumptions

	2004	2010	2020	2030	2040	2050
Annual growth rates						
- GDP	3.3	5.0	3.2	2.2	0.7	0.4
- Labour productivity	4.1	3.6	3.1	2.7	1.9	1.7
- Employment	2.8	1.4	0.1	-0.5	-1.2	-1.3
- Population (15-64)	0.5	0.1	-1.1	-0.4	-0.8	-1.6
- Labour supply (15-64)	1.4	0.7	-0.6	-0.5	-1.2	-1.3
Unemployment rate	19.0	15.8	9.9	7.0	7.0	7.0
Real interest rate	3.0	3.0	3.0	3.0	3.0	3.0

According to the assumptions employment growth rate will decrease from 2.8% in 2004 to 1.4% in 2010, reaching 0.0% in 2024, and thereafter, as a result of a decline in the labour supply, the number of employed will start to decrease.

The changes in economically active population are determined by the changes of the working age population and the assumptions on the growth of the labour force participation rates. The projection base on two main assumptions:

- 1) EUROSTAT population projection and
- 2) labour force participation rates calculated using the cohort method developed by the OECD with the assumption that the younger generations will have higher participation rates when

they became old. According to these assumptions, the number of economically active persons will grow until 2013, then there will be a downturn because of shrinking working age population which will be mitigated by rising activity of the population in the working age. As of 2028, the participation rate will drop due to decrease of the share of prime age population (with highest participation rates) in the working age population. This effect and permanent decrease of the working age population will result in the accelerating decrease in labour supply after 2030 which amount up to 1,3% annually at the end of the projection period.

The changes in the unemployment rate result from the changes in the labor supply and in the employment rate. According to the assumptions of AWG, the unemployment rate will decline from 19% in 2004 to 15.8% in 2010, 9.9% in 2020 and 7% in 2030. Afterwards the unemployment rate will level off at 7%, which is the NAIRU level.

It is assumed that the productivity growth, which is currently higher than in the EU15, will be slower in accordance with assumption on the labor productivity convergence adopted by AWG.

The GDP growth is the consequence of the developments concerning the production factors. In 2007-2010 it will exceed 5% annually, afterwards it will gradually fall. Lower dynamic of the labor productivity will cause GDP growth to go down to 3.2% in 2020, and in the subsequent years the decreasing numbers of the employed will lead to even lower GDP growth, which will reach 0.4% in 2050.

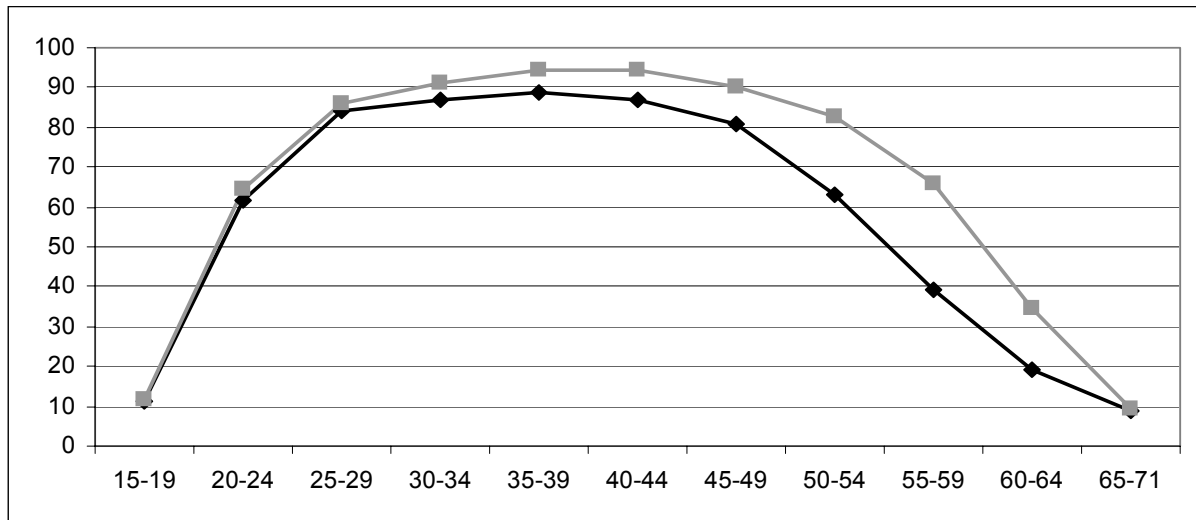
The real interest rate was assumed at the level of 3% for all the EU25 countries following the assumption of convergence of interest rate.

Socio-demographic assumptions of the projection reflect the expectations concerning the main tendencies concerning the future labor market developments in Poland, which can be characterized as follows:

- 1) The number of the working age population will follow the trend indicated by the demographic forecast. It will rise reaching a peak in 2012 and afterwards there will be a continuing fall, slightly slower in 2028-2038 because of the baby boom generation from the turn of 70ies and 80ies entering the labour market.
- 2) The labour productivity in Poland will be improving at a greater rate than in EU15, which reflects the process of catching up with the productivity standards. On the other hand, a convergence mechanism has been assumed to make the productivity dynamics in the new member states follow the productivity dynamics in the old member states, and as a result in 2050 in UE10 it will reach the level of 1,9%, whereas in UE15 – it will reach 1,7%.
- 3) In the AWG projection it has been assumed that the rate of wage growth will be equal to the rate of the productivity growth, so that the share of the labor factor in the added value remains constant. This assumption hasn't been reflected in recent Polish labor productivity data developments. According to data from 1999 until recently, the rate of labor productivity growth in Poland has been higher than the rate of the wage growth. This trend cannot remain unchanged, however, overestimating wages in the current period may bear consequences for the projection (ie.: in overestimating the revenue from of the old-age pension contributions)
- 4) The economic activity (measured by the economic activity rate) will rise from the current level, which is one of the lowest in the EU25 countries. The source of this increase should be the greater activity on the labor market of the next generations. This assumption reflects the growing activity of women, higher level of human capital of next generations, which will improve their chances to remain longer on the labor market, as well as increase of real retirement age following the introduction of the new pension system and limiting access to the pre-retirement benefit expenditure.
- 5) The employment rate in Poland is currently the lowest among EU countries (in the 15-64 age group in 2003 it amounted to 51%). It results from the low activity rate and high unemployment. The employment rate should rise sharply in the future due to economic

activity growth (Graph 20 - 6) and improvement of the labor market situation (decreasing structural unemployment).

**Graph 20 - 6 Comparison of the economic activity rates in 2004 and 2050**



## 20.3 The results of the forecasts – baseline scenario

### 20.3.1 Analytical tools

In case of Poland the forecasts concerning old-age and disability pensions refer to:

- General Pension System, including non-financial and financial tiers
- Farmers' Pension System
- Security Provision Systems
- Preretirement benefits

The projections cover neither minimum pension nor the Occupational Pension Programmes, nor the latest amendments in the law on the old-age and disability pensions from the Social Insurance Fund concerning old-age pensions for miners and prolonging the possibility for early retirement till 2007<sup>124</sup>.

The forecasts concerning the general pension system have been prepared using the actuarial model of Social Insurance Fund. The following expenditures are forecasted:

#### Insurance based

- old-age pensions
- disability pensions
- survivors' pensions
- work injury pensions (disability and survivors')
- sickness benefits
- nursing allowances
- full orphan allowances

<sup>124</sup> The amendments were introduced while the work on the projections was in progress and there was no technical possibility to include them in the modelling. According to the government estimates, the changes increase pension expenditure by 0,3 percentage points of GDP annually.

- funeral grants
- rehabilitation benefits
- compensations due to work injury or occupational disease
- maternity allowances
- family care allowances

Non-insurance based

- budgetary old-age pensions
- budgetary disability pensions
- budgetary survivors' pensions
- combatant's supplements
- lump sum payments for energy costs
- and other benefits

Other

- prevention activities
- administrative costs

The *FUS04* model does not incorporate any demographic forecasting sub-model. Demographic projection must be loaded from an external source. In order to meet our requirements, we combined two independent demographic projections: the base projection, accurate for both total and cohort figures were delivered by Eurostat. Note that this projection did not diversify for the agricultural and non-agricultural population, which was crucial to meet our goals due to separation of general and farmers pension system. Therefore incorporation of an auxiliary projection was necessary - the broad and complex one covering the period up to the year 2030, originated from Polish Central Statistical Office has then been used. By merging the two - a hybrid projection was created (but still coherent with Eurostat predictions).

*FUS04* model is founded on the actuarial basis. Its kernel is a classical multiple decrement cohort-component actuarial model, which evaluates present and nominal values for essential pension-type payments (old-age and other pensions). Elemental calculation unit is "same-sex-and-same-age" cohort. The kernel is boosted with complementary modular sub-models projecting other benefit expenditures. The sophistication of the method applied decreases with the declining financial significance of a benefit. The contribution revenues forecast is derived from both the past experience and projected changes in demographics and labour market. Revenues are projected individually for four various types of social insurance: old-age, disability, sickness and work-injury. Again, calculations are executed for "same-sex-and-same-age" cohorts. The model reflects a typical deterministic approach, however, it could be employed as a tool for quasi-stochastic analysis through the huge multidimensional matrix of parameters for modeling variety of scenarios.

The expenditures in the farmers' system and the security provision system have been estimated with use of Polmodel – the simulation model of social policy budget.

In order to calculate the future pension contributions and expenditures of the scheme in the first step the employment of the individual farmers by age and gender were estimated. In the next step the number of the insured and the number of the beneficiaries were calculated and finally the pension contributions and expenditures of the scheme.

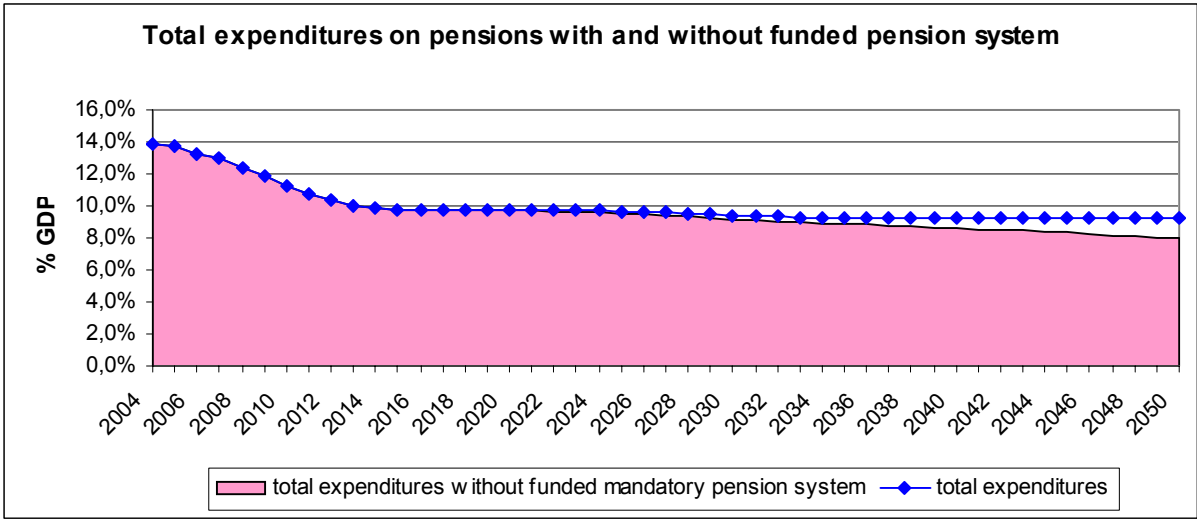
### **20.3.2 Results**

In 2004 Poland had one of the highest pension expenditures in the European Union, reaching 13,9% GDP. The old-age pension system reform not affected the level of these expenditures yet. The old-age pensions continue to be paid out on the previous system's rules based on the defined-benefit formula. It's worth noting that it will be possible to provide the holistic analysis of the reform only after the contributors who entered the labor market after 1<sup>st</sup> January 1999 start to receive the old-age pensions. Until then the insured will retire according to the rules that include pension rights accrued under the

previous old-age pension system, as which the level of pensions will be affected by the initial capital. Graph 20 - 7 presents the total expenditures for old-age and disability pensions, together with the financial component payments<sup>125</sup>. The expenditures fall significantly till 2014, and subsequently stabilise at the level of about 9.3 % GDP. The initial drop in expenditures results from the increase in the effective retirement age which amounted to just 58.7 for men and 56 for women in 2004. It means that men used to retire on average by 6.3 years earlier and women by 4 years earlier than it is foreseen by the general law. What's more, the decrease in the expenditures will be affected by the indexation of benefits with the CPI, as well as the assumption on the reduction in the number of the disability pensioners. In Poland, similarly to the other EU10 countries, a relatively high GDP growth has been assumed, which results in the relative decline in expenditures expressed as % of GDP, although it is expected that expenditure will grow in real terms. Stabilization of the expenditures expressed in percentages of GDP is the consequence of the pension reform, due to which the expenditures remain stable in spite of considerable growth in the number of old-age pensioners. The underlying cause is the pension formula, which incorporates a direct relationship between the accumulated capital and life expectancy in the level of the benefit. Additionally the expenditures are kept stable due to the way of indexation of national accounts in Social Insurance Institution. These accounts are indexed to the growth rate of the sum of contributions. This solution serves as a balancing factor, because the value of this rate depends not solely on the wage growth rate but also on the number of the insured. Due to such mechanism the liability of the pension system decreases in case of a fall in the number of the contributors.

The analysis of the old-age and disability system expenditures in the EPC report concerns two categories: public expenditures and the total expenditures. In case of Poland it means that the funds accumulated in Open Pension Funds are not included into the public expenditures. The methodology is applied in accordance with the EUROSTAT's classification. It is explained by the fact, that the Open Pension Funds are subject to private agreement between the contributor and the Fund, although the insurance of this kind is obligatory and guaranteed by the state. Until March 2007 Poland can benefit from the transitional period during which the Open Pension Funds can be classified as the central and local government sector funds, although in this respect the expenditures aren't included into the public expenditures. As a result of the exclusion of Open Pension Funds from the public sector accounts, the decline in the expenditures is even greater – from 13.9% GDP in 2004 down to 8% GDP in 2050. It is presented on the Graph 20 - 7 below.

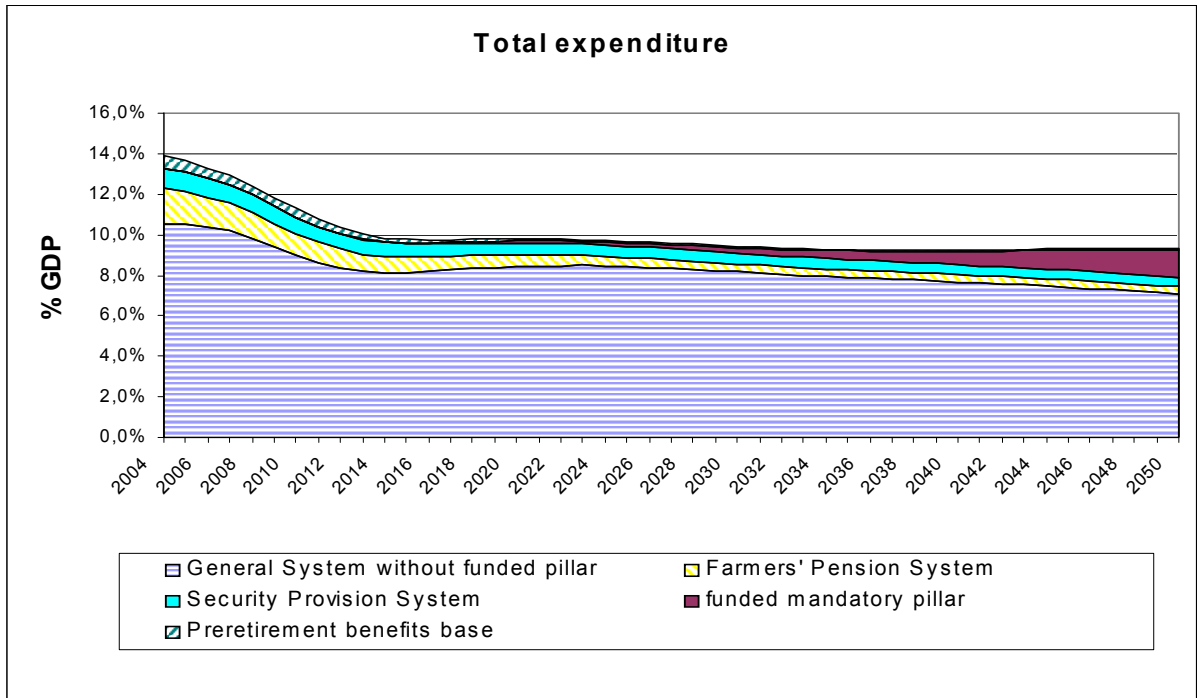
**Graph 20 - 7 Total expenditures on pensions with and without funded pension system**



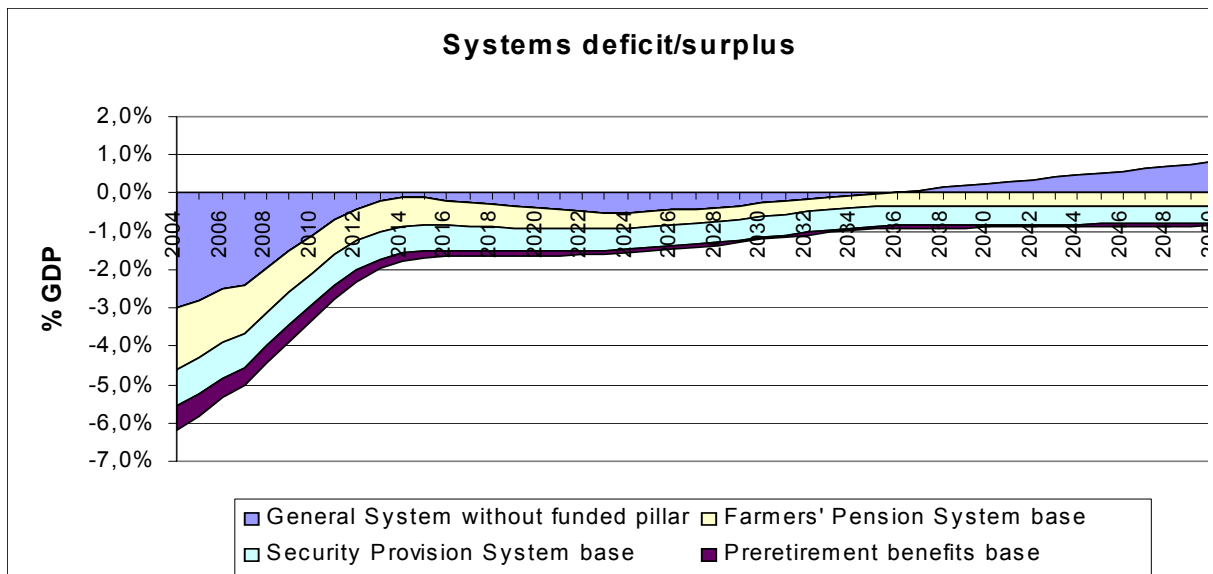
<sup>125</sup> The same formula has been adopted for calculating the payments of funds accumulated in the Open Pension Funds as well as in the case of national capital in the Social Insurance Institution.



**Graph 20 - 8 Pension expenditure by schemes**



**Graph 20 - 9 The projected evolution of the pension system deficit/surplus**



In the **General Pension System** in 2004 a deficit of about 3% GDP is observed. In subsequent years it decreases and turns into surplus after 2037. The decline in deficit is caused by the expenditure reduction for reasons which have been described above. Additionally, an increase in contribution revenues is caused by employment rate growth thanks to the growth in the participation rate and a fall in the unemployment rate (from 19% in 2004 to 7% in 2025). The wage growth is in line with the productivity growth, which was assumed to be high at the beginning (up to 4.4% in 2006). These factors affect to considerable extent the growth of the volume of contributions in the first part of the projection period. As the effective retirement age is simultaneously increased, the receipts from the contributions grow significantly.

The demographic changes also contribute to the developments described above. The number of the beneficiaries will decrease until 2012, thereafter to rise to the end of the projection period. It also has its impact on the deficit.

It is worth remembering, that in the general old-age system a funded Demographic Reserve Fund exists. The law on pensions from Social Insurance Fund does not define the moment of the opening of this reserve. For that reason the forecasts do not take this fund into account.

In the **Farmers Security System** in 2004 the deficit reached 1.6% GDP. It is forecasted that it will decrease down to 0.3% GDP, mainly due to decrease in the beneficiaries from 1.7million in 2004 down to 1million in 2023.

**The Security Provision Systems** are non-contributory, as a result their balance is presented as deficit which burdens the state budget. The construction of the **pre-retirement benefits system** in Poland is also based on the non-contributory rules.

**Table 20 - 2 The contribution of decomposed factors to the change (in percentage points) in all public pension expenditure relative to GDP**

	Public pensions		Due to growth in:			
	Start level 2005	p.p. change 2005-50	Dependency ratio	Employment rate	Take up ratio	Benefit ratio
PL	13.7	-5.7	10.4	-3.2	-4.5	-7.5
EU 10	11.5	0.3	9.9	-1.7	-3.8	-3.5
EU 25	10.6	2.2	8.6	-1.1	-2.1	-2.7

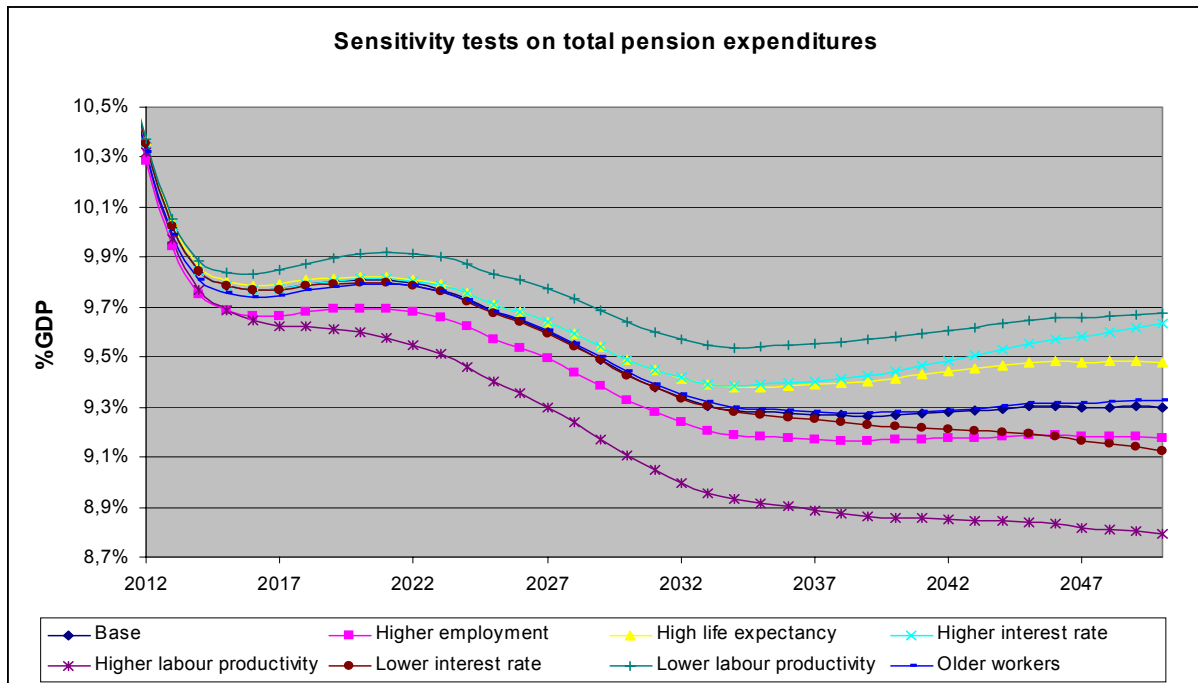
- **Table 20 - 2** provides the decomposition of the changes in the old-age and disability pensions expressed as % of GDP. The analysis shows, that the demographic changes *ceteris paribus* would result in increase of the expenditures by 10.4 %GDP, up to 24.1% in 2050.
- Due to the employment rate and the participation rate growth, the GDP rises. It means that GDP grows in real terms faster than the expenditures (benefits indexed by CPI) expressed by this measure. In the whole forecasted period it gives the result in minus by 3.2% of GDP. Increasing the effective retirement age (the forecasts assume the official retirement age equal to 60 for women and 65 for men) and limiting the access to the disability pensions will result in reduction of expenditures by 3.8% of GDP.
- A considerable decrease of benefit ratio (average pension/GDP per worker) is caused among others by the change in the formula of calculating the pension level – transition from the defined-benefit system to the defined-contribution system. Moreover, the expenditures do not take into account the payments from the second pillar and this fact additionally decreases this indicator. What's more, the indexation of benefits at the level of prices with the high GDP growth ratio assumed in the initial period also contributes to the decrease of benefit ratio in relation to GDP.

- It is forecasted that the total expenditures for old-age and disability pensions will amount to 8% of GDP in 2050. It includes the payments from the second pillar which will amount to 1.3% of the GDP. The level of the payments from the second pillar can be considered as low in comparison to other countries, in which the obligatory capital system has been introduced. It is caused by the fact that the capital system exists only in the general pensions system and does not exist in the Farmers Security System. Moreover, in the total expenditures the Security Provision Systems, pre-retirement benefits, and – above all – the disability systems are taken into account. It's worth remarking, that the disability payments are included in the expenditures on the old-age pensions. According to the definition of AWG, the disability pensions for those, who reached the general retirement age, are included into the old-age pension expenditure.
- The receipts from the contributions remain stable through the whole forecast's period and amount between 7.7 % GDP and 8.1%GDP in 2020, and afterwards stabilize at the level of 7.9% of GDP. In the same time even greater outflow of contributions to the second pillar can be observed. It results from the increasing employment and participation rate, which means increase of the number of contributors with simultaneous growth of the wages. On the other hand, the decrease of the expenditure on the old-age and disability pensions makes the contributions finance the benefits. In 2004 the contributions stood for 55% of the payments volume and this ratio was the lowest in EU. It is forecasted that in 2050 the contributions will finance the expenditures up to 99% and this ratio will be one of the most favorable in EU. Also the assumption on the decreasing number of the persons insured in the deficit-burdened Farmers Security Fund which means decline in number of those dependent on the state budget funding plays an important role. It's worth remarking that through the whole forecasted period there are funds accumulated in the Demographical Reserve Fund which in 2050 will amount to 0.5% PKB, and which is not accounted for. In the future opening up of this fund in the period of most unfavorable demographic developments can also limit the deficit to some extent.
- In all the EU countries the growth of assets of the capital systems is forecasted. It means that the role of this type of solutions of financing the old-age pensions increases. In Poland these assets can reach the level of up to 85% GDP.

### **20.3.3 Sensitivity tests.**

Taking into consideration the particular scenarios it is worth remembering that the expenditures are expressed in per cent of GDP. However, the GDP growth differs across scenarios. It results from the assumptions on the production function. The increase in the expenditures does not always mean the rise in the deficit of the system. In some cases the growth of expenditures may be accompanied by the increase in the receipts from the contributions. On the other hand the decline in the expenditures can be connected with simultaneous real growth of benefits. It takes place especially in case of strong GDP growth.

Graph 20 - 10 Sensitivity tests on total pension expenditure



*Higher life expectancy scenario*

In this scenario it has been assumed that the average life expectancy will be longer by 1.8 years in comparison to the baseline scenario, due to decrease in all the age specific mortality rates by 15%. This test is important because of the role of all the assumptions concerning the life expectancy for the forecasted outcomes and systematic underestimation of the life expectancy in the former demographic forecasts in previous years. The assumption on the average life expectancy - longer than the one assumed in the baseline scenario - results in expenditures increase of 0.2% GDP. The expenditures in the general pension system do not rise as the pension formula is to some extent neutral for this type of changes. The rise in the expenditures is caused by the growth of the disability pensions paid out to those, who reached the obligatory retirement age (in case of AWG these expenditures are included in the old-age system). The disability expenditures remain on the same level because of the definition adopted, according to which the disability pensions are paid out until reaching the obligatory retirement age.

*Higher employment rate scenario*

In this scenario it has been assumed that the employment ratio increases to the level higher by 1 percentage point over the level assumed in the baseline scenario and then in 2015-2050 remains stable on the level higher by 1 percentage point. This scenario points to what extent the burden connected with the society ageing is sensitive to the improvement of the labor market situation. In case of this scenario the number of economically active increases and the unemployment declines. It causes a drop of the expenditures on the pre-retirement benefits and disability pensions.

*Higher employment rate of older workers scenario*

In this scenario it has been assumed that the employment in the 55-64 age group grows during 2005-2025 period by 5 percentage point over the level assumed in the baseline scenario, and simultaneously the economic activity rises proportionally. It is worth remembering that in this scenario no change in

the retirement age is assumed. The increase in the employment affects the decline of the public expenditures only to limited extent. The analysis of particular systems shows that such scenario bears consequences for the social insurance system. The expenditures for the pre-retirement benefits decrease, as they are addressed mainly at the elderly. The expenditures on the old-age pensions increase, as the volume of contributions on the individual accounts increases, so the greater number of years of work experience raises the level of old-age pensions.

The source of financing the benefits is an important aspect of this scenario. Pre-retirement benefits are financed from the state budget, so the decline of pre-retirement benefits expenditures results in decrease in the state budget burden. On the contrary, the increase in the expenditures caused by the payment of higher benefits is connected with the higher receipts from the contributions. As a result, although the expenditures remain stable at the same level, it is followed by a decrease in the state budget burden and simultaneous increase in the level of old-age pensions. This scenario points at the positive consequences of increasing employment among the elderly. It's worth remembering, that the retirement age in this case has remained unchanged.

#### *Higher labour productivity scenario*

In this scenario it has been assumed that the rate of the productivity growth and the real wages growth reaches in 2015 the level higher by 0.25 percentage points than in the baseline scenario, and in 2015-2050 the rate of growth will remain stable at such a high level. These assumptions result in a very rapid growth of the contributions and of the benefits, although the total real value of contributions grows faster than the total real volume of old-age pension expenditure, decreasing the burden of the system.

#### *Lower labour productivity scenario*

In this scenario it has been assumed, that the productivity growth rate and the real wages growth reaches in 2015 the level lower by 0.25 percentage points than in the baseline scenario, and in 2015-2050 the rate of growth will remain at such a low level. A lower productivity growth assumption results in the increase of expenditure by 0.3% of GDP in comparison to the baseline scenario. Lower wages make the pensions and the receipts from the contributions lower. Comparing the real growth of the expenditures in the baseline scenario and in the scenario with lower productivity growth, a decrease in expenditures is observed. However, taking into consideration the whole macroeconomic situation in the country, one can notice, that the GDP growth is slower as a result of the lower productivity. Therefore the expenses expressed in percentages of GDP will be higher.

#### *Higher interest rate scenario*

In this scenario an interest rate at the level of 4% has been adopted, which is higher by 1 percentage point than in the baseline scenario. In case of the higher interest rate the public expenditures remain unchanged. It results from the fact that there is no assumption on when the Demographic Reserve Fund will be opened. If the interest rate was higher by 1 percentage point than in the baseline scenario, in 2050 the assets of the Demographic Reserve Fund would be higher by about 54%. Higher Demographical Reserve Fund assets mean lower Social Insurance Fund deficit, but it doesn't have impact on the level of pensions.

In case of the funded scheme, the interest rate does have a direct influence on the level of the benefits. It considerably affects the replacement ratio and the increase of the purchasing power of the pensions. The total expenditure growth amounts to 0.3% of GDP in the whole projection period.

#### *Lower interest rate scenario*

In this scenario an interest rate at the level of 2% has been adopted, which is lower by 1 percentage point than in the baseline scenario. Similarly to the previous scenario, the public expenditure remains

unchanged, however, the assets of the Demographic Reserve Fund will rise at lower rate, which diminishes the possible impact of the Fund. The total expenditure will decrease by about 0.2% of GDP, which translates into the lower level of pensions only. Lower interest rate results only in slower growth of the assets in the Open Pension Funds.

## **20.4 Summing up and Conclusions**

It can be stated that Poland is to large extent prepared for the challenges which public finances will have to face in connection with the population ageing and the future developments on the labour market. This is mainly a consequence of the pension introduced in 1999. It is clear, that the Polish state budget will follow the path from the one of the most burdened with the pensions expenditures (with the lowest level of contributions share in financing of the expenditures) in EU25 in 2004, to the balanced one, with public expenditures at the level of 8% GDP by 2050.

The design of the general pension system provides conditions in which increases in the average life expectancy has small impact on the expenditures. But as the relation between the number of years of contribution payment and the number of years of receiving the pensions is changed, it affects directly the level of the pensions.

Keeping stable the proportions between the contributory years and the period of receiving the benefit allows for preserving the level of benefits on the adequate level and influences positively the economic growth. The sensitivity tests show that the economic growth (higher interest rates, higher employment rate and economic activity rate) affect directly the level of benefits. The improvement of financial situation of the future pensioners does not necessarily mean changes in the pension system. In order to improve the situation in the pension system it is important to provide conditions for the labour market development and the economic growth. The pension system will react properly and its financial balance will be preserved.

Among the most important challenges that the pension system will have to face one can point to the reform of the disability pensions and the reform of the Farmers' Pension System. The sensitivity analysis shows, that any changes to the demographic assumptions pose threats to the financial situation. It is caused by the construction of these systems. The defined-benefit systems are less resistant to the effects of the population ageing.

Before introducing any legal changes to the pension system in Poland, any short- or long term amendments, one should consider the foreseen demographic changes and the necessity to provide conditions which favor improvement of the financial stability or at least are neutral to the situation of public finance.

# 21. Portugal

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## 21.1 Introduction

In the European Union, population ageing is a serious factor of risk for the sustainability of public finances. As such, the European Commission requires that each Member State include in its Stability Programme an update of the long-term projections of the budgetary items, on the revenue side as well as on the expenditure side, that are sensitive to ageing. In addition, as referred to by the European Commission (2005), the timely discussion in Parliament of these updated projections is well-perceived in terms of *governance*.

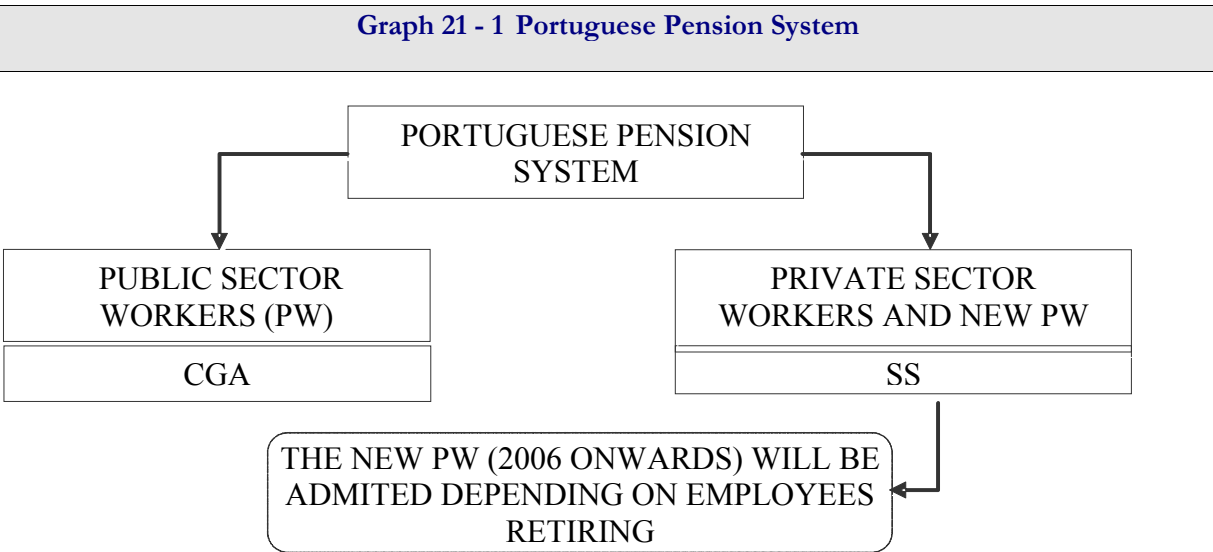
The Portuguese projections now presented are in line with all the assumptions established in the AWG. In order to carry on with this exercise two models have been developed, currently linked between them (see Graph 21 - 1):

- The public sector employees model (CGA model) - see section I;
- The model concerning private sector employees plus the new public sector employees (from 2006 onwards) – ModPensPer model – see section II.

Basically, the models are linked because the new public sector employees will be part of the social security system 2006 onwards, and the new entries will depend on the number of employees retiring. The assumption we have assumed is that for every two workers that retire only one is admitted until public employment reaches 12.2% of the labour force.

The two models will be described separately, for simplification sake. However, results will be presented together, at the end of the document, where these results are compared with the results reached in the 2001 projection exercise.

In this paper we present the results for the AWG scenarios but also for an extra scenario that corresponds to the Portuguese Official Projections presented in the State Budget for 2006.



As a final comment, when we calculated net public expenditure with public pensions we assumed that the effective average tax rate is about 6.64% of total expenditure with public pensions<sup>126</sup>, in order to reflect changes introduced in the 2006 State Budget.

## 21.2 Public Sector Workers' Pension Scheme

In this section the model and the underlying assumptions used to revise the long-term projections of the *Caixa Geral de Aposentações* (best known as the CGA), the Portuguese public sector workers' pension scheme are presented. These new projections adopt both the demographic and the macroeconomic assumptions of the Ageing Working Group, a sub-group of the Economic Policy Committee that recently began its second round of long-term projections of age-related budgetary items. It is worth highlighting that these latest projections already incorporate the effects of the Retirement Statute Reform (*Reforma do Estatuto da Aposentação*) that was presented by the Government on August 25, 2005 (see Ministry of Finance and Public Administration and the Ministry of Labor and Social Solidarity, 2005 for all the details).

### 21.2.1 The model and the underlying assumptions

The model consists of a system of difference equations, duly parameterized using microdata from the administrative databases of the CGA, one for active contributors and another for pensioners. We model separately two groups of public sector workers. One group is for the Retirement Statute (*Estatuto da Aposentação*) that covers all contributors that began working for the public sector before September 1, 1993, and another group is for those that began working after that date. For the latter, Decree-Law No. 286/1993 applies. In addition, we project separately retirement pensions (that include old age and disability) and the survivors' pensions that are computed as a fraction of the latter pensions.

**Retirement.** Spending on retirement pensions (AP is for *aposentação*) is computed as:

$$P_t^{AP} = P_{t-1}^{AP} (1 + a_t^{AP}) - p_t^{m,AP} N_t^{m,AP} + p_t^{n,AP} N_t^{n,AP} = p_t^{s,AP} N_t^{s,AP} \quad (1)$$

where  $a_t^{AP}$  is the annual real increase in pensions, an instrument at the discretion of the economic policy decision maker,  $p_t^{m,AP}$  is the average pension of the  $N_t^{m,AP}$  retirees that die in the year  $t$ , and  $p_t^{n,AP}$  is the average pension for the  $N_t^{n,AP}$  new retirees in year  $t$ . At the end of  $t$  there is then a stock of

$$N_t^{s,AP} = N_{t-1}^{s,AP} + N_t^{n,AP} - N_t^{m,AP} \quad (2)$$

retirees with an average pension of  $p_t^{s,AP}$ .

The number of contributors of a certain age that retire in a given year is  $N_{i,t}^{n,AP}$  which depends on the rules that dictate the access to retirement benefits.

On average, a new CGA retiree receives a statutory pension of

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<sup>126</sup> Calculated by the Ministry of Finance and Public Administration. This value results from considering that the weight of tax correspondent to pensions on total tax is the same as the weight of pensions' income on total income. This assumption is due to the fact that pension income is added to total income and the tax estimating procedure is applied from here on, that is, it isn't possible to estimate taxes concerning pensions separately.



$$p_t^{n,AP} = t_t^{AP} \cdot YOC_t^{AP} \cdot RR_t^{AP} \quad (3)$$

where  $t_t^{AP}$  is the annual accrual rate,  $YOC_t^{AP}$  is the number of years of contributions at the date of retirement, and  $RR_t^{AP}$  is the reference wage computed as the average of revalued past wages according to current rules.

The number of pensioners that die in year  $t$  is

$$N_t^{m,AP} = \eta_t^{m,AP} N_{t-1}^{s,AP} \quad (4)$$

and is determined using the mortality rates that are specific to populations of the *Caixa Geral de Aposentações* which are typically lower due to access to better health care services (ADSE is better than SNS) and due to the fact that they worked in the services sector.

For these retirement pensions, we assume that on average

$$p_t^{m,AP} = \rho^{m,AP} p_{t-1}^{s,AP} \quad (5)$$

which is thus proportional to the average pension in retirement.

**Survivors.** Expenditure on survivors' pensions in the CGA is computed according to

$$P_t^{CS} = P_{t-1}^{CS} (1 + a_t^{CS}) - p_t^{m,CS} N_t^{m,CS} + p_t^{n,CS} N_t^{n,CS} = p_t^{s,CS} N_t^{s,CS} \quad (6)$$

where  $a_t^{CS}$  is the real annual increase in pensions determined by the authorities,  $p_t^{m,CS}$  is the average pension for the  $N_t^{m,CS}$  survivors that die in year  $t$ , and  $p_t^{n,CS}$  is the average pension of the  $N_t^{n,CS}$  new survivors in year  $t$ . At the end of time  $t$  there is thus a stock of

$$N_t^{s,CS} = N_{t-1}^{s,CS} + N_t^{n,CS} - N_t^{m,CS} \quad (7)$$

survivors with a pension that averages  $p_t^{s,CS}$ .

The number of new survivors in year  $t$  is assumed to be

$$N_t^{n,CS} = N_t^{m,AP} \quad (8)$$

Thus, for every retiree that dies there is a survivor that benefits from a fraction of his/her pension.

On average, a new survivor gets a statutory pension worth

$$p_t^{n,CS} = 0.5 p_t^{m,AP} \quad (9)$$

because the pension paid to survivors is proportional to the retirement pension.

The number of survivors that die in year  $t$ ,

$$N_t^{m,CS} = \eta_t^{m,CS} N_{t-1}^{s,CS} \quad (10)$$

is determined using the mortality rates that are specific to the CGA.

We assume that, for these, the survivors' pension is, on average,

$$p_t^{m,CS} = \rho^{m,CS} p_{t-1}^{s,CS} \quad (11)$$

**Assumptions.** Conditional on the rules for access to retirement and for the calculation of statutory pensions, all that remains is the parameterization of the real discretionary increase for pensions that is assumed to be the same as for public sector wages. In order to replicate the growth rate of the average retirement pension registered between 2002 and 2004, which was a period of budgetary restraint, we assume a real discretionary increase of 0.1% per annum from 2007 onwards.

The long-term macroeconomic scenario adopted in the baseline scenario of the Ageing Working Group that is detailed in Table 21 - 1.

<b>Table 21 - 1 Macroeconomic assumptions of the baseline scenario (growth rates in %)</b>				
	<b>'05-'19</b>	<b>'20-'34</b>	<b>'35-'50</b>	<b>'05-'50</b>
GDP	2.2	1.7	0.8	1.5
Labour productivity	2.0	2.2	1.7	2.0
Employment	0.2	-0.5	-0.9	-0.4

In addition to the baseline scenario we consider five more scenarios requested by the Ageing Working Group in order to assess the sensitivity of the results.

#### **The assumptions of the sensitivity scenarios:**

<i>Scenario</i>	<i>Description</i>
B	Baseline scenario (see Table 21 - 1) for the underlying assumptions)
1	Higher life expectancy (increase of 1 to 1.5 years by 2050) <i>A linear reduction of the mortality rates specific to each age from 2004 to 2050, such that by 2050 they are 15% lower</i>
2	Higher employment rate <i>The employment rate increases by 1 percentage point during the period 2005-2015 and remains higher until 2050.</i>
3	Lower labour productivity growth rate <i>The productivity growth rate is 0.25 pp lower in 2015 (decelerates between 2010 and 2015 and remains 0.25 pp lower from 2015 to 2050</i>
4	Higher employment rate for those between 55 and 65 years of age <i>The employment rate for elderly workers increases 5pp during the period 2005-2025 and remains higher until 2050, with the corresponding increase in the participation rate</i>
5	Higher labour productivity growth rate <i>The productivity growth rate is 0.25 pp higher in 2015 (accelerates between 2010 and 2015 and remains 0.25pp higher from 2015 to 2050</i>

Note: Sensitivity analyses with respect to the real interest rate are absent because the CGA does not have a reserve fund and thus a change in the interest rate has no impact on pensions.

For each of these six scenarios we consider two cases – the before and the after – which characterize the situation before and after the Reform of the Retirement Statute presented by the Government on August 25, 2005. The imposed changes on the access to retirement (see below) are estimated by running a few queries in STATA to the CGA administrative database, on the basis of which we determine the impact of this reform on the time series of the number of new retirees, of the number of years of contributions upon retirement, and of the effective penalty applied to those who file for early retirement. Note that this produces separate projections for the number of regular retirees, early retirees, disabled pensioners, and pensioners that are forced to retire because they have reached 70. Upon examination of aggregate data for the past few years, one concludes that, as a rule of thumb, the number of new retirees due to disability is half the total number of old-age retirees, early retirees and those who were forced to retire because they reached the upper age limit, 70.

### Changes in access to retirement with the Reform of the Retirement Statute

<i>Regime</i>	<i>Type of retirement</i>	<i>Specifics</i>
<i>Retirement Statute</i>		
<b><i>Before the Reform (Pre)</i></b>		
	Regular	AGE $\geq$ 60 and YOC $\geq$ 36
	Early	AGE $<$ 60 and YOC $\geq$ 36 (penalty of 4.5% per year prior to the legal retirement age, 60). There is a 1 year bonus for each group of 3 YOCs completed above 36.
	Age Limit	AGE $\geq$ 70
<b><i>With the Reform (Post)</i></b>		
<u>Til the end of 2014:</u>		
	Regular	AGE $\geq$ ILA and YOC $\geq$ 36 (The legal retirement age, ILA increases progressively 6 months / year from 60 in 2005 to 65 in 2015).
	Early	AGE $<$ ILA and YOC $\geq$ TCC (The complete career length, TCC, increases progressively 6 months / year from 36 in 2005 to 40 in 2013). There is a penalty of 4.5% for each year before the legal age of retirement, ILA. There is a bonus of 6 months for each year of seniority beyond 36.
	Age Limit	AGE $\geq$ 70
<u>From 2015:</u>		
	Regular	AGE $\geq$ 65 and YOC $\geq$ 40
	Early	AGE $\geq$ 60 and YOC $\geq$ 40 (penalty of 4.5% for each year before the legal age of retirement, 65. There is a bonus of 1 year for each 3 YOCs completed above 40).
	Age Limit	AGE $\geq$ 70
<i>Decree-Law No. 286/1993</i>		
Unchanged	Regular	AGE $\geq$ 65 and YOC $\geq$ 40

Early	AGE ≥ 60 and YOC ≥ 30 (penalty of 4.5% for each year before the legal age of retirement, 65. There is a bonus of 1 year for each 3 YOCs completed above 40).
Age limit	AGE ≥ 70

Note: YOC (*years of contributions*) is seniority at the date of retirement.

In addition to changing the access to retirement, the Reform of the Retirement Statute altered the benefit formula for calculating the statutory pension. It is now a weighted average of two terms, where the first weight is the fraction of the contributive career registered until the end of 2005.

The first term is thus the old statutory pension (in which the reference wage generally corresponds to the last wage while working) corrected for the fact that the complete career length progressively increases from 36 years in 2005 to 40 years in 2013. This way, the effective accrual rate drops from  $(1-0.1) \times (1/36) = 2.5\%$  in 2005 to  $(1-0.1) \times (1/40) = 2.25\%$  from 2013 onwards. The second term is a statutory pension that is the product of the number of years of contributions upon retirement, a reference wage that is the revalued average of wages from all the years of contributions from 2006 onwards, and an accrual rate that depends on the relation between the reference wage and the national minimum wage. We assume this accrual rate is 2% until 2015 and 2.15% from then on. Naturally, to calculate these terms it was necessary to use the wage profile by age obtained from the administrative CGA database for contributors. This database is from March 2005, and we assume that the shape of this profile is time-invariant.

### 21.2.2 Public sector employees (CGA) – projection results

Table 21 - 1 and Table 21 - 3 summarize the long-term projections of the CGA account. Before the Retirement Statute Reform of 25 August 2005, the CGA pension expenditure by 2050 was projected to reach 4.5% of GDP in the (3.9% of GDP). From 2005 to 2025 the increase is 0.6 pp. The sensitivity analyses suggest that these results are not very sensitive, except for the cases where life expectancy varies. This idea is confirmed by Graph 21 - 2, Graph 21 - 3 and Graph 21 - 4 that illustrate the evolution of CGA pension expenditure.

The case “Before the Retirement Statute Reform” exhibits a change in trend around 2035, due to the 1993 reform that established the Decree-Law No. 286/1993 by which all contributors that began working in the public sector from 1 September 1993 onwards get a statutory pension that is determined by the rules that apply to private sector workers. In the case “After the Retirement Statute Reform” this inflection is quite similar. There are other characteristics that are worth highlighting, such as the reduction in pension spending as a percentage of the GDP from 2006 to 2012 due to the simultaneous increase in the complete career length and the rise of the legal retirement age.

**Table 21 - 2 Expenditure on CGA pensions, % of GDP**

\ Cases	B		1		2		3		4	
	Before	After	Before	After	Before	After	Before	After	Before	After
2010	4.0	3.6	4.0	3.6	4.0	3.6	4.0	3.6	4.0	3.6
2025	4.9	4.5	4.9	4.5	4.9	4.5	4.9	4.5	4.9	4.5
2050	4.5	3.9	4.6	4.0	4.5	3.9	4.5	3.9	4.5	3.9

Note: CGA pension expenditure in 2005 is 4.1% of GDP.

**Table 21 - 3 Long-term Projections of the CGA account, baseline scenario, % of GDP**

Year	Expenditures		Revenues		Balance	
	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>
2005	3.9	3.9	2.6	2.6	-1.3	-1.3
2010	4.0	3.6	2.2	2.3	-1.7	-1.3
2025	4.9	4.5	1.0	1.0	-3.9	-3.5
2050	4.5	3.9	0.0	0.0	-4.5	-3.9

Note 1: The CGA does not have a reserve fund.

Note 2: Revenues include only contributions.

The increase in the number of CGA pensioners is presented numerically in Table 21 - 4, and graphically in Graph 21 - 5. Note that only Case 1 differs with respect to the number of pensioners on account of a different set of mortality rates. The remaining cases – Cases 2, 3, 4 and 5 – are macroeconomic variations of the baseline scenario.

Following from the analysis of Table 21 - 4 the recent measures restrict the increase of the number of CGA pensioners in such a way that in 2010 the number of retirees and pensioners is projected to be just 3% higher than registered in 2005. By comparison, without the reform the number of retirees and pensioners would increase by 8%. This restraining effect is temporary, though, in the sense that by 2025 it will have disappeared. For 2050, a population of pensioners and retirees almost twice that registered in 2005 is projected. This is the effect of an ageing population reflected in the expected existence of more elderly individuals living longer.

**Table 21 - 4 Number of CGA retirees and pensioners (2005 = 1.00)**

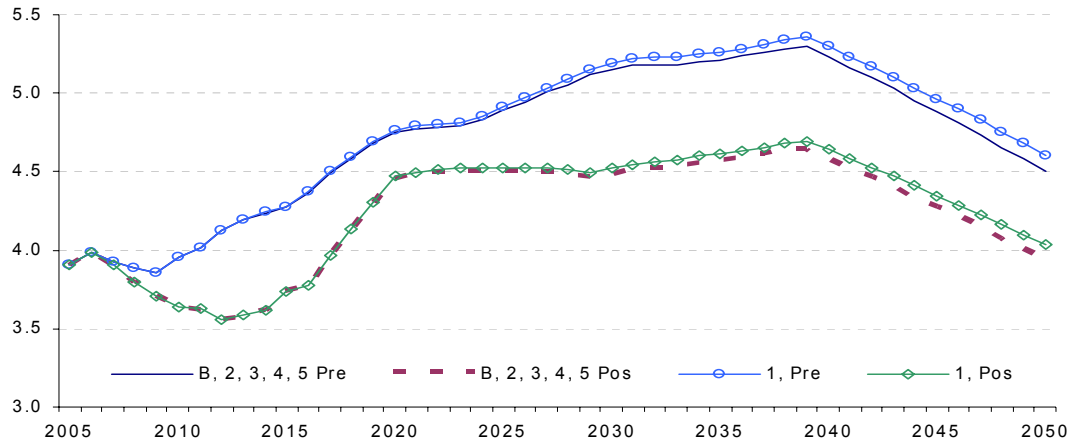
Year	\ Cases B, 2, 3, 4 and 5		1	
	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>
2010	1.08	1.03	1.08	1.03
2025	1.57	1.64	1.58	1.65
2050	1.79	1.77	1.83	1.82

Graph 21 - 6 presents the projection of the number of CGA contributors. Here, the assumption is that for every two new retirees, only one is replaced, until public workers are 12.2% of active population<sup>127</sup> (however, 2006 onwards the new public sector employees will be part of the social security system). Graph 21 - 7 presents in graphical form the projections of the CGA account. Note that expenditures refer to all pension spending paid to previous CGA contributors, and revenues only include contributions. Average wages, upon which contributions to CGA are levied, are assumed to grow at 1.6% per annum in real terms. This reflects a wage drift of 1.5% and a discretionary increase of 0.1%.

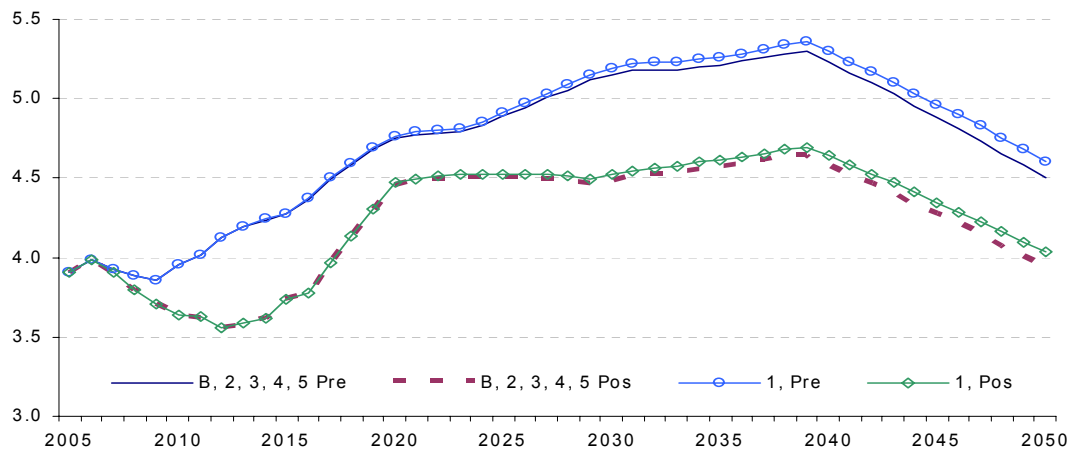
The effects of the Reform of the Retirement Statute in terms of improving the long-term sustainability of this pension scheme are significant: without this reform the deficit more than triples from 1.3% of GDP to 4.5% in 2050, whilst with the reform, the imbalance is slightly smaller.

<sup>127</sup> However, the new public sector employees will be part of the social security system 2006 onwards. In this way, the CGA system will be a closed system 2006 onwards.

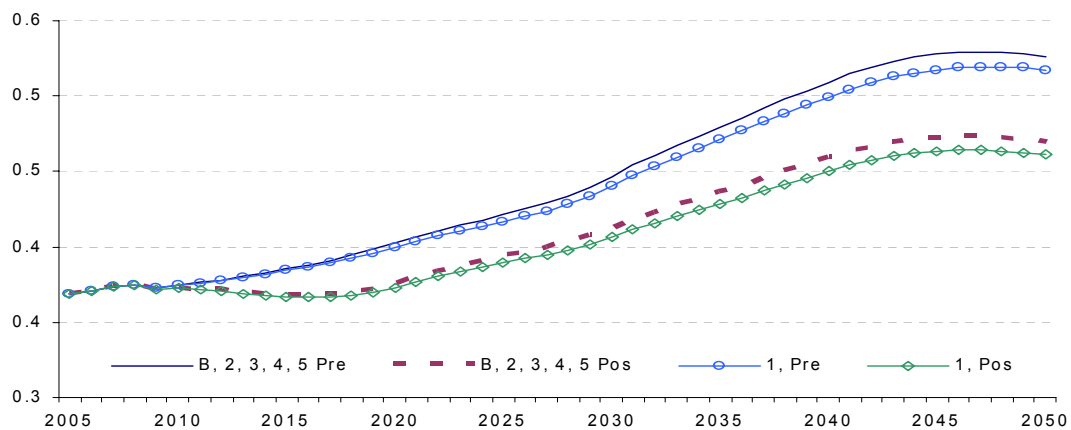
**Graph 21 - 2 Projections of CGA expenditure, % of GDP**



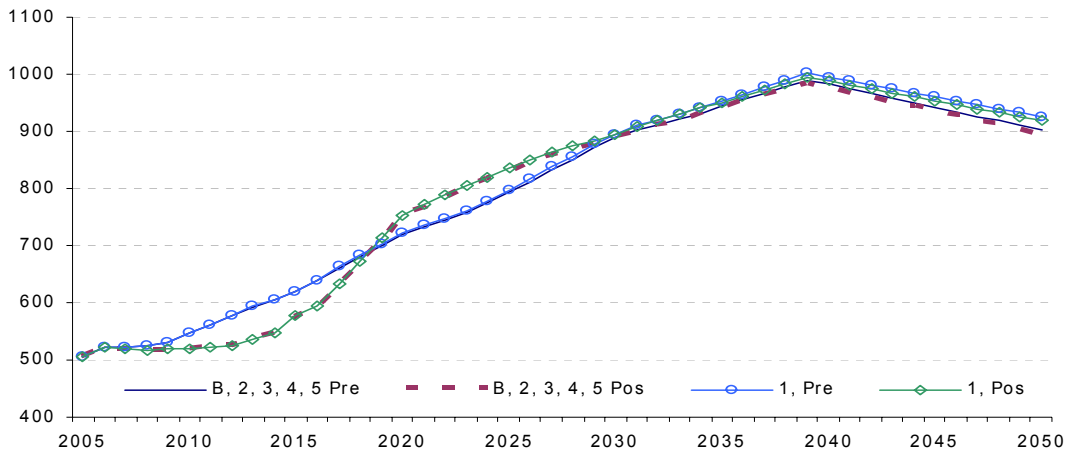
**Graph 21 - 3 Projections of CGA pension expenditure, retirement pensions only, % of GDP**



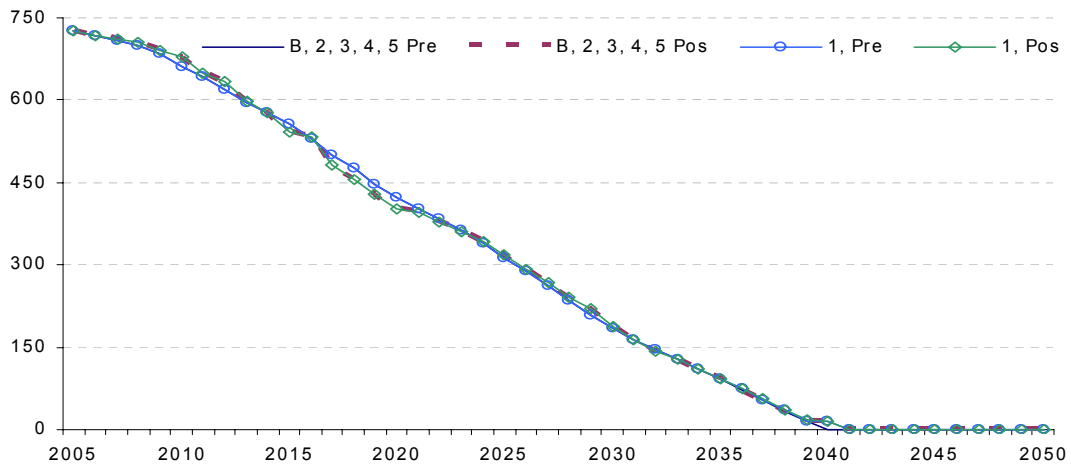
**Graph 21 - 4 Projections of CGA pension expenditure, survivors pensions only, % of GDP**



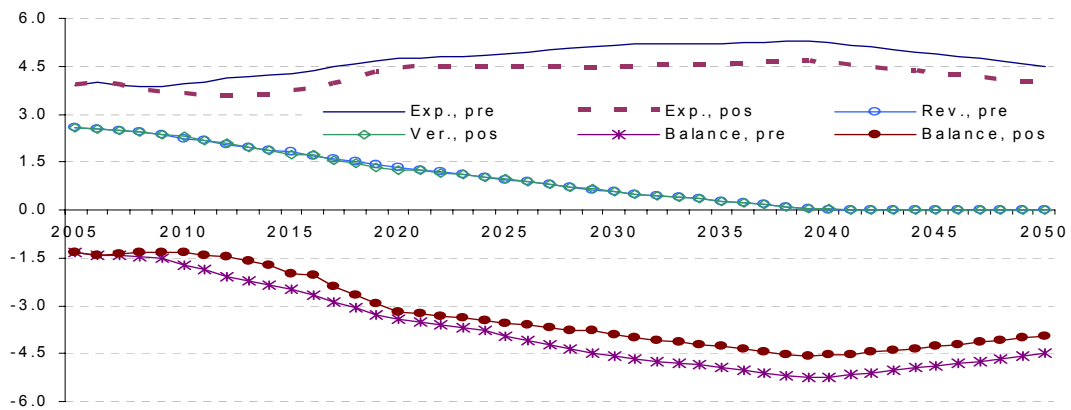
**Graph 21 - 5 Projection of the number of all CGA pensioners, in 1000**



**Graph 21 - 6 Projection of the number of CGA contributors (closed scheme), in 1000**



**Graph 21 - 7 Projections of the CGA account, baseline scenario, % of GDP**



## **21.3 Old Age Pension System of The Social Security System for Private Sector Employees**

### **21.3.1 Overview**

The Portuguese Social Security system covers most of the private sector work force. Public sector workers are covered by another scheme, although from 2006 onwards new public sector workers will join the Social Security system.

Private occupational schemes play a very limited role overall, nevertheless it should be noted that there is an important privately run scheme, financed on a capitalization basis, for bank employees.

The Social Security pension system is basically a defined benefit system working on a *pay as you go* financing basis. Old age pensioners with at least 15 years of earnings are entitled to an earnings related pension. There are also pension benefits for survivors (orphans and widows) and for disabled.

Minimum pensions are guaranteed for pensioners whose statutory pension (the pension that derives from the application of the pension benefit formula) falls below that level and are set according to the pensioner contributory career. These minimum levels are guaranteed by social complements, financed by the State Budget.

The elderly that are not eligible for an earnings-related pension under the General Contributory Regime receive the social pension, a means tested benefit paid by the non contributory regime which is exclusively financed by the state budget.

Old age pension benefit formula has been changed in 2002 in order to take into account life time wages. Nevertheless transition clauses will considerably delay the full introduction of the new rules.

The old pension formula based on a flat accrual rate of 2%, the full length of service and a reference wage based on the best 10 years monthly wages out of the last 15 years allows a maximum gross replacement rate of 80%.

In the new formula annual accrual rates are now set according to the level of wages declared. However this is only applied for pensioners with more than 20 years of contributory history. For all the others a flat accrual rate of 2% is still applied. The use of lifetime wages (at least the best 40 years) for determining old age benefits is another significant change, which is expected to improve compliance within the system as well as being an incentive for older workers to stay in the labour force longer.

To all contributors with a contributory career of at least 15 years in January of 2002 and to all contributors getting retired until 2017, the best pension out of three different benefit formulas is assured: the old benefit formula, the new formula, and a proportional one, in which for the contributory history before 2002 the old formula is applied and the new formula for the contributory history after January 2002 is applied. For all members of the labour force with registered contributions within the Social Security System before January 2002 it is assured the formula that grants a higher pension, the new formula or the proportional one.

Although the System is run on a pay as you go basis a share of the Social Security contributions should be annually transferred to the Social Security Trust Fund (FEFSS), which due to budget constraints, has been reduced in the past recent years. The fund assets represented about 4% of GDP in 2004.



### 21.3.2 Recent trends and reforms

Due to sluggish economic growth in recent years the Social Security has been experiencing a significant growth of its allowances, namely old age pensions (early retirement of long term unemployed) and unemployment benefits seriously compromising the equilibrium of the system.

The government, through a special commission, is preparing a set of measures and reforms to improve the financial sustainability of the Social Security system. Some measures have been taken until now:

- Minimum contribution of self-employed workers has been raised in approximately 50%.
- Special action plan on fraud and contributive evasion.
- Some old age early retirement schemes have been temporarily suspended or completely abandoned.

Another significant measure, already enacted, is that new public sector employees have to join the general Social Security scheme from January 2006 onwards; this will produce higher contribution revenues to the Social Security system in the short term and consequently higher benefit expenditure in the long run.

All of the previous mentioned measures have been accounted for in the presented projections.

Other measures are also expected to be proposed by the government in 2006:

- Introduction of a pension ceiling.
- Reschedule of the transition mechanism of the new old age benefit formula allowing a faster transition.
- New framework for unemployment benefits.

Due to the fact that these specific measures are still currently under public discussion with social partners and respecting the “no policy change” AWG guideline, they have not been considered within the projections.

### 21.3.3 The projection model: ModpensPor

The ModpensPor is basically a partial equilibrium model run on Gauss language, developed and maintained by the Ministry of Labour and Social Solidarity to assess long term impacts of ageing, economic growth and policy making on the Social Security balance sheet.

It runs aggregate projections on variables such as contributions, unemployment benefits, sick leave benefits and maternity benefits, as well as micro-level projections (based on individual profiles) on pensions and family benefits.

Basically the model takes in account a set of structural data on the Social Security system (for every allowance considered the number of beneficiaries by age, gender and their average benefit) regarding the year of 2004 and then, according to a macroeconomic and a demographic scenario, makes projections assuming that the fundamental relations regarding the Social Security system will remain constant.

Mortality rates applied to pensioners are those implicit in the demographic scenario considered. New pensioners by age and gender are determined by assuming a constant proportion of the set of new pensioners of that sex and age on the overall population in 2004 for that same age and gender.

So, the number of new pensioners for each eventuality (old age, survivors and disability) will be given by the following relation:

$$NewPens_{,ig} = \frac{NewPens_{2004,ig}}{Pop_{2004,ig}} \times Pop_{,ig} \quad (12)$$

where *NewPens* stands for new pensioners, *i* for the age and *g* for the gender.

New pensioners will be added to the stock of living pensioners each year, such that the number of total pensioners each year could be written in the following way:

$$TotalPens_{tig} = NewPens_{tig} + (TotalPens_{(t-1)(i-1)g}) \times \mu \quad (13)$$

The parameter  $\mu$  expresses the survival function, deterministically given by the demographic scenario considered, of total living pensioners in t-1 period that survive to t:

$$\mu = POP_{tig} / POP_{(t-1)(i-1)g} \quad (14)$$

Average old age and disability pensions for new pensioners are calculated in a specific procedure within the model according to age, gender and a theoretical wage history derived by the model.

This wage history is derived by applying to the pensioner's last wage a matrix of average wage growth in the Portuguese economy since the 1960's.

The model simulates as well some specific pension allowances, such as the dependency complement for the contributory regime pensioners.

Employment, beneficiaries of maternity and sick leave benefits grow, for each age group and gender, at the same rate as the average employment growth rate given by the macroeconomic scenario. In terms of the average benefits of these allowances it is assumed that they grow in line with average wages. In fact, with the exception of family benefits, these allowances are all earnings related.

$$Beneficiaries_{tig} = Beneficiaries_{(t-1)ig} \times \Delta Employment_t \quad (15)$$

$$Wage_{tig} = Wage_{(t-1)ig} \times \Delta Wage_t \quad (16)$$

So, total contributions can easily be derived by the following formula:

$$Contrib_t = Contrib_{(t-1)} \times \Delta Wage_t \times \Delta Employment_t \quad (17)$$

Unemployment beneficiaries are assumed to grow in line with the number of unemployed given by the macroeconomic scenario.

Individual profiles of pensioners and beneficiaries have a monthly base and are calibrated on an annual basis according to the Social Security's 2004 balance sheet.

Employment and salaries are also calibrated for the entire projection horizon in order to simulate the fact that new public employees will join the Social Security from 2006. It should be stated that due to higher qualifications, average wages of public sector workers are higher than average wages in the private sector.

Of course different sets of policy, applied in different horizons, can be considered within the model itself.

The model takes in account the impacts regarding the progressive introduction of the new benefit formula as well as all the features regarding the financing model established to the Social Security system, namely the pension trust fund and the specific state budget contributions to the social insurance subsystem and to the family protection subsystem.

Several policy scenarios can be considered within the model algorithm; increase in the effective retirement age, different pension benefit formulas and different contributive ceilings. In this exercise however is considered solely a *no policy change scenario*, i.e. of the new measures considered will only those being implemented until the end of 2005 were projected.

The main assumptions concerning these projections are:

- Pension indexation: a pension increase of 0.1 p.p. in real terms.
- Contributory career: in the long run old age pensioners will have an average contributory career of 32 years;
- Effective contributory rate: an effective overall contributory rate of 32% which is the effective rate underlying total contributions to the Social Security in 2004, is assumed;
- The pension trust fund receives the surpluses generated by the social insurance subsystem, as well as 6% of overall contributions. These transfers only take place if they don't generate a deficit within this subsystem.
- Surpluses from the family protection subsystem are transferred to the social insurance subsystem.

The following chart presents a brief summary of the data on pensioners considered in the model. In the end of 2004 there were about 2.6 million pensioners, most of them (1.6 million) in the General Contributory Regime.

**Table 21 - 5 Social security data on pensions, 2004**

		Pensioners		Average Pension Entitlement - euros	
		Total	New Pensioners	Total	New Pensioners
Old Age	RGC	1310811	82803	328.56	438.78
	RNCE	43260	1231	191.57	182.36
	RESSAA	265136	319	201.85	182.87
Disability	RGC	241718	23327	286.17	292.51
	RNCE	47501	2113	179.34	180.05
	RESSAA	13132	64	200.97	184.34
Survivors	RGC	543965	41362	164.58	177.25
	RNCE	3500	217	120.92	52.69
	RESSAA	87661	5508	125.32	123.23

*RGC – General Contributory Regime, RNCE – General Non Contributory Regime, RESSAA – Non Contributory Regime for Agriculture Sector Workers.*

Pension entitlements are still very low, namely for older pensioners, which reflects the immaturity of the Portuguese Social Security System, where a large part of current pensioners still have very low contributory carriers as well as lifetime wages. The average contributory career of an RGC old age pensioner is just about 20 years, while a new RGC pensioner exhibits a 28 year career in average.

It should be stated that the definition of pensioner presented is very particular. In fact a pensioner can be accounted for twice since the model considers as a pensioner a person that is entitled to one specific pension. If, by chance, that pensioner is entitled to two pensions (old age and survivor) he is counted twice. So, the number of pensioners should be understood as the number of pension entitlements in the Social Security System.

In 2004 overall Social Security pensions represented about 7% of the GDP, while contributions about 7.7%. Unemployment benefits have increased considerably in the last years and represent about 1.2% of GDP.

The chart presenting the main Social Security balance sheet aggregates in 2004 does not reflect the financing model of the Social Security system. The system encompasses several subsystems which

reflect different financing sources. In the Social Insurance Subsystem, the most important subsystem, run exclusively in a contributory base, solely Social Security contributions are used to finance this subsystem's allowances: statutory pensions, most of the unemployment benefits, sick leave and maternity. Other subsystems are either financed exclusively by the state budget (Solidarity Subsystem – where non contributory pensions and pension supplements are included - and Social Network Subsystem) or by a mix of state budget transfers and Social Security contributions (Family Protection and Active Labour Market Policies Subsystem – family allowances, some unemployment benefits and some pension related benefits).

**Table 21 - 6 Social security balance sheet in 2004**

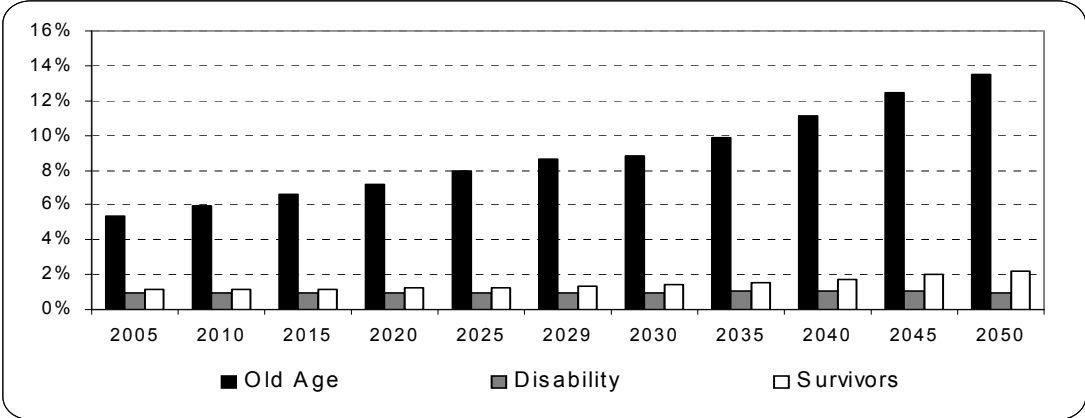
	<i>Euros (10<sup>9</sup>)</i>	<i>% of GDP</i>
<b>Contributions</b>	10429.2	7.7%
<b>Pension Expenditure</b>	9613.1	7.1%
<b>Pension Trust Fund Assets</b>	5779.1	4.3%
<b>Unemployment Benefits</b>	1635.2	1.2%
<b>Sick Leave and Maternity</b>	734.9	0.5%
<b>Family Allowances</b>	570.9	0.4%

**21.3.4 AWG Projections**

The AWG scenarios presented fully account all of the AWG guidelines concerning macroeconomic and demographic assumptions.

A similar exercise has been carried out recently to assess the financial sustainability of the Portuguese Social Security System. Different macroeconomic assumptions were considered within this exercise, namely an average annual growth of GDP of 2% in the long run, as well as a higher employment rate for elderly workers. A specific appendix on this matter was presented in the State Budget report for 2006.

**Graph 21 - 8 Social security pensions – AWG baseline scenario, % of GDP**



The baseline AWG Scenario shows a significant increase in overall pension expenditure until 2050. This increase will be essentially driven by old age contributive pensions. For this exercise earnings

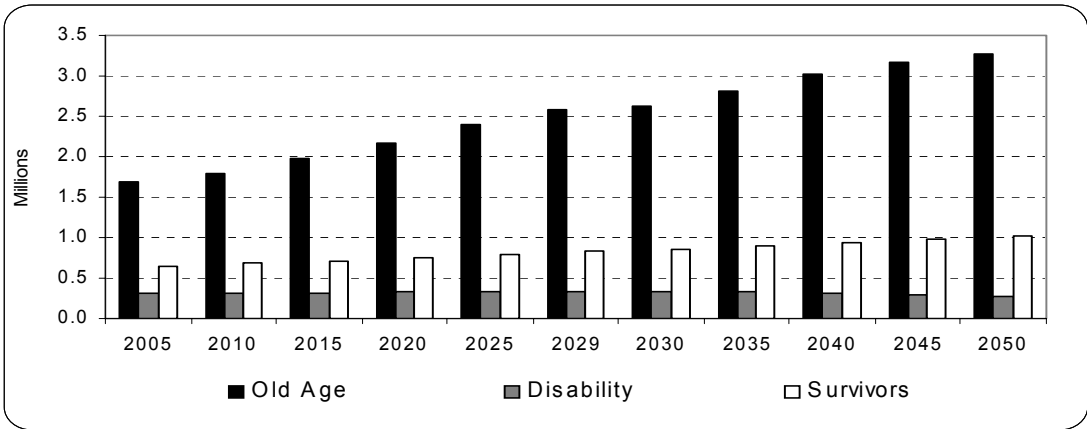
related pensions include the social complements referred to in the overview of the pensions system, although they are not an expenditure of the contributive subsystem, since they are not financed by contributions.

According to this scenario, total pension expenditure in the Social Security which represents in 2005 7.5% will eventually represent 16.6% of the GDP in 2050.

There are essentially three main reasons for such an increase:

- An ageing population, with a consequent increase in the number of old age and survivor pensioners.
- Maturation of the system, i.e., new pensioners have higher pensions due to longer working lives and higher declared wages.
- Pension benefit formulas, will still grant pensioners relatively high replacement rates regarding their last wage.

**Graph 21 - 9 Social security pensioners – AWG baseline scenario**



**Table 21 - 7 Social security projections - AWG baseline scenario, % of GDP**

B - Baseline		2005	2010	2020	2030	2040	2050
OLD AGE PENSIONERS (10'3)		1685	1796	2172	2622	3011	3273
DISABILITY PENSIONERS (10'3)		302	308	325	333	317	263
SURVIVAL PENSIONERS (10'3)		650	682	758	854	941	1024
TOTAL PENSIONERS (10'3)		2637	2786	3255	3809	4269	4560
OLD AGE PENSIONS		5.4%	5.9%	7.2%	8.8%	11.1%	13.5%
DISABILITY PENSIONS		1.0%	0.9%	0.9%	1.0%	1.1%	1.0%
SURVIVORS PENSIONS		1.1%	1.1%	1.2%	1.4%	1.8%	2.2%
RGC OLD AGE PENSIONS		4.7%	5.5%	7.1%	8.7%	11.0%	13.3%
RGC DISABILITY PENSIONS		0.9%	0.8%	0.8%	0.9%	1.0%	0.9%
RGC SURVIVORS PENSIONS		1.0%	1.1%	1.2%	1.4%	1.8%	2.2%
of Wich Social Complements (1)		0.7%	0.9%	1.1%	1.4%	1.8%	2.3%
CONTRIBUTIONS		7.9%	8.0%	8.3%	8.8%	9.1%	9.2%
TRUST FUND ASSETS		4.4%	4.0%				

(1) Social complements are financed by the state budget, other RGC pension allowances are financed in a 50 % basis by the state budget

According to the baseline projection the Social Insurance Subsystem will start generating deficits in 2009. The pension trust fund assets will assure the financial sustainability for another 5 years, until 2014.

The following graph expresses the evolution of the general contributory regime old age pensions and overall contributions. From the mid twenties there's a significant, and larger, financing gap between social security's main financial outflow (old age contributive pensions) and inflow (contributions).

If the baseline scenario confirms, by 2050 the current account deficit of the Social Insurance Subsystem will represent in that year an amount of 6.9% of the GDP, due to a significant increase in pension expenditure. It should be stated that the negative trend from 2030 onward has to do mainly with the GDP projections given by the AWG.

**Table 21 - 8 Baseline and sensitivity scenarios: social security pension expenditure and contributions (private sector), % of GDP**

AWG Scenarios		2005	2010	2020	2030	2040	2050
<b>Total Pension Expenditure</b>							
B	Base Line	7.5%	8.0%	9.4%	11.2%	14.0%	16.6%
1	High Life Expectancy	7.5%	8.0%	9.4%	11.4%	14.3%	17.2%
2	High Employment Rate	7.5%	8.0%	9.3%	11.1%	13.8%	16.4%
3	High Employment Rate (55-64)	7.5%	8.0%	9.3%	11.1%	13.8%	16.4%
4	High Productivity	7.5%	8.0%	9.2%	10.8%	13.4%	15.7%
5	Low Productivity	7.5%	8.0%	9.6%	11.6%	14.6%	17.5%
<b>Contributions</b>							
B	Base Line	7.9%	8.0%	8.3%	8.8%	9.1%	9.2%
1	High Life Expectancy	7.9%	8.0%	8.3%	8.8%	9.1%	9.2%
2	High Employment Rate	7.9%	8.0%	8.3%	8.8%	9.1%	9.2%
3	High Employment Rate (55-64)	7.9%	8.0%	8.3%	8.7%	9.1%	9.2%
4	High Productivity	7.9%	8.0%	8.3%	8.7%	9.1%	9.2%
5	Low Productivity	7.9%	8.0%	8.4%	8.9%	9.3%	9.4%

**Table 21 - 9 Sensitivity scenarios: Differences from the baseline projection (for the private sector), in percentage points of GDP**

AWG Scenarios		2005	2010	2020	2030	2040	2050
<b>Total Pension Expenditure</b>							
B	Base Line						
1	High Life Expectancy	0.00	0.01	0.07	0.18	0.36	0.62
2	High Employment Rate	0.00	-0.03	-0.08	-0.11	-0.14	-0.18
3	High Employment Rate (55-64)	0.00	-0.01	-0.06	-0.13	-0.19	-0.21
4	High Productivity	0.00	0.00	-0.18	-0.36	-0.61	-0.87
5	Low Productivity	0.00	0.00	0.18	0.38	0.64	0.93
<b>Contributions</b>							
B	Base Line						
1	High Life Expectancy	0.00	0.00	0.00	0.00	0.00	0.00
2	High Employment Rate	0.00	0.01	0.01	0.00	0.00	0.00
3	High Employment Rate (55-64)	0.00	0.01	0.00	-0.01	-0.02	-0.02
4	High Productivity	0.00	0.00	-0.02	-0.02	-0.03	-0.03
5	Low Productivity	0.00	0.03	0.10	0.14	0.15	0.14

The following graph presents the “worst case scenario” and the “best case scenario” of all the AWG sensitivity tests in the long run, which represent the high and low productivity scenarios. High employment scenarios have a positive, but limited, impact on the Social Insurance System pension expenditure.

## 21.4 Summing up Public and Private Sectors' Pension Schemes

As mentioned above, the Portuguese projections presented are in line with all the assumptions established in the AWG. In this section results for both models are presented in an aggregated way.

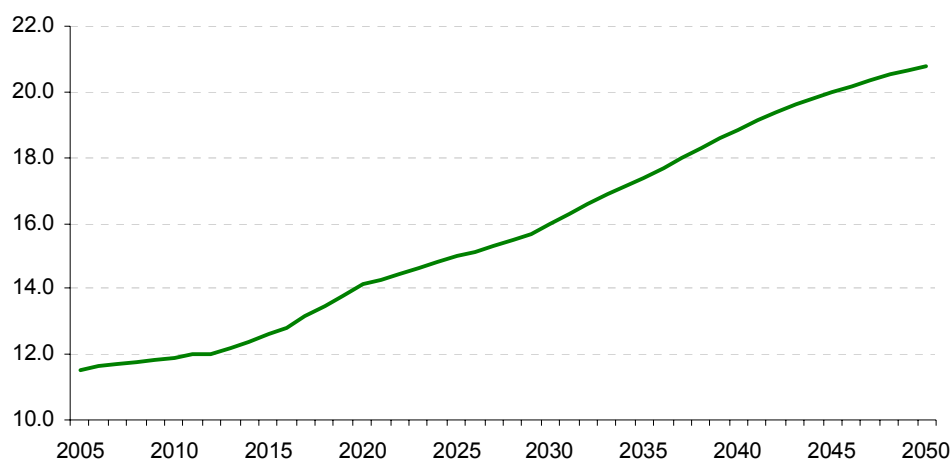
Expenditure on pensions as % of GDP will increase 9.3 p.p. in the following 45 years, growing from 11.5% in 2005 to 20.8% of GDP in 2050. This represents a 7 p.p. higher increase of GDP relative to previous projections (2001).

**Table 21 - 10 Total Pension Expenditure, baseline projection, as % of GDP**

	2005	2010	2020	2030	2040	2050	change 2005-50
EPC (2003) <sup>1</sup>	10.9	11.8	13.1	13.6	13.8	13.2	2.3
Final projections, 2005	11.5	11.9	14.1	16.0	18.8	20.8	9.3
Differences in p.p.	0.6	0.1	1.0	2.4	5.0	7.6	

Note: <sup>1</sup>European Commission (2003), Economic Policy Committee, (2003), The impact of ageing populations on public finances: overview of analysis carried out at EU level and proposals for a future work programme, p 14.

**Graph 21 - 10 Total Pension Expenditure, baseline projection, % of GDP**



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European Commission (2003), Economic Policy Committee, *The impact of ageing populations on public finances: overview of analysis carried out at EU level and proposals for a future work programme*.



## 22. Slovenia

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### 22.1 Pension and Invalidity Insurance in Slovenia

The pension system in Slovenia was radically, but not dramatically reformed in the 1999 and begins operate as the new system in the year 2000. The main features and principles guiding the reform were to obtain the fiscal sustainability and social adequacy of pension and modernisation of the system by introducing the supplementary pre - funded pension insurance.

Currently, the pension system in Slovenia is a combination of:

1. A (modernised and modified) Bismarckian PAYGO defined benefit model. Benefits are provided by the Pension and Invalidity Insurance Institute (IPIIS - ZPIZ), which is an autonomous public finance agency.
2. Compulsory and voluntary supplementary (pre) funded pension insurance, which can be provided by financial intermediaries. The operators (regardless of their ownership) must obtain a license from the public authorities.

The pension and disability insurance arrangements are no longer limited to mandatory pension insurance but also include compulsory and voluntary supplementary pension schemes. It should be underlined, however, that the compulsory supplementary pension and disability insurance scheme has replaced the former provision according to which the actual accumulation period for work in harsh conditions or in specific occupations unlikely to permit employment until full retirement age has been increased by an adjustment factor.

A voluntary supplementary scheme is a new option offered in particular to younger generations of the employed population, who will clearly have to use their own savings to provide for their social security in their old age due to a gradual decrease in pensions earned in the mandatory insurance scheme. Mandatory insurance is financed on a pay-as-you-go basis, while supplementary pension and disability insurance is based on funded schemes (Graph 22 - 1 Pension system in Slovenia).

**Graph 22 - 1 Pension system in Slovenia**

<b>I PILLAR</b>	<b>II and III PILLARS</b>
A (modernized and modified) Bismarckian PAYG defined benefit model	Compulsory and voluntary supplementary (pre) funded pension insurance
Benefits are provided by the Pension and Invalidity Insurance Institute - ZPIZ.	Benefits are provided by financial intermediaries which must obtain a license from the public authorities
<b>REGULATED BY ONE AND THE SAME LAW</b>	

The social pension and invalidity insurance in the Republic of Slovenia is uniform and compulsory for employed, self employed, persons with earnings on regular basis. Beside the above mentioned the persons set out by the law can join compulsory social pension insurance on a voluntary basis.

In the reform of the year 2000, the main changes in parameters were reducing the existing generosity of benefits and in same time introducing some new entitlements. This was done by: Increasing retirement age; Reduction of yearly accrual rate; Opening the scale of accrual rates; Actuarial bonuses/maluses; Reduction of pension indexation while the total accrual rate for new pensioners is every year less than one year before; Smaller difference between minimal and maximal pension base 1:4; Increase of reference period for pension base from 10 to 18 best consecutive years; Valorisation and indexation the same; New benefits for widowed partner and introduction of state (national) pension

### **22.1.1 Benefits**

- **pensions:** old-age, invalidity (disability), widow's/widower's, survivors', and partial pensions;
- **benefits from invalidity insurance** (occupational rehabilitation, invalidity benefit, reassignment, part-time work and other benefits from invalidity insurance, and reimbursement of travel expenses);
- **supplementary benefits**, such as supplementary allowance, assistance and attendance allowance, disability allowance;
- **other benefits**, such as transitional allowance, maintenance allowance, and recreation grant).

The same law governing the pension and invalidity insurance applies to state pension entitlement. The parameters are gradually implemented from the current status to the year 2014.

### **22.1.2 Qualifying conditions for old-age pension**

#### **Age and pension qualifying period**

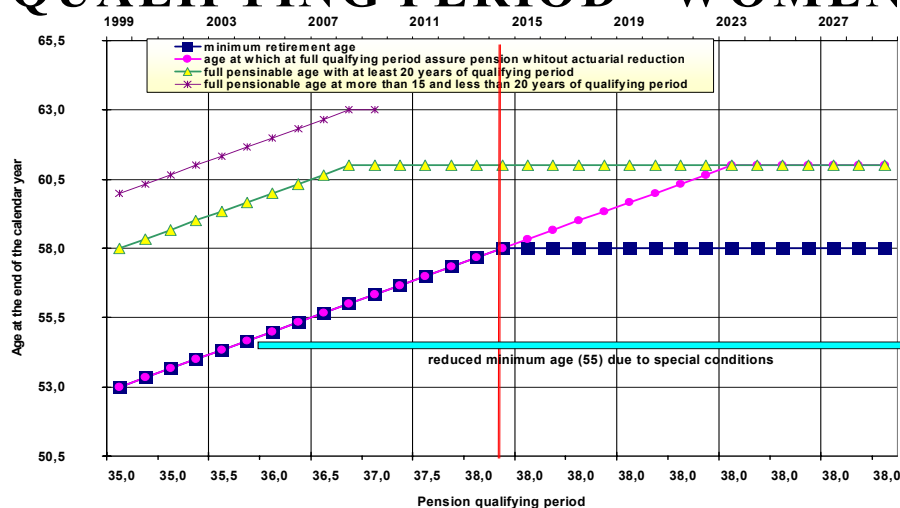
Men may claim old-age pension:

1. at the age of 65 and having accumulated at least 15 insurance years, or
2. at the age of 63 and having accumulated 20 pension qualifying years, or
3. at the age of 58 and having accumulated 40 pension qualifying years.

Women are qualified for old-age pension:

1. at the age of 63 and having completed at least 15 insurance years but less than 20 years; or
2. at the age of 61 and having completed 20 or more pension qualifying years; or
3. at the age of 58 and having completed 38 pension qualifying years.

## RETIREMENT AGE AND PENSION QUALIFYING PERIOD - WOMEN



### 22.1.3

#### Qualifying conditions for invalidity pension

For invalidity pension a person may qualify in three categories according to the remaining ability to work.

### 22.1.4

#### Pension base

The pension base for the year 2005 is calculated from the 15 consecutive years' of the most favourable average of salaries and on year more to the 18 consecutive years' till the end of 2008.

The indexation of pension base and adjustment of pensions are the same <sup>128</sup>.

### 22.1.5

#### Pension formula and pension amount

Pension amount (P) depends from earnings, pension period, age and gender, total accumulated accrual rates and indexation formula.

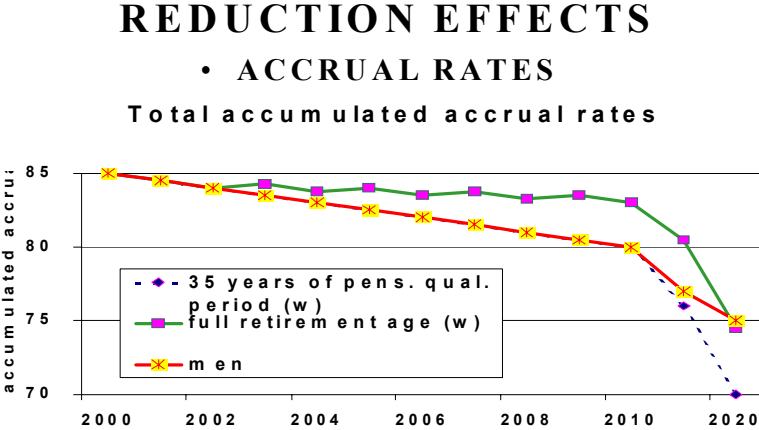
1.  $P = f\{\text{pension base}(P_b), \text{pension qualifying period} (qp), \text{bonuses and maluses, total accumulated accrual rate, indexation}\}$
2.  $P_b = f\{\text{average earnings of the 18 best consecutive years, adjustment}\}$
3.  $\text{Qualifying period} = f\{\text{working period, period with supplementary calculated periods, granted periods, purchased period}\}$
4.  $\text{Bonuses and maluses} = f\{\text{age, gender}\}$
5.  $\text{Total accrual rate} = f\{\text{age, gender, accumulated accrual rates before 2000, accumulated accrual rates after 2000}\}$
6.  $\text{Accrual rate before 2000} = f\{\text{pension qualifying period, gender}\}$
7.  $\text{Accrual rate after 2000} = f\{\text{pension qualifying period, gender, age}\}$
8.  $\text{Indexation} = f\{\text{growth of (net wages), equalisation of old and new accrual rates}\}$

<sup>128</sup> In 2003, Pension base (from an insured person's most favourable 13 consecutive years of insurance) was equivalent to 79.1% of insured person's average salaries.

The pension amount is no longer limited by a maximum total accrual rate: the longer the pension qualifying period, the higher the accrual rate.

Given the unchanged ratio between average monthly salaries and pension base in the following years, old-age pension for 40 pension qualifying years for men and 38 pension qualifying years for women, would amount to 57.3% of most favourable average 18 consecutive insurance years.

**Graph 22 - 3 Reduction effects for total accrual rates**



**22.1.6 Indexation of pensions and other benefit**

The pensions and other benefits are indexed with the rate of (net) wage growth of all employed persons. The indexation takes place twice a year, in February and December.

To equalise old pensions to the new ones deriving from new set of parameters (mainly accrual rates) a coefficient of reduction of indexation is applied at the first indexation in a calendar year (in February).

**Graph 22 - 4 Equalization of old and new pensions**

### EQUALIZATION OF OLD AND NEW PENSIONS

- INDEX OF ADJUSTEMENT IS REDUCED BY COEFICIENT BETWEEN TOTAL ACCUMULATED ACCRUAL RATES IN THE TWO CONSECUTIVE YEARS

	2001	2002	2003	2004	2005	2010	2024
TOTAL ACCUMULATED ACCRUAL RATE IN THE OLD SYSTEM	85,00	85,00	85,00	85,00	85,00	85,00	85,00
TOTAL ACCUMULATED ACCRUAL RATE IN THE NEW SYSTEM	84,50	84,00	83,50	83,00	82,50	80,00	72,50
RELATIVE DECREASE	0,59%	0,59%	0,60%	0,60%	0,60%	0,62%	0,68%
CUMULATIVE RELATIVE DECREASE	0,59%	1,18%	1,76%	2,35%	2,94%	5,88%	14,71%

### 22.1.7 Financing of the compulsory pension insurance

The social security contribution rates are 15.5% and 8.85% of gross wage for insured persons and employers respectively. From the national budget and other sources is paid the difference between the Institute's revenue from contributions and other sources, and its outgoing.

## 22.2 Model Description <sup>129</sup>

The model for projecting long-term implication of current pension, health care and long-term care is derivative of the generational accounting model. The idea of the generational accounts is the government's intertemporal budget constraint.

$$\sum_{s=0}^D N_{t,t-s} + \sum_t^{\infty} N_{t,t+s} + W_t^g = \sum_{s=t}^{\infty} G_s (1+r)^{-(s-t)}$$

The first element on the left-hand side of the equation is present value of the remaining net payments of existing generations; the second element on the left is the present value of the remaining net payments of future generations; and the third element on the left-hand side is the government net wealth in the year  $t$ . On the right-hand side we have the present value of government consumption.

Generational accounts dismember all revenues and expenditures of the public sector. All expenditures and revenues of the public sector are assigned to particular age (and sex) groups. These profiles are applied on the future demographic projections and as result generational accounts answer on the question whether the tax and transfer-policy of a selected base year can be maintained into the indefinite future or whether sooner or later adjustments will be necessary in order to meet the government's intertemporal budget constraint.

In the same way also our model combines age and gender specific profiles with demographic projections. But it concentrates on expenditures and revenues in specific year instead of following specific generations in indefinite future. It uses (more) detailed age and gender profiles and it concentrate only on specific types of expenditures.

In the model we used the latest demographic projections from Eurostat, published in April 2005. We use also the latest assumptions from European Commission about the future labour productivity, GDP growth, activity rates, employment rates and unemployment rates. **The linkage between these rates and retirement rates is crucial part of the model.** We have estimations about the increasing age at retirement sue to new pension legislation which entered into force in the year 2000.

But it is very hard to predict the additional prolongation of working period i.e.; instead of estimating only legally enforced changes we applied calculations of Institute of Macroeconomic Analysis and Development<sup>3</sup> for the future projections of retirement rates.

We calculated all the available estimates for future reduction of the level of pension benefits as the consequent of pension reform introduced in the year 2000. They were prepared for the purpose of the

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<sup>129</sup> Jože Sambt, Faculty of Economics

OLG model. Age and gender structure of pensioners was made on the basis of data from Institute of Pension and Disability Insurance of Slovenia<sup>130</sup>.

We assume that wage growth will be the same as productivity growth. According to the legislation from the year 2005 pension growth will be indexed to the growth of wages (but the growth of pensions will be in the transition period smaller than the growth of wages because of gradual reducing pension benefits, which is the consequence of the pension, reform from the year 2000). For health and long-term care expenditures we assume that per capita they will grow with the same growth rate as labour productivity.

**Table 22 - 1 Pension expenditure according to different demographic assumptions**

		2003	2010	2020	2030	2040	2050
Medium variant	Revenues	9.5	10.0	10.9	11.5	11.5	11.5
	Expenditure	11.3	11.0	11.0	12.8	15.0	16.4
High variant	Revenues	9.5	10.1	11.0	11.6	11.4	11.4
	Expenditure	11.3	11.0	11.0	12.7	14.5	15.3
Low variant	Revenues	9.5	9.9	10.8	11.5	11.5	11.5
	Expenditure	11.3	11.0	10.9	12.8	15.2	16.9
Zero migration variant	Revenues	9.5	9.9	10.8	11.5	11.5	11.5
	Expenditure	11.3	11.0	11.1	13.3	16.1	18.3

All those three types of expenditures are expressed as share of GDP. Growth rate of GDP is calculated as sum of labor input growth rate and labor productivity growth rate. That means that it is calculated in the same way as the calculation from European Commission.

## 22.3 The Model for The Projection of The Numbers of Pensioners and Contributors in The Full Employment Scenario

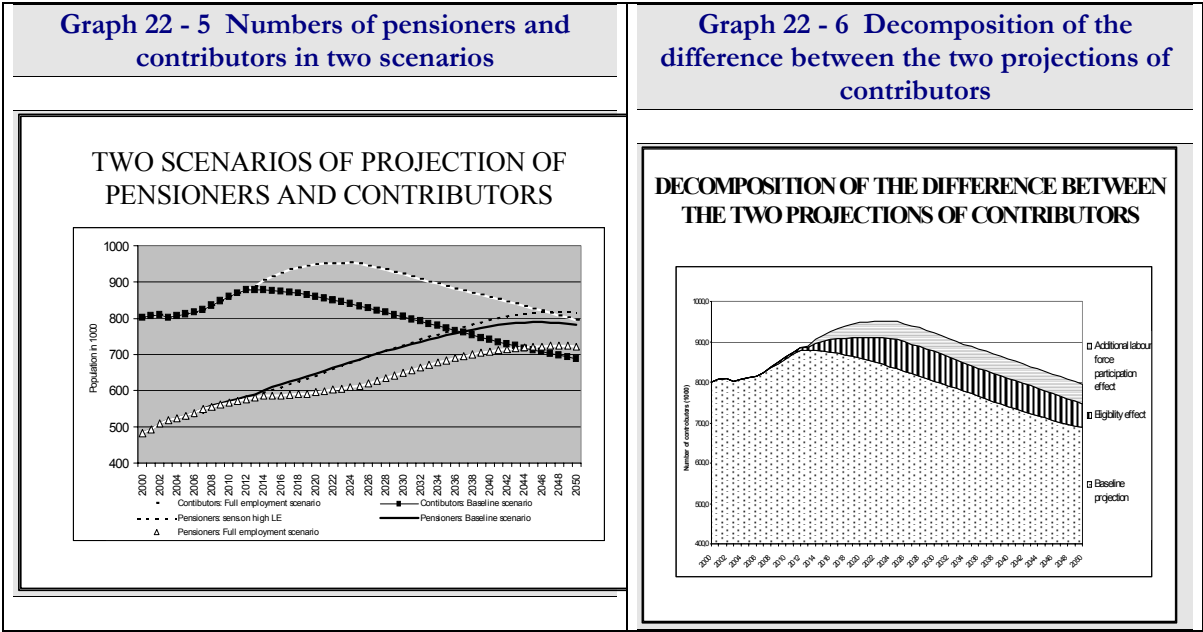
**Methodological basis:** Since the scope of economically active population, as defined by labour force surveys, in Slovenia oscillates around the number of persons in employment according to the national accounts methodology, it may, notwithstanding the methodological differences, be considered as an approximation for the projection of the latter. This projection can be made by using a demographic projection and a projection of gender- and age-specific rates of various mutually exclusive socio-economic conditions of the population. Beside employment we took into account also regular education, unemployment, retirement, and various other forms of inactivity. For the past these rates have been determined or estimated on the basis of the available statistic data. We also took into account that some persons, such as students or pensioners who are working, should be treated as supplementary employed persons.

**Basic elements of the projection:** The projection of the number of retired persons in the base and other AWG sensitivity tests scenarios are made according to the above mentioned methodology. We used the AWG alternative employment and unemployment rates and our proper assumptions of the rates of education, other inactivity and supplementary employment. The starting points of our projection were the already specified objectives in the field of education and pension legislation. The projection of the number of contributors to the pension system is made on the assumption that this number equals to the number of persons in formal employment. The projection of this category is made from the AWG alternative projections of employment by the deduction of the projection of informally (unpaid family workers, grey economy and similar), or supplementary employed person (students or pensioners who are working).

<sup>130</sup> See the next chapter , The model for the projection of the numbers of pensioners and contributors in the pension system and the full employment scenario, Tomaž Kraigher, IMAD

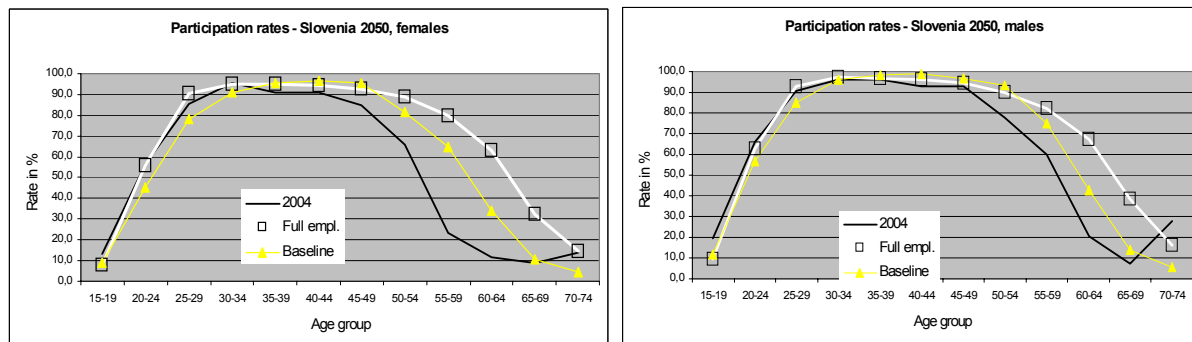
**Full employment scenario:** Beside AWG scenarios we made also an alternative projection named full employment scenario. This scenario is based on the Eurostat’s baseline population projection for Slovenia according to which the working-age population (aged 15-64) should begin to decline as early as in the beginning of the next decade. From the current 1,405,000 it will drop to a mere good one million in 2050, while the number of elderly population would double. Old-age dependency ratio would rise from the current 21.2 to 56.0. Therefore, the full employment scenario assumes that in order to mitigate the consequences of the decline in working-age population, there will be a considerable decline in unemployment, retirement and other kinds of inactivity. On the other hand, it is assumed that (due to a variety of structural obstacles) this decline will progress at a moderate pace so that the decrease in economically active population will not occur before 2020.

The unemployment rate should be reduced from the current 6.4% to about 3%. Participation rates of the inactive working-age population should be increased by two thirds. Participation rates are now low particularly in older population groups (55-64), partly still influenced by early retirements in the past, and partly by the inadequate educational and vocational structure of this age group that, for this reason, no longer seeks employment. Since the yield from adult training in this age group is very low, an increased work activity of this age group may be achieved mainly by postponing retirement. We assume that due to later entering of youth in labour market according to growing enrolment in post-secondary education, and due to possible economic incentives for voluntary extension of work activity, the effective retirement age will move in twenty years from the present 58 to about 65. This scenario would be possible only within a favourable environment for economic growth and appropriate working conditions for work activity of older persons.



**Comparison to Baseline scenario:** No-policy change Baseline scenario does not permit a sustainable ratio between the future number of beneficiaries' contributors to pension system in Slovenia. Under no-policy change conditions in 2050 the number of pensioners would exceed the number of contributors. Dependency ratio will be reduced from 1.6 in 2004 to about 0.9 contributor to one pensioner. AWG sensitivity tests do not enable any substantial variations neither in this ratio, nor in the number of pensioners and contributors. Further policy efforts should be made both to encourage higher employment and to reduce retirement eligibility at least toward the relationship given by the full employment scenario described above. This scenario would enable a dependency ratio about 1.1 in 2050.

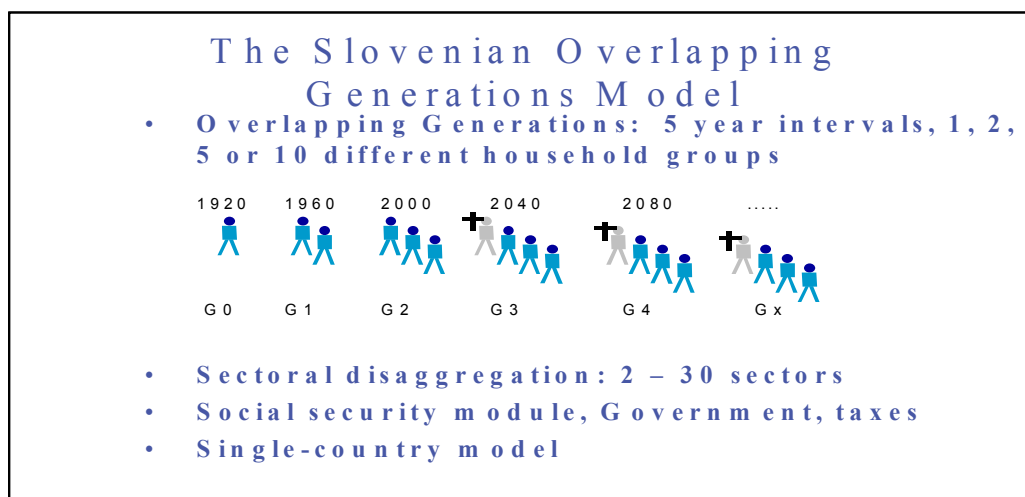
**Graph 22 - 7 Participation rates in 2004, baseline and full employment scenarios**  
 Females Males



## 22.4 Description of the OLG-GE Model of the Slovenian Economy<sup>131</sup>

The model SIOLG 1.0 is a dynamic overlapping-generations general equilibrium model of the Slovenian economy, based on social accounting matrix (SAM) for the year 2000, data on demographic structure of the population, expected future demographic developments, characteristics of Slovenian households, and decomposition of households within generations. The model has been developed with the very intention of analyzing the sustainability of the Slovenian public finances, though it can be used to analyze any part or any sector of the economy.

**Graph 22 - 8 The Slovenian overlapping generatios model**



Dynamic general equilibrium model SIOLG 1.0 comprises not only the standard model structure of a national economy, but also the demographic block and the pension block, within the framework of which the first pillar of the Slovenian pension system is being modelled. Since the model incorporates most of the contemporary techniques of the CGE modelling (cf. Verbič 2005), the arrears in this field in Slovenia compared to the rest of the world have practically been eliminated. Namely, the model is build within the general algebraic modelling system (GAMS), which has become both most widely

<sup>131</sup> Boris Majcen, Institute for Economic Research

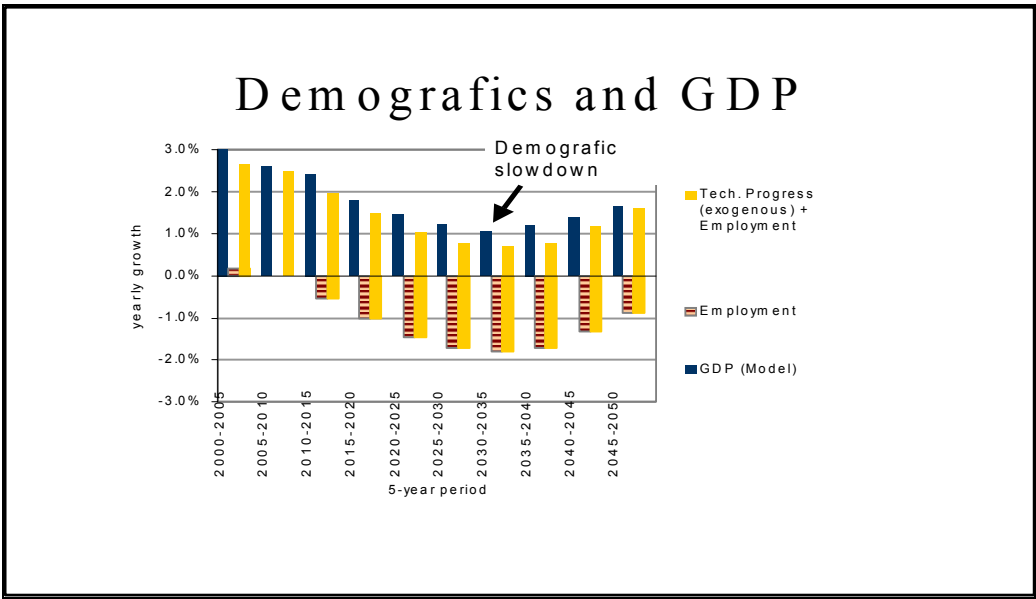


used programming language and most widespread computer software (Brooke et al. 1998) for construction and solving large and complex CGE models.

Within the GAMS framework, the dynamic general equilibrium model is written in Mathiesen’s (1985) formulation of the Arrow-Debreu (1954) equilibrium model, i.e. as a mixed complementarity problem (MCP). The key advantage of this formulation is the compact presentation of the general equilibrium problem, which is achieved by treating variables implicitly and thus significantly reducing the computation time for higher-dimensional models. Namely, the mathematical program includes equalities as well as inequalities, where the complementarity slackness holds between system variables and system conditions (cf. Rutherford 1995a; Böhringer et al. 2003). Functions of the model are written in Rutherford’s (1995) calibrated share form; a reasonably straightforward algebraic transformation, which nevertheless considerably simplifies the calibration of the model (cf. Böhringer et al. 2003; Balistreri and Hillberry 2003). To solve the model, i.e. to achieve convergence, a recent version of the PATH solver (Ferris and Munson 2000) is used, which is renowned for its computational efficiency.

Consumers live in the model according to their expected length of life, i.e. their life expectancy at birth. Assuming that the life expectancy is approximately 80 years and that the active lifetime period starts at the age of 20, there are 60 generations in each period of the model. There is a new cohort of consumers born in each such period, thus increasing the population, while at the same time a number of consumers pass away and decrease the total population. Consumers are observed in five-year intervals within households, which maximize the expected lifetime utility subject to their income constraints, where one has to put out the need to save for retirement and to support children. Households are differentiated in the model according to year of birth, income and size; within each cohort distinction is made between couple without children and nuclear family with two children on average, and five income profiles representing different income brackets. Consequently, there are ten versions of the model altogether, which facilitates analysis of intra-generational effects of different economic policies.

**Graph 22 - 9 Projected evolution of demographics and GDP**



The volume of labour and the labour productivity growth are given exogenously. Changes in wages are reflected in changes of the labour supply. Consumption of households with children is additionally

corrected due to extra cost per child, where the children are born in the childbearing age of the woman or, to be precise, the household, i.e. in the age bracket of 20-40 years. In the first ten years after retirement the household is comprised of two persons and afterwards of one adult. Saving decisions of households affect investment decisions of firms in the capital markets and thus future production. The effects ascribed herein have recurrent effects on product market through decreasing prices and on labor market through higher productivity, leading to higher wages and finally higher income of households. Both effects can be analyzed with a dynamic OLG-GE model quite straightforwardly.

The perfect foresight assumption in the forward-looking model specification implies the ability of households to perform intertemporal optimization of the present value of entire future consumption. In other words, the consumers have full information at their disposal, adopt on average the right decisions and are familiar with future modifications of key economic indicators, which is the quintessence of rational expectations. They are able to anticipate new policies and to prepare themselves to future changes. The assumption of equilibrium in all markets and assumption of achieved sustainable economic growth enable analysis of different scenarios, which cause deviations from the reference growth path and changes in macroeconomic and microeconomic indicators. This is especially important when analyzing social security, because it makes possible projecting the effects of demographic changes on the social security system. For this we have three variants of demographic projections available; the low variant combines lower fertility with lower life expectancy and lower net migration, while the high variant combines higher fertility with higher life expectancy and higher net migration than in the reference medium variant.

On the other hand, the assumption of perfect foresight is also valid for firms, which maximize profits in the environment of perfect competition. Technology is given by the constant elasticity of substitution (CES) production function. The number of production sectors in the model is dependent on availability of the input-output table for the base year, which means that there are 60 sectors of the standard classification of activities (SCA) available for discretionary aggregation. Government spending is dependent on economic growth and growth of the population, and is financed with revenues from personal income tax, capital income tax, value-added tax and import duties. Sources of revenue of the Slovenian system of public finances represent various possibilities of funding different economic policies in the simulation phase of the modeling.

The dynamic general equilibrium model SIOLG 1.0 is closed using the Armington's (1969) assumption of imperfect substitutability, where the commodities are separated by its source on domestic and imported products. Demand for imported products is derived from cost minimization criterion of firms and utility maximization criterion of consumers. As regards the export side of the model, domestically produced products are sold at home and abroad, but are nevertheless treated as imperfect substitutes. Slovenia is assumed to be a small open economy, implying that the changes in the volumes of imports and exports do not affect the terms of trade. International capital flows are endogenous, given the intertemporal balance of payments constraint.

## **22.5 Results of Projections**

Estimates based on generation accounts were used to assess long-term sustainability of the present pension and disability insurance system.

Although results show that the pension reform has had positive impacts on a decrease in pension fund deficit, the deficit will be impossible to avoid, taking into account indexation of pensions to wages, demographic projections, and constant other factors. Thus the deficit could amount to 2.4% of GDP in 2020 and to 10% in 2050, which is shown in the table below:

**Table 22 - 2 Pension funds, taking account of parameters of the Pension and Disability Insurance Act**

<b>IPII – ZPIZ financing, share of GDP</b>	<b>2003</b>	<b>2005</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>
Social insurance contributions	9.5	9.7	9.8	10.0	9.9	9.7	9.7
Pension expenditure	11.3	11.2	11.2	12.5	14.6	17.0	18.5
Changes in deficit		0.3	0.4	-0.7	-2.9	-5.5	-7.0

Increase in pension fund deficit, which would persistently continue in the observed period until 2050 in spite of a rigorous pension reform and amount to very high shares in GDP, will have to be curbed in time with appropriate measures.

One of very effective measures is surely a gradual increase in the activity level and consequently a reduction in the retirement level, particularly of generations over 55 years of age. This measure would represent a double favourable effect for the pension fund: the fund would receive contributions from a larger number of employees for a lower number of pensioners at the same time. Given the assumed raising of activity level, the pressure of demographic changes could be neutralized by 2030, when the pension fund could even record an additional surplus as compared with the base year 2003. After that date, however, negative demographic trends could nevertheless cause a gradual increase of additional deficit that is expected to rise to 3.1% of GDP by 2050.

**Table 22 - 3 Pension funds, taking account of the increase in employment**

<b>IPII - ZPIZ financing, share in GDP</b>	<b>2003</b>	<b>2005</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>
social insurance contribution	9,5	9,7	10,0	10,9	11,5	11,5	11,5
pension expenditures	11,3	11,4	11,0	11,0	12,8	15,0	16,4
changes in deficit		0,1	0,9	1,8	0,6	-1,7	-3,1

Individual factors effecting pension expenditure or its share of GDP will have different impacts in the analysed period. Table 22 - 3 shows contributions of individual factors to the change in pensions as a GDP percentage with regard to the base year 2003. The calculation takes account of the full action of pension reform with indexation of pensions to wages. The positive value represents the contribution of individual factors to increasing the share of pensions in GDP, and the negative the other way round: contribution of individual factors to decreasing the share of pensions in GDP. As expected, the anticipated demographic changes will contribute by far the greatest part to the increasing share of pensions in GDP. The share of pensions in GDP should thus have risen by 1.8% of GDP without changes in other factors as early as in 2010, taking into account only assumed demographic changes. However, the other three factors will act in the opposite direction, so that the overall change will be relatively small. The effect of employment in this period is primarily a result of the anticipated increase in the activity of women as a consequence of the implementation of the pension reform, which is additionally also reflected in the eligibility factor. The importance of the two factors in checking the increase of the share of pensions in GDP is relatively low and further decreases with years, which is certainly also a result of the assumptions employed. One should point to the positive contribution of the eligibility factor at the end of the reviewed period, which is a result of the assumption that the level of retirement of women will gradually increase to 100% and the fact that there will be a growing number of older women due to demographic changes.

**Table 22 - 4 Contribution of factors to the change in pensions as % of GDP (100% indexation)**

<b>Contribution to the change in the share of pensions in GDP expressed as percentage points of GSD</b>	<b>2003</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>
Demographic dependency	0.00	1.79	4.89	7.95	10.82	12.17
Employment	0.00	-0.48	-0.46	-0.08	0.26	-0.18
Eligibility	0.00	-0.68	-0.67	-0.33	-0.18	0.28
Level of benefits	0.00	-0.06	-0.90	-1.54	-1.92	-2.06
Total	0.00	0.57	2.86	6.01	8.98	10.20

The factor that checks the increase of the share of pensions in GDP at the most is actually the level of benefits that, in fact, comprises the effect of the action of pension reform together with the assumed indexation of pensions to salaries. Projections thus show that the pension reform effects could not compensate for the intense demographic pressures, in particular between 2030 and 2050.

We are presenting below a scenario of possible reduction of the financial gap in the pension fund by implementing a more suitable labour market policy, raising levels of activity and thus simultaneously reducing the retirement level of Slovenia's population. The scenario also includes the raising of the retirement age as a result of each individual's decision about retiring at a later date. The scenario tries to simulate the raising of the average age limit for retirement to approximately 65 years for both men and women. A relatively rapid increase in the activity level is assumed, which would, if such a result could actually be achieved in practice, also contribute to finding a solution for negative consequences of demographic changes for the pension fund. In this respect, it should be pointed out once more that the effect of the scenario only on the pension fund's revenues side is shown. The full effect would be shown if we also took account of the impact of increased activity on the amount of contributions to the pension fund.

Sustainability of pension financing will be maintained if the increased employment level will be achieved, as shown in Table 22 - 5.

**Table 22 - 5 Contribution of factors to the change in pensions as % of GDP with an increase in employment (100% indexation)**

<b>Contribution to the change in the share of pensions in GDP expressed as percentage points of GSD</b>	<b>2003</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>
Demographic dependency	0.00	1.50	4.29	6.78	9.20	10.52
Employment	0.00	-0.87	-1.83	-2.00	-1.99	-2.27
Eligibility	0.00	-0.90	-2.00	-2.00	-1.91	-1.38
Level of benefits	0.00	0.06	-0.80	-1.31	-1.60	-1.73
Total	0.00	-0.22	-0.34	1.47	3.70	5.15

## Annex 1 : Socio-economic status of the population

Table 22 - 6 Target rates of the socio-economic status of the population in comparison with 2004, in % of the age group, men

Men	Basic and secondary education		Involvement in full-time study		Retirement rate		Other inactivity		Activity		Employment		Unemployment rate <sup>132</sup>		Supplementary activity rate <sup>133</sup>
	2004	Target	2004	Target	2004	Target	2004	Target	2004	Target	2004	Target	2004	Target	Assump
5-9	80.0	80.0													
10-14	100.0	100.0													
15-19	77.1	80.0	7,5	10.0			1.4	2.1	19.6	9.4	14.8	8.0	24.6	14.1	15.0
20-24			28,1	40.0	0.0	0.0	15.2	33	66.1	62.7	58.8	58.0	11.1	7.5	15.0
25-29			6,6	5.0	0.1	0.2	5.8	2.8	90.4	92.8	84.1	89.1	7.0	4.0	15.0
30-34					0.6	0.6	3.5	2.4	96.2	97.1	92.7	94.3	3.7	2.8	15.0
35-39					1.2	1.2	3.2	2.1	96.1	96.9	90.6	94.2	5.8	2.7	15.0
40-44					2.1	2.4	5.8	2.1	92.6	95.9	87.8	93.2	5.2	2.8	15.0
45-49					4.8	4.4	5.0	2.0	92.8	94.3	89.2	91.4	3.9	3.0	15.0
50-54					11.0	8.8	12.1	2.2	77.8	90.2	72.7	87.5	6.6	2.9	12.8
55-59					30.1	17.6	14.7	2.8	60.6	82.0	58.9	79.3	2.9	3.4	13.7
60-64					82.9	35.2	6.6	2.2	20.8	67.1	20.8	67.1	0.0	0.0	13.1
65-69					98.2	70.5	0.0	0.0	7.5	38.2	7.5	38.2	0.0	0.0	12.4
70-74					98.6	95.0	0.0	0.0	29.6	16.1	29.6	16.1	0.0	0.0	11.6
75+					100.0	100.0	0.0	0.0							

<sup>132</sup> As % of active population of the same gender and age group

<sup>133</sup> As % of students or pensioners in the same gender and age group

**Table 22 - 7 Target rates of the socio-economic status of the population in comparison with 2004, in % of the age group, women**

Women	Basic and secondary education		Involvement in full-time study		Retirement rate		Other inactivity		Activity		Employment		Unemployment rate <sup>134</sup>		Supplementary activity rate <sup>135</sup>	
	2004	Target	2004	Target	2004	Target	2004	Target	2004	Target	2004	Target	2004	Target	Assump	
5-9	80.0	80.0														
10-14	100.0	100.0														
15-19	78.8	80.0	10,4	12.0			2.7	1.8	13.5	8.0	9.8	6.8	27.3	15.0	15.0	
20-24			40,3	48.0	0.0	0.0	16.4	3.3	56.3	55.9	46.3	51.0	17.8	8.7	15.0	
25-29			7,5	6.0	0.1	0.1	9.6	4.0	85.7	90.8	77.0	86.4	10.1	4.8	15.0	
30-34					0.7	0.7	4.2	4.5	95.5	94.9	89.7	91.8	6.1	3.3	15.0	
35-39					1.3	1.3	8.3	3.8	90.9	95.1	87.6	92.7	3.6	2.6	15.0	
40-44					2.4	2.6	7.4	3.3	90.9	94.4	85.4	92.0	6.0	2.6	15.0	
45-49					5.2	4.7	11.6	3.2	84.9	92.7	82.5	90.3	2.8	2.6	15.0	
50-54					20.5	9.5	16.5	3.1	66.1	88.7	61.1	84.8	7.5	4.3	12.8	
55-59					71.6	18.9	12.8	3.5	23.7	79.9	23.7	78.0	0.0	2.4	12.1	
60-64					89.9	37.8	7.6	3.6	11.9	63.1	11.9	63.1	0.0	0.0	11.8	
65-69					97.2	75.6	2.0	0.0	9.0	32.6	9.0	32.6	0.0	0.0	10.9	
70-74					99,6	95.0	0.1	0.0	14.3	14.4	14.3	14.4	0.0	0.0	9.9	
75+					92,0	100.0	8,0	0.0								

Source: the author's projection on the basis of SORS and PPII data.

<sup>134</sup> As % of active population of the same gender - age group

<sup>135</sup> As % of students or pensioners in the same gender - age group

## 23. Slovakia

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### 23.1 Description of the Pension System

The pension system in Slovakia consists of three pillars. Broadly used pay-as-you-go system was supplemented by voluntary pension scheme from 1996. Moreover, the fully funded pillar has been introduced in 2005 in effort to decrease pension costs in long-run. The fully funded pillar is voluntary for people currently working (they can decide if they will contribute to this pillar until July 2006) but mandatory for workers newly entered labour market.

**Table 23 - 1 Three pillars of the Slovak pension system**

	<b>Until 2003</b>	<b>From 2004</b>	<b>From 2005</b>
<b>1<sup>st</sup> pillar</b>	<u>Mandatory</u> Non-reformed PAYG – defined benefit system (redistributive)	<u>Mandatory</u> Reformed PAYG–defined benefit system (direct link: contributions→ benefits)	<u>Mandatory</u> Reformed PAYG–defined benefit system (direct link: contributions→ benefits)
<b>2<sup>nd</sup> pillar</b>	-	-	<u>Voluntary/Mandatory</u> Fully Funded Pension Fund
<b>3<sup>rd</sup> pillar</b>	<u>Voluntary</u> Supplementary Pension scheme (from 1996)	<u>Voluntary</u> Supplementary Pension scheme	<u>Voluntary</u> Supplementary Pension scheme + other financial products

Financial problems of the non-reformed PAYG system can be attributed more to the relatively high rate of unemployment and low motivation of the economically active population to contribute to the system. Since high unemployment in economy presents a structural problem associated with the process of the transformation of a command economy into a free-market economy, and a sustained effort to increase employability, particularly of the long-term unemployed, its solution may be expected only gradually, in medium term.

For these reasons, the Slovak Republic has embraced a reform approach, which not only has a relatively fast effect on the overall financial balance of the pension system (the so-called **parametric change**, consisting in the change of particular parameters of the existing system), but also a radical **systemic change** that alters the basic features of the pension system. Although a parametric reform may facilitate considerably the extension of the period of financial stability and sustainability of the pension system, in the long run it is just a postponement of the need to solve its fundamental problems to the future.

#### 23.1.1 Pension system until 2003 (before reform)

##### Retirement age

Until the end of 2003, i.e. prior to launching first reform steps in the Slovak pension system, the rise of entitlement to old-age pension was conditional upon completion of minimum 25 years of employment and reaching of the retirement age prescribed by law. The retirement age was as a rule 60 years for men and 53 to 57 years for women (depending on the number of reared children).

##### Pension formula and benefits

For the calculation of the amount of old-age pension a relatively complicated formula was used, which in principle took account of the period of employment and the average income of the individual, determined as the average monthly income during five “best earnings” years over the period of 10 years prior to retirement.

In determining the assessment base for the calculation of pension, only the “first” SKK 2,500 had been fully counted of the total income. From the range 2,500 – 6,000 SKK only one-third was counted, from the range 6,000 - 10,000 SKK only one-tenth was counted and the monthly income exceeding SKK 10,000 was not considered at all. The pension calculated on this basis was subsequently adjusted upon its award by a coefficient that reflected the growth in wages after 1989 and the indexation of pensions introduced from 1991. This reduction of the assessment base was the main tool of income redistribution in the construction of pre-reform pension system; hence the people with lower income could expect considerably higher replacement rates than the persons with higher incomes.

The described way of pension’s calculation in the pre-reform pension system was to a significant extent redistributive, with the link between the amount of contributions paid and the amount of pension benefit received being considerably weakened. The monthly income exceeding SKK 10,000 was not considered in the calculation of pensions even in 2002, when the average monthly wages in the SR economy was more than SKK 13,500, which had a significant negative impact on the motivation to pay “contributions” for pension security. In other words, contributions were collected up to monthly incomes of SKK 32,000, but the pension was not increased for earnings above SKK 10,000.

**Table 23 - 2 Pension brackets and cumulative distributions of pensioners in these brackets in 2000**

<b>Pension Brackets</b>	<b>Bracket thresholds (EUR/month)</b>	<b>% of males</b>	<b>% of females</b>
Old Age Pensioners Receive Minimum Pension of	55	0,31%	1,37%
Old Age Pensioners Receive Pension under	71	0,40%	3,05%
Old Age Pensioners Receive Pension under	94	1,15%	13,85%
Old Age Pensioners Receive Pension under	118	9,68%	61,52%
Old Age Pensioners Receive Pension under	142	58,02%	90,92%
Old Age Pensioners Receive Pension under	170	90,79%	98,85%
Old Age Pensioners Receive Pension under the Maximum Pension of	205	100,00%	100,00%
Average gross wage = 294 EUR		Average net wage = 238 EUR	

The classification of occupations according to demands involved in their performance into three categories emphasised the security orientation of the system. The system favoured persons carrying out specific kinds of work (such as miners, pilots, artists, people carrying out hazardous works in chemical industry, etc.) by laying down lower retirement age and by more advantageous way of calculating pensions. From the system also such benefits were provided that did not have any link to the previous economic activity of the individual and the reason for their payment to the person concerned was solely social.

Years of service credit were also given to large numbers of people without collecting contributions from them. The unemployed were given years of service credit until 2000. High school students, aged 14-18, were given years of service credit until 2001. University students received years of service credit right until the reform was implemented in January 2004. In addition, mothers caring for children, the disabled, and those in military service all received years of service credit without actually contributing.



A minimum pension equal to a little more than 1/3 of minimum wage was also provided. A social pension could also be granted by the Social Insurance Agency to anyone who was either over the age of 60 or disabled and had no entitlement to any other benefit. This pension was financed by the state and was not higher than subsistence level, approximately 60 percent of minimum wage.

Widow's pensions were provided at any age if the widow were disabled, were taking care of child, or had raised three children. If she had raised two children, the widow's pension was available at age 45. Otherwise, the widow's pension was only available at age 50 unless the worker had died as a result of a work injury, in which case the eligible widow's age was 40.

## Pension indexation

The indexation mechanism applied in the pension system until 1991 laid down that pensions were to be raised only in cases where, from the time of recent pension increase, the average monthly wage rose by a minimum of 5 %, or the so-called cost of living index rose at least 10 %. However, this mechanism did not involve any principles for determining the scope of indexation. The Government and the Parliament would approve the actual amount of pension indexation. Owing to such arrangements indexation was used also as an important tool of the political agenda.

### 23.1.2 Pension reform in 2004 (PAYG reform)

#### Social security contributions

Social contributions are paid up to a wage of three times the average wage, and the benefits will be paid on this same base. The reserve fund is designated to cover any shortfalls in other funds. So while called a reserve fund, it is essentially an additional contribution meant to help cover deficit.

**Table 23 - 3 Social security contributions, % of gross wages**

	2003	2004	2005
<b>Paid by employer</b>	<b>21.60</b>	<b>21.75</b>	<b>21.75</b>
Pension insurance	21.60	19.00	17.00
- old age insurance*	-	16.00	14.00
- disability insurance	-	3.00	3.00
Reserve fund	-	2.75	4.75
<b>Paid by employee</b>	<b>6.40</b>	<b>7.00</b>	<b>7.00</b>
Pension insurance	6.40	7.00	7.00
- old age insurance*	-	4.00	4.00
- disability insurance	-	3.00	3.00
<b>Total</b>	<b>28.00</b>	<b>28.75</b>	<b>28.75</b>

*\*The employer is required to pay only 5% to PAYG on behalf of employees who join funded pillar and the rest 9% will flow to 2<sup>nd</sup> pillar.*

*Source: Ministry of Finance*

#### Retirement age

The retirement age for women was set at 57 years until the end of 2003. However, the retirement age was reduced by 1 year for each child raised, down to minimum of 53. Current law set the only retirement age at 62 with gradually increase by 9 month per year for every category of woman, bearing in mind the pre-reform retirement ages depended on the number of children raised. Retirement age for men is gradually increased from 60 to 62 also by 9 month per year. Pre-reform retirement ages for men were also complicated in terms of various scale of retirement ages depended on the description of occupation. The number of pensioners eligible for reduced retirement age was, in comparison with

women, relatively low. Approved pension reform has avoided all advantages for specific occupations and set the retirement age to 62.

**Pension formula and benefits**

The *old-age benefits* are based on a point system, which is the equivalent of providing workers 1.16 percent of the average lifetime wage, wage indexed, per year of service. Between 2004 and 2006, there are transition rules which provide some minimal transition from the previous redistributive system to the new system.

Pension point (pension value) was set as follow:

$$PP_{2004} = \frac{RR\% \otimes AV_{2003}}{Years} \dots\dots\dots 4,72 = \frac{50\% \otimes 377,75}{40} \text{ in EUR}$$

- Where:
- PP2004* – pension point in 2004
- RR%* - replacement rate (gross pension over gross average wage)
- AV2003* - Average wage in the economy (estimated at the time of writing law)
- Years* – years of service
- 1 EUR = 38,879 SKK

The new pension system has introduced also new elements which allow pensioners to retire before retirement age set by legislation or defer it. In such cases the old-age pension is reduced/increased by 6% per year (by 0.5% for every started 30-day period before/after reaching the statutory retirement age). On the other hand the pension is increased by 6% per year while working over the retirement age. **The third option is working together with drawing pension.** All mentioned options can help to make elder people more flexible with positive impact on labour market in following decades. Considering the substantial changes in pension system, the detailed analysis about impact on participation rate will be available after several years.

Pre-reform pension system was creating room for underreporting individual’s earnings without any significant impact on the future pension. The current pension system has created **direct link between contributions paid and benefits** received from the system. This is a noticeable motivation for individuals to legalize their income in effort to receive higher pension when retired.

*Disability pensions* are calculated exactly as the new old age pensions. The disability pensioner is treated as a full career worker, being given credit for all the years between the time of disability and the legal retirement age, but with the average wage on which the pension is based being calculated as the average earnings up to the time of disability.

*Widow and widower benefits* are based on 60 percent of the pension that the worker would have been entitled to at date of death or 60 percent of the pension that the worker had already been receiving. The benefits are awarded for only one year unless the survivor is taking care of a dependent child, is more than 70 percent disabled, or has reached retirement age. If the survivor reaches retirement age without remarrying, the pension is reinstated.

*Orphan’s pensions* are given to children who have lost a parent and who are under the age of 26, and attending school or preparing for their profession. Orphan’s benefits are 30 percent of the benefits which would have been awarded to the worker. The sum of widow and orphans’ benefits cannot exceed 100 percent of the pension.

Highlighting of the principle of merit was part of the transformation of the pay-as-you-go financed pension system from the “security” to the insurance system. The Act on social insurance removed

direct restrictions of the minimum and maximum amounts of pension benefits. The system limits the minimum/maximum pension benefits only indirectly - through the definition of the minimum/maximum assessment bases for paying contributions. Since minimum insurable earnings are equal to minimum wage which is approximately 40 percent of average wage, an individual can generally earn no less than 0.4 point per year of contribution, so that after 40 years of contributions, the pension would then be half of the minimum wage. If an individual makes fewer years of contribution, the pension will be significantly less than half of the minimum wage. However, individual's earnings pensions as well as those who do not qualify for pensions may apply for social assistance which is provided at the minimum subsistence level, which is about 2/3 of minimum wage.

Years of credit are still awarded without individuals making contributions for mothers with children under the age of six, for the disabled, and for those in military service. In the case of mothers and military, the State provides contributions. In the case of disabled, the disability fund transfers contributions to the old age fund.

### **Pension indexation**

Pensions post-retirement are indexed 50 percent to inflation and 50 percent to nominal wage growth. Pre-reform, the increases were decided by Parliament and expected to be around the same as wage growth, but often were not. The indexation of 50 percent to wage and 50 percent to prices will cost all pensioners relative to wage indexation if it had occurred, but the indexation in the past always depended on Parliament's actions and often did not achieve full wage indexation.

#### **23.1.3 Pension reform in 2005 (Introduction of Fully Funded Pillar)**

The introduction of ownership rights into the pension system was one of the most important reform steps. In the pre-reform pension system, functioning exclusively on the basis of enforced intergeneration redistribution (pay-as-you-go financing), there was a very weak and limited dependence of the amount of pension benefits upon the amount of contributions paid. Quite understandably, this resulted in the perception of contributions as being payments of another form of taxation, which lead to contribution payment avoidance, concealment and shifting of income, all kinds of adjustments to the assessment bases, discouragement to get employed officially, giving preference to informal (shadow) economy, migration to the labour markets of the countries having lower contribution burden, etc.

The tool to achieve the said objectives was the introduction of a mandatory capitalisation component in the pension system, together with strengthening of the position of voluntary forms of pension saving and insurance. After the reform then the new architecture of the mandatory pension system consists of two equal components – a defined-benefit, pay-as-you-go pension system (the social insurance system) and a funded, defined-contribution system (old-age pension saving scheme).

The new funded pillar which was implemented in early 2005 has split the contributions of employers to the old age fund from the current 14 percent which goes entirely to the public system into a portion which goes to the public system (5%) and a portion which goes to a private fund (9%). Employee contributions of 4 percent will continue to be directed to the public fund. The portion of the contribution specifically designated for old age, 18 percent will thus be split 50-50 between the private and public components, while the public agency retains all the funds allocated for disability and for the reserve fund.

The Social Insurance Agency (SIA) continues to collect all contributions as before, but will transfer the contributions of those who join the mixed system to the private pension company of their choice. The private company will invest the contributions on behalf of the workers.

Any current worker may choose to join the mixed system, but all new entrants to the labour market will automatically be put into the mixed system. Once a person has chosen to join the mixed system,

he cannot return to the pure PAYG system ever. There is a limited period of time, between January 1, 2005 and June 30, 2006 for current contributors to make their choice of whether or not to join the multi-pillar system.

The PAYG pension benefits for those who choose the mixed system will be derived from their pension points as before, with years of payment only to the PAYG regarded as generating full years of contributions while years under the mixed system will generate only half years of contributions. While a year of contribution to the PAYG alone will generate a 1.6% accrual rate, a year of contribution to the mixed system will generate only 0.6 percent accrual rate per year of contribution. The PAYG benefit is cut in half in line with the 50%-50% split in the contribution rate for old age. Additional benefits will come from money in the individual fund account.

*Disability provisions* are more complicated, with the disabled worker below the retirement age receiving a full PAYG pension as if he had never contributed to the funded system. However, upon reaching retirement age, the PAYG pension is reduced to reflect the years under the mixed system, but additional benefits from the funded system become available. During the period of disability, the disability fund in the PAYG system will pay contributions on behalf of the worker to the pension company of his choice, allowing the worker to retire with virtually full benefits despite the disability. This provision somewhat increases the incentive to claim disability early since the funded account continues to grow and accumulate assets whether working or disabled, and only the PAYG component, which is less than half the total pension, has the indexation differential of 50-50 applied to it, compared to the full wage indexation of the pensionable base given to those who continue to work.

*Survivors* of working age individuals receive a reduced PAYG pension, 60 percent of what the person had accumulated toward the old age pension plus the value of the private pension account. Unlike in the case of disability, survivors' pensions for those who contribute to the mixed system will be less than for those who contribute only to the public system, although mixed system survivors will inherit the balance of the private pension account at whatever age. The same rules as noted above apply for the PAYG part, with public pensions only paid for one year unless the widow or widower has reached retirement age, is disabled, or is caring for a child. Survivors of retirees get 60 percent of the retirees' annuities, both in the PAYG and funded systems and whatever balance may be left in the funded account.

The funded system requires that individuals take out a minimum life annuity equal to 60 percent of the subsistence minimum. The rest of the account may be withdrawn either as a lump sum or in the form of a programmed withdrawal, but the programmed withdrawal can take place over whatever time frame the saver chooses, one year, five years, 10 years, or whatever. A programmed withdrawal results in the pension company maintaining the individual's account in retirement and continuing to invest the funds. Each year based on investment returns and the term of the contract, a monthly withdrawal is calculated such that the account will be completely exhausted when the term of the contract ends. Once the individual is receiving a pension from the funded system, survivors then get 60 percent of the annuity received by the pensioner and the balance of the account.

#### **23.1.4 The position of the voluntary pension schemes (not covered in the pension projection)**

A system of voluntary supplementary pension insurance based on employer-employee principle, or on individual principle, comprises standard and significant part of pension systems in Europe. In the case of the Slovak Republic, voluntary pension schemes had practically one institutional form of the complementary pension insurance and were established in 1996 solely on the employer-employee principle and the voluntary principle.

In principle the system of complementary pension insurance was conceived as a defined- contribution system, in which the amount of supplementary pension income depended on the amount of savings in the individual account of the policyholder and the amount of yield achieved through investment in the

financial markets. It was administered by specific types of institutions – complementary pension insurance companies, which could originally be founded by employers, an organisation of employers, the trade union organisation, or multiple trade union organisations. Each complementary pension insurance company had to apply for a license to engage in complementary pension insurance from the Ministry of Labour, Social Affairs and Family of the SR, which together with the Ministry of Finance of the SR supervised the complementary pension insurance performance.

In 2004 the National Council of the Slovak Republic passed the Act on supplementary pension savings, under which the system of complementary pension insurance<sup>136</sup> transformed into the system of supplementary pension saving<sup>137</sup>, in which participation is open not only to employees but to every natural person older than 18 years.

Complementary pension insurance companies can transform, in 2005, into supplementary pension companies that can carry out supplementary pension saving only subject to a licence from the Financial Market Authority. A supplementary pension company will raise and manage at least two supplementary pension funds. Oversight function over the new supplementary pension saving is transferred from the Ministry of Labour, Social Affairs and Family and the Ministry of Finance to the Financial Market Authority, which on 1 January 2006, will merge with the Národná Banka Slovenska (National Bank of Slovakia).

In the system of supplementary pension saving, the duty is preserved to pay contributions to supplementary pension saving by the employer on behalf of employees carrying out works that are, subject to the decision of the competent health protection authority, categorised under category 3 or 4, at a minimum rate of 2% of the employee's assessment base. This duty is conditional upon conclusion of the participation contract. The law also stipulates the duty of the employee, who carries out works of category 3 or 4, to conclude the participation contract with a supplementary pension company.

The law tightens conditions for payment of supplementary old-age pension. The minimum age required for payment of supplementary old-age pension is raised from 50 to 55 years, and the period of supplementary pension saving is extended so that it cannot be shorter than 10 years, with a view to supporting the long-term character of the supplementary pension saving (minimum duration of payment of contributions for complementary pension insurance, which was determined in the benefit plan, under the Act No. 123/1996 Coll, could not be determined for more than 5 years). Payment of a part of the personal account balance is permitted upon satisfaction of conditions for payment, along with drawing supplementary old-age pension.

From 1 January 2005, not only supplementary pension insurance companies but also other financial institutions - banks, life assurance companies, pension fund management companies and security traders (special purpose saving) have become part of the voluntary pension schemes that are supported through tax relief schemes of the State. Until the end of 2004, only the complementary pension insurance system received tax relief.

The contributions to supplementary pension saving or special purpose saving reduce the taxable base of the taxpayer, who participates in the above referred pension schemes, but by not more than SKK 12,000 annually. Equally, contributions to supplementary pension saving (not to special purpose

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<sup>136</sup> Pension insurance is an insurance policy in which the insurance company assumes the obligation to provide the policyholder insurance benefit in the case of the insured accident occurring (if it so agreed with the policyholder), and it meets this obligation for a reward, i.e. insurance premium. The insurance company assumes the financial coverage of the agreed risk. For this purpose, the insurance company raises insurance (technical) reserves from the premiums collected. Insurance is a means to how to distribute losses suffered by several policyholders over all policyholders.

<sup>137</sup> Pension saving is saving in the personal account of the saver, which in essence covers only the risk of old age. In the event of contingency, which is old age, the saver will be paid out only the amount saved in the personal account, including yields (negative as well), either in the form single settlement or in the form periodical down payment. In the event of death or invalidity (=disability) of the saver, the saver, the assets recipient, or survivors (heirs) will be paid out solely the amount saved, including the yields.

saving), which are paid by the employer on behalf of his employee, are a tax-deductible expense of the employer.

For the payment of financial resources from a special-purpose saving the same conditions are applicable as for the supplementary pension saving, i.e. period of saving not shorter than 10 years, and the amount saved can be paid out no sooner than upon reaching 55 years of age.

## 23.2 Model Information

### 23.2.1 General Information

**PROST - Pension Reform Options Simulation Toolkit** - A toolkit to simulate the behaviour of pension systems over time and the fiscal implications of reforming them. Model developed by World Bank and run by Financial Policy Institute (Ministry of Finance).

#### General characteristics

Programmed in Visual Basic, with input and output in EXCEL

- Input file is an Excel template enabling customization for individual cases.
- Output file is also an Excel file and can be saved or combined with other files.
- Flexibility in programming approach. User can specify a 'stock' approach or a Markov 'flow' approach using either population or employment as base
- Customized to handle civil/state pension systems as well as national schemes.
- Policy oriented with minimal information requirements - makes it easy for non-technical end users

Forecast potential costs and benefits of alternative reform options.

- Permits an easy and quick approach for sensitivity analysis and scenario comparisons
- Automated procedures for some parametric reforms like retirement age increase.

#### **Input file**

The input file is an Excel Workbook template with six embedded worksheets. The first of these worksheets contains data that are not age specific while the next three contain age specific data. The fifth and sixth worksheets contain individual specific data and information on the reforms to be undertaken, respectively. Most of the data are entered for the base year, the final year, as well as any years in between if necessary.

*General* – Input information about the economy (inflation rate, interest rate, gdp growth etc.) as well as non age-specific some parameters of the pension system (retirement age, accumulated reserve fund, contribution rate, wage and pension brackets, etc.)

*Population* – Input base year population along with age specific fertility and mortality rates as well as immigration information

*Labour* – Input base year labour force participation rate, unemployment rate, distribution of earning by age

*Pension* – Input base year pension system information including number of contributors, beneficiaries, coverage rate, etc.

*Profiles* – Information on representative individuals, such as gender, age of starting work, career path

*Reform* – Information on specific reforms to be simulated. Users can choose between any combination of conventional PAYG, notional account PAYG, and defined contribution pillars, and all the parameters relevant to each of these reforms. Users specify who will be permitted to join the new system, the rules of the transition, and how the acquired rights will be paid, through prorated pensions, through recognition bonds, or through initial notional capital.

## **Output file**

There are 5 output modules generated by the program. The modules contain a graphical summary sheet along with Excel worksheets.

*Population Projection* - Population projections are made along with life tables and population pyramids, population dependency rate.

*Demographic Structure* - Labor force and employment projections, projections of contributors and beneficiaries, system dependency rate.

*Financial Flows* - Macroeconomic trends, wage projections, benefit projections, revenue and expenditures of the pension system, and the implicit pension debt, all projected for the base case assumptions. Pensioners at any time are divided into new and old pensioners. New pensioners get pensions based on existing formula (or proposed). Existing pensioners get last years' benefits plus whatever indexation is assumed. Projections are also made for the pension fund balance as well as the current balance of the pension system. The required adjustments to replacement rates and/or contribution rates necessary for 'balancing' the fund are also derived and projected. The implicit pension debt for the unreformed system is also calculated.

*Individual accounts* –Using the specifics in the Profiles input sheet, the program calculates the impact on up to 6 individuals who start work at each year of the simulation period, which allows both intra-generational and intergenerational analysis. Currently, the user can look at outcomes under the PAYG system as defined in the law, the PAYG system if contribution rates are changes to maintain balance, the PAYG system if benefit rates are changed maintain balance, and a reformed system as specified in the "Reform" input sheet.

*Systemic transition* - Impact of reform on both the individual and system. Benefit payments and replacement rates are calculated under each of the three pillars. A hypothetical annuity is also calculated so that the replacement rates under each of the three pillars can be compared. Financial flows are calculated for each pillar and an implicit pension debt is calculated for the reformed system. Finally, the model takes the average new pensioner in each future year and calculates this person's replacement rate from each of the pillars and combined.

### **23.2.2 Using PROST in the Slovak Republic**

FPI used all available AWG inputs to run pension projections. Model accepted all age specific data including participation rates, unemployment rates, etc. In case of population projection, which is output of the model, Eurostat was asked to sent cohort specific data.

Model covers PAYG system and fully funded pillar from 2005. The switching pattern was used according to the Ministry of Finance's estimates and is presented in the table bellow. We expect that 65%people will choose to contribute also to the second pillar. Very important is timing during the 2005 until June 30, 2006, the period when current workers can decide to choose to contribute to the mixed system. Current assumption is that in 2005 will switch 85% and 15% in 2006. The gradual increase of revenue shortfall has direct impact on public pension system.

**Table 23 - 4 Switching pattern to contribute to the funded scheme (both men and women)**

<b>From Age</b>	<b>To Age</b>	<b>Switchers</b>	<b>Non-switchers</b>
	New Entrants	100.0%	0.0%
-	19	40.4%	59.6%
20	30	87.8%	12.2%
31	35	89.2%	10.8%
36	40	81.7%	18.3%
41	45	66.5%	33.5%
46	50	36.0%	64.0%
51	55	8.4%	91.6%
56	100	0.3%	99.7%

Note that the pension projections currently sent to the AWG assume that people who choose contribute to the second pillar will switch at the beginning of 2005 (100%).

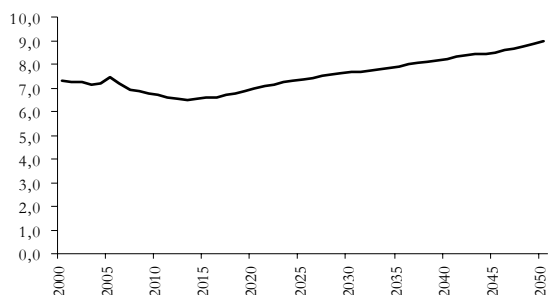
- Model works with age specific earnings profile which were not included in AWG base assumption (data from Statistical office)
- Pension benefits are divided into 4 schemes – old age, disabled, survivors and orphans. The base year for the model is 2000, updated according to the available data for next years (up to 2004)
- Model calculates number of pensions and not number of pensioners. Number of pensioners reported to AWG is estimated based on 2000-2004 data
- Number of pensions is defined as a stock (%) of population reflecting other variables (increasing retirement age, participation rates and unemployment rate)
- The average years of service is 40 years for males and 36 for females at retirement age
- Existing pension benefits are based on pension distribution, new pensions are defined with average replacement rate (% of average gross wage)
- Pensions are indexed according to law (50% wages + 50% prices)
- All equations used by PROST are available upon request

### 23.3 Results of The Pension Projections

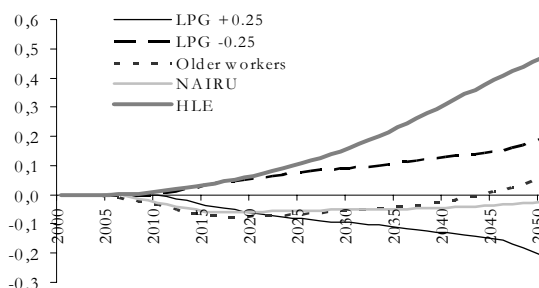
<b>Table 23 - 5 Pension expenditure projection in the AWG baseline scenario, % of GDP</b>					
	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2030</b>	<b>2050</b>
Revenues	6.9	6.4	6.3	6.4	6.3
- public pension system (PAYG)	6.9	5.1	5.0	4.7	4.4
- private mandatory pillar from contributions	0.0	1.2	1.3	1.7	1.9
Expenditures	7.3	7.4	6.7	8.3	11.2
Public pension system (PAYG)	7.3	7.4	6.7	7.7	9.0
- old age	7.3	5.6	4.8	5.0	6.3
- other	0.0	1.8	1.9	2.7	2.7
Private mandatory pillar (2nd pillar)	0.0	0.0	0.0	0.7	2.3
<b>PAYG balance</b>	<b>-0.4</b>	<b>-2.3</b>	<b>-1.7</b>	<b>-3.0</b>	<b>-4.5</b>
Assets of 2nd pillar	0.0	1.2	7.0	31.5	58.0

**Graph 23 - 1 Public pension expenditure in the baseline and sensitivity scenarios**

**Public pension expenditures - baseline (% of GDP)**



**AWG sensitivity tests on public pension expenditures - difference from baseline (% of GDP)**



*Sensitivity tests on interest rates has no impact on public pension expenditures*



## Annex 1: Benefit formulas and the architecture of the new pension system

Table 23 - 6 Architecture of the new pension system

Component	I. (Mandatory)	II. (Mandatory)	III. (Voluntary)
Way of financing	Pay-As-You-Go	Funded Private	Funded Private
Administration	Public (Social Insurance Agency)	(Pension fund management companies)	(Supplementary pension companies )
Tool	Redistribution	Savings accumulation	Savings accumulation
Pension amount	Pension amount dependent on insurance period, assessment base amount	Pension amount dependent on the amount saved in the personal pension account	Depending on the accumulated savings
Pension form	Pension determined by a statutory formula	Annuity, or annuity and program withdrawal	Pension drawing forms, individual choice

### Benefit formulas as stated in pension act

Old-age pension in PAYG is computed using the following formula

$$D = \text{POMB} \times R \times \text{ADH}$$

Where:

D = pension,

POMB (average personal wage point), calculated on the basis of OMB (personal wage point, as a variable reflecting the merit rate of the insured, measured against the average wage level in every individual year of the working career),

R = number of years of the working career,

ADH = actual pension value is a quantity setting the value - price for one OMB. The amount of ADH, on 1 January 2004 was SKK 183.58, on 1 January 2005, its amount is SKK 195.31. The ADH amount is always applicable from 1 January to 31 December of the calendar year and its amount for the next year is determined by using the wage index in the economy of the SR.

$$\text{OMB} = \square \text{VZ}/\text{VVZ}$$

Where:

$\square \text{VZ}$  = annual sum of the assessment base on which insurance contributions have been paid,

VVZ = general assessment base = 12 x average monthly wage in the economy of the SR, applicable in each individual calendar year of the economic activity of the insured person.

Upon reaching the retirement age, the economic activity affects the amount of pension.

$$D' = (D + D_1) \times \%$$

Where:

D' = total sum of the pension,  
 D = the amount of pension acquired at the date of reaching the retirement age,  
 D<sub>1</sub> = the amount of pension acquired by the economic activity at the date of reaching the retirement age,

$$D_1 = \square OMB \times ADH$$

% = 0.5 % for every 30 days of the economic activity after reaching the retirement age.

The change of the definition of invalidity – the new system defines invalidity as a long-term unfavourable health state, as the result of which the capacity to carry out gainful activity has been reduced by more than 40 %, as compared with a healthy person.

Determination of the amount of invalidity pension at a reduction of the capacity to carry out gainful activity in the interval of 41 %- 70 %.

$$ID = [POMB \times (R + R_1) \times ADH] \times M$$

Where:

ID = invalidity pension,

POMB = average personal wage point,

R = number of years of insurance as of the date of the rise of invalidity,

R<sub>1</sub> = number of years of insurance from the rise of invalidity until reaching the retirement age,

ADH = actual pension value,

M = percentage rate of reduction in the capacity to carry out gainful activity.

Determination of the amount of invalidity pension at the rate of reduction in the capacity to carry out gainful activity exceeding 70 %.

$$ID = POMB \times (R + R_1) \times ADH$$

#### Valorisation of benefits

- ✓ in percent,
- ✓ at 1 July of the calendar year,
- ✓ taking account of the wage and price development.

$$\% = (M + C)/2 \times 100$$

Where:

M = year-on-year wage growth index,

C = year-on-year price growth index.

## 24. Finland

Jorma Tuukkanen, Ministry of Finance

Jussi Huopaniemi, Ministry of Finance

Marja Tuovinen, Ministry of Finance

### 24.1 The Finnish Pension System: An Overview

The Finnish public pension system (the first pillar) is made up of two statutory pension schemes: one is the national pension scheme guaranteeing a minimum pension to all residents whereas the other is an employment-based, earnings-related pension scheme.

Voluntary pension schemes (the second and third pillar) have played a minor role in Finland due to the relatively high net replacement ratio of public pensions, the lack of pension ceilings and full coverage of the systems.

The statutory schemes are closely linked together, with the amount of national pension depending on the size of the earnings-related pension benefits. Increases in the earnings-related pension reduce the national pension by 50 per cent of the increase in the earnings-related pension. If the earnings-related pension is above a defined level, the national pension is not paid at all. Therefore only about half of pensioners who get earnings-related pension get also national pension. At the same time there are 100 000 pensioners getting only national pension. Taking in addition all pension types into account the total number of pensioners in 2004 was roughly 1.3 million.

Total expenditure on pension benefits in 2004 was 11.6 % of GDP. Payments in statutory pensions amounted to 11.3 % of GDP, of which amount 10.7 % of GDP is included to the social security pensions used in the AWG -projections for Finland. Accordingly, the coverage of the projections is good. (See the appendix)

In 2004, earnings-related pensions accounted for 86 per cent and the basic national pensions for the rest. In the future, the role of the national pensions in the total pension coverage will diminish as the level of earnings-related pensions will rise. The old age and early pensions are 74 % of all social security pensions. As a consequence of a decrease in the statutory age for old age pensions in the pension reform, the share of these pensions increased and the share of other pensions decreased in 2005.

**Table 24 - 1 Social security pensions in 2004, Eur million**

	<b>National pensions</b>	<b>Earnings-related pensions</b>	<b>Total</b>	<b>%</b>
Old age and early pensions	1 628	10 174	11 802	73,9
Other pensions	583	3 586	4 169	26,1
Total %	2 211 13,8%	13 760 86,2%	15 971	100.0

Pension-tested national pensions are administered by the Social Insurance Institution (KELA) supervised by Parliament. These pensions are financed as a pay-as-you-go by contributions of employers (46 per cent in 2004) and the rest mainly by state shares. The purchasing power of national pensions is kept intact by indexation to the consumer price index. In addition to normal index increases, the level of national pension has also been discretionarily raised, last in 2005.

The earnings-related pension system is based on a tripartite arrangement, consisting of employees, employers and the government. Private employees belong to six different sector-related schemes run by private pension institutions. There are about 60 pension institutions of very different sizes. The pension companies compete with each other. The Finnish Centre for Pensions is the statutory central body of the private sector pension schemes. The Ministry of Social Affairs and Health is in charge of the general supervision of the earnings-related schemes. Employees in central and local government as well as employees of the Finnish Evangelical-Lutheran Church have their own earnings-related schemes. The schemes for central government employees are managed by the State Treasury under the general supervision of the Ministry of Finance, whereas the Local Government Pension Institute administers the scheme for local government employees. In practice, the pension rules for all schemes are equal.

The financing of earnings-related pensions is a combination of a fully funded and a pay-as-you-go system based on pension contributions from both employers and employees. The pre-funded scheme covers approximately one quarter of earnings-related pension outlays, the rest (3/4) is financed through the PAYG system. Despite the partially funded system in pensions, Finland's earnings-related pension scheme is entirely of the defined-benefit type. The pre-funding is collective in the sense it actually has no effect on the size of the pension. The main purpose of the pre-funding is to smoothen pension contributions in the coming years.

The financial position in the earnings-related pension schemes is fairly good as the system is running on surpluses. The annual surplus is some 2½ per cent in relation to GDP. The market value of the pension fund's assets was 58.7 per cent of GDP in 2004.

The individual pension is accumulated according to the following rules. Pensions accrue from the age of 18 to 52 at the rate of 1.5 per cent of wages a year, from 53 to 62 at 1.9 per cent and from 63 to 68 at 4.5 per cent a year without any cap. The retirement age is flexible (62-68).

There are two indices in the earnings-related pension system. The first (pre-retirement index) adjusts past earnings to the present level when computing the pension at the time of retirement. This "wage coefficient" puts a weight of 80 per cent on wages and 20 per cent on prices. The other index (post-retirement index) aims at keeping the purchasing power of earnings-related pensions ahead of inflation. This index has a weight of 80 per cent on consumer prices and 20 per cent on wages. The life-expectancy coefficient adjusts the pensions to be paid to the changes in longevity as of 2009.

Statutory pensions (the first pillar) are taxed as earned income (progressive tax rate) with tax deductions applying for smaller pensions. The taxation arrangement of earnings-related pensions is of the EET type. The contributions to pension schemes and investment incomes of the pension institutions are exempted from taxation. Tax treatment of supplementary pensions arranged by the employer (the second pillar) is the same as that of statutory pensions (the first pillar). Self-acquired voluntary pensions (the third pillar) are taxed in the capital income taxation regime with a flat tax rate, and pension contributions can also be deducted to a certain amount from taxation within the capital income taxation regime.

## **24.2 The Earnings-Related Pension Scheme**

### **24.2.1 The reformed earnings-related pension scheme**

The Finnish statutory earnings-related pension scheme was extensively reformed 2005. The scheme is described below according to the new legislation. The earnings-related pension scheme consists of

several pension acts, which together cover the different sectors of the economy<sup>138</sup>. In practice all work performed by a person aged 18 - 67 in the position of employee or self-employed person is covered by some pension act.

In the 2005 reform the pensions benefits under the different acts were harmonised to a large extent. There is, however, still a need for different pension acts, because of the differences in the financing of the pensions.

### 24.2.2 Pension accrual and pension benefits

The earnings-related pension system is of the defined benefit type, i.e. the size of the pension expenditure determines the contribution level and the need for other financing. Pension benefits and contributions are proportional to earnings, the earnings-related scheme does not include ceilings or progression.

An earnings-related pension accrues from earnings between the ages of 18 and 67 according to the accrual rates shown in the table below. Persons aged under 18 or over 68 do not accrue a pension and they are also not covered by the insurance obligation. For employees the pensionable income is the salary/wage reduced by the employee contribution. For self-employed persons and farmers a pension accrues from the insured earned income in its entirety<sup>139</sup>.

**Table 24 - 2 Accrual rates as % of earnings according to the insured person's age**

Age	Accrual rate
18-52	1.5
53-62	1.9
63-67	4.5 / 1.5

The accrual rate for a person who has reached the age of 63 is 1.5 per cent, if he or she draws an old-age pension.

Under the pension acts a person aged 18–62 accrues a pension on the basis of the following periods of social security benefits and activities:

- parent's allowance
- job alternation leave
- earnings-related unemployment allowance
- training comparable to the aforementioned
- sickness allowance
- rehabilitation allowance financed by the pension providers.

In addition there are certain benefit periods with minor importance.

<sup>138</sup> In the private sector there are acts covering employees and separate acts for sea men, farmers and entrepreneurs. In the public sector the state, local governments and the Evangelical-Lutheran Church have their own pension acts.

<sup>139</sup> Currently the employee contribution is 4,6 % for the insured aged 52 or less and 5,8 % for older insured (employee contribution is linked to the accrual rate, see table 2.1)

Under the so-called special act a pension accrues on the basis of studies which end with the taking of a vocational or university degree or qualification and caring for a child aged under 3 years at home. The accrual basis is a monthly income of 523.61 euros in the index level for 2004. This income is indexed by the wage coefficient (see above).

When calculating the initial amount of the pension the earnings for the different years are adjusted in line with the wage coefficient, where the weight of the change in wage level is 80 per cent and the weight of the change in consumer prices is 20 per cent. Pensions are adjusted in line with an index where the weight of the change in earnings level is 20 per cent and the weight of the change in prices is 80 per cent. In addition to the yearly index adjustments, disability pensions payable to young and middle-aged persons are increased when the pension has been paid for five years. For persons aged under 27 the increase is 21 per cent. For persons older than this the increase is reduced, until persons having reached the age of 55 receive no increase at all.

The pension benefits are disability, unemployment, part-time, old-age and survivors' pensions. The disability pension may be granted as a full or a partial pension, depending on how much the insured person's work capacity has decreased. The partial disability pension is half of the full pension. The amount of the disability pension is obtained by adding up the pension accrued up to the start of the pension and the pension for projected pensionable service. The projected pensionable service is the time from the onset of disability to the age of 63. The accrual rate for projected pensionable service is 1.5 per cent a year until the age of 50 and 1.3 per cent a year between the ages of 50 and 62. The wage/salary used for the projected pensionable service is the average wage for the 5 years preceding the disability.

The unemployment pension may be granted to long-term unemployed persons born in 1949 or earlier when they have reached the age of 60. The age groups entitled to an unemployment pension may start receiving earnings-related unemployment allowance after having reached the age of 55 and after that start receiving an unemployment pension.

Persons born after 1949 are not entitled to an unemployment pension, but after reaching the age of 57 they may receive earnings-related unemployment allowance until the old-age pension starts. These long-term unemployed may take the old-age pension between the ages of 62 and 65 in which case they receive the pension accrued up to retirement without any abate for early retirement.

The part-time pension may be awarded to an insured person who has reached the age of 58 and who reduces the work input so that the earnings are reduced to 35–70 per cent of the stabilised earnings. The size of the part-time pension is half of the earnings reduction caused by the decrease in work input. A pension accrues from the work during the part-time pension as from other work and in addition an old-age pension accrues at the rate of 0.75 per cent a year on the earnings reduction.

The insured is entitled to a normal old-age pension at the age of 63 and to an early old-age pension at the age of 62. The early old-age pension is reduced by 0.6 per cent for each month that the pension is taken early. If the insured continues working after having reached the age of 63 and does not take the old-age pension, the accrual rate for the pension is 4.5 per cent a year. On the other hand, those who draw an old-age pension but also work after the age of 63 accrue a pension at the rate of 1.5 per cent. After age of 68 the pension accrual and the insurance obligation end. If the insured person does not take the old-age pension upon reaching the age of 68, the pension is increased by an increment for deferred retirement of 0.4 per cent per month.

Survivors' pensions can be paid to the surviving spouse, the former spouse and the children. The former spouse is entitled to a surviving spouse's pension if the deceased was liable to provide maintenance to the former spouse. If the deceased has two or more children younger than 18, the total amount of the survivors' pensions equals that of the deceased person's pension. If there is one child younger than 18, the total amount of the survivors' pensions is about 80 per cent of the deceased person's pension. If the deceased has no children younger than 18, the surviving spouse's pension can

be at the most half of the deceased person's pension. In this case the final level of the surviving spouse's pension is determined on the basis of the adjustment of the surviving spouse's pension, which typically reduces the surviving spouse's pension or cancels it out completely.

The initial amount of old-age pensions is adjusted to account for the change in longevity for 62-year-olds through the life expectancy coefficient. The life expectancy coefficient is determined so that the capital value of the old-age pension remains unchanged even if life expectancy for persons of retirement age changes compared to the expectancy calculated from the statistics for 2003-2007. The life expectancy coefficient is also applied to disability pensions when they are changed to old-age pensions at age 63 and to surviving spouse's pensions in connection with the adjustment of the surviving spouse's pension. The life expectancy coefficient will affect the pensions for persons born in 1948 and later. The value of the coefficient is defined for each one-year cohort separately.

### **24.2.3 Financing pensions**

The annual pension expenditure for private sector employees is financed through the annual premium income, from accumulated funds and the payment transferred from the unemployment insurance contribution. In 2003, the shares of these financing sources were: premium income 75 %, funded component 21.1 %, unemployment insurance contribution 3.9 %. The transfer from the unemployment insurance to the pension scheme covers approximately the amount of pensions accruing on the basis of unemployment periods.

The private-sector pension providers have to continuously cover the actuarially determined liability. To cover the liability the pension providers have assets (pension assets). The amount of the pension providers' assets which exceeds the liability constitutes the solvency margin, through which the pension providers prepare for investment risks. New liabilities are continuously created through pension accrual and old liabilities are released as pensions become payable. For insured aged under 54 years a share corresponding to an accrual of 0.5 per cent is funded for the old-age pensions. The increase in the employee contribution levied from persons aged over 53 is funded in full. In addition the old-age pension liability is annually increased by the yields on the pension providers' investments. Disability and unemployment pensions are funded when the pension starts. The size of the funding is determined so that it is sufficient for paying the pensions until the old-age pension starts, with the exception of the index adjustments to the pensions. The 2005 reform included an additional funding by the year 2013, corresponding to 7.5 per cent of the private-sector wage sum.

Pension expenditure for self-employed persons and for farmers is financed through the annual premium income and the State's share. The State's share is the part of pension expenditure which the premium income is insufficient to finance. These two schemes are pure pay-as-you-go. The contribution under self-employed persons approximately equals the average contribution under private sector employee's pension acts. Farmers' average contribution rate is about 50% lower. Pension expenditure under seafarers' pension act is financed through employers', employees' and the State's shares. Each party is responsible for a third of the financing. Pension expenditure under the special act (covering students and parents with small children) is financed by the state on pay-as-you-go basis.

The state and local government pension schemes were originally based on a pure pay-as-you-go system. The Local Government Pension Institution started funding pensions in 1988 in order to curb the increase in pension contributions. The target has been set at keeping the local government pension contribution below 30 per cent of the wage sum. The State Pension Fund was established in 1990 to prepare for the State's future pension expenditures. The aim of the Fund is to gather assets so that the cost burden caused by the pensions of the post-war baby-boomers can be lessened in the years when pension expenditure is at its highest.

## **24.3 The National Pension Scheme**

National pensions are intended to provide a basic retirement income for those whose earnings-related pensions are small or non-existent. All residents of Finland are eligible for the national pension. The old-age pension is payable to insured people over 65 years. The national pension is also payable as disability, unemployment and survivor's pensions. The supplementary means-tested pension components are: pensioners' housing allowance, pensioners' care allowance, front-veterans' supplements and increase for children. The pension benefits are adjusted yearly to changes in the price index. National pensions are financed by employers' social security contributions and transfers from the state.

The employment pension reform, put into effect in 2005, had implications also for national pensions. The age-limit for early old-age pension increased by 2 years and the eligibility for unemployment pension will be discontinued by 2010.

The incentives to continue to work were increased for low-income workers with short employment history. Usually the national pension decreases as the persons' earnings-related pension increases with the phasing-out rate of 50 %. The exception is made for earnings-related pension rights beyond 63 years.

## **24.4 The Models and Their Assumptions**

### **24.4.1 The model for earnings-related pensions**

#### **24.4.1.1 *Structure***

The results concerning the earnings-related pension scheme have been calculated using the long-term planning model of the Finnish Centre for Pensions. The model is deterministic and replicates the functioning of the Finnish earnings-related pension scheme. The model is developed to meet the planning and forecasting needs of the pension scheme. It is an actuarial projection model by nature and there is only little economic theory built in to the model.

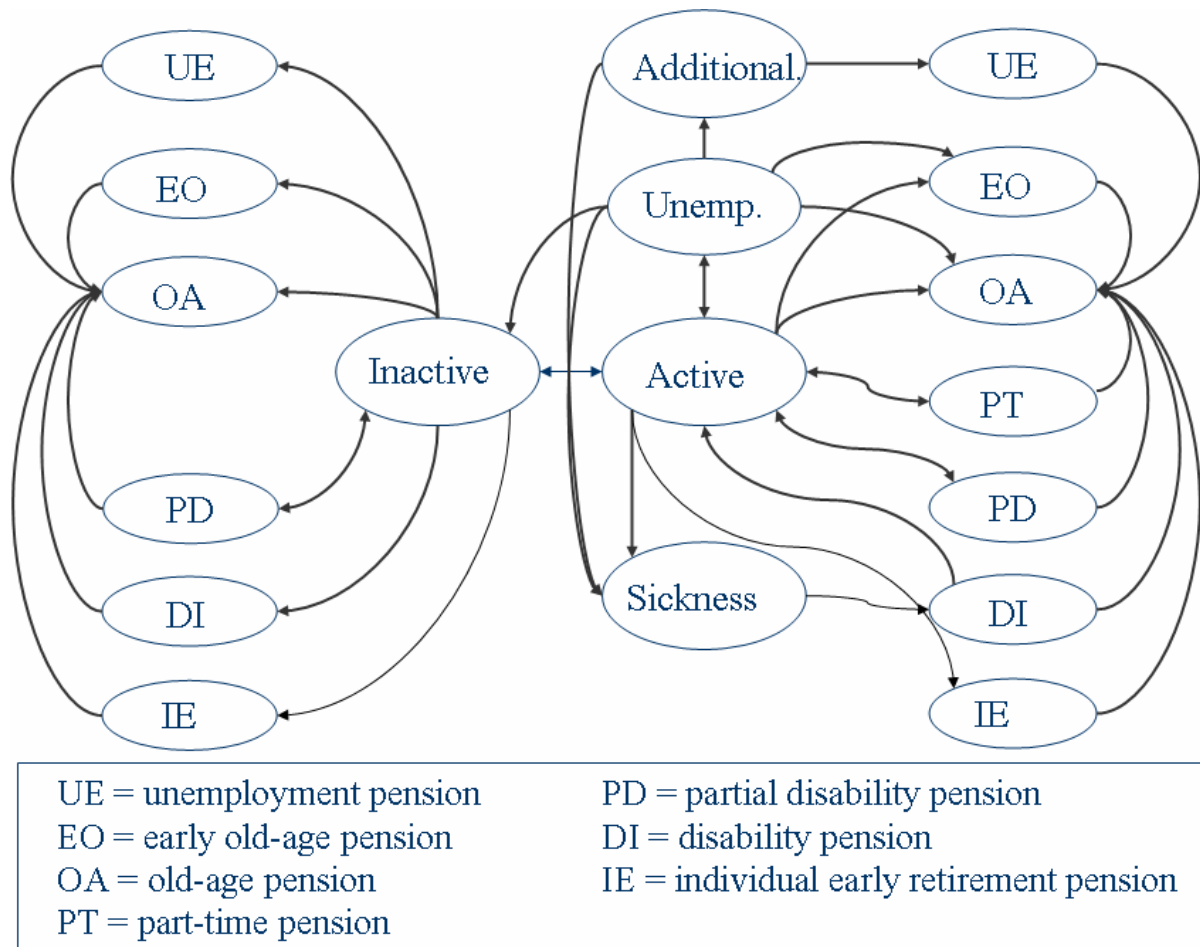
The most important results of the model are annual pension expenditure, contributions and accumulation of funds. As the population has been categorised according to age and gender in the model, the model could also be used to calculate generation and gender-specific results. Results for each pension act are calculated separately. However, it is usually not worthwhile to present all the results by pension act separately, as there are numerous pension acts. Below the private and the public sector are reported separately.

Unless otherwise stated, the acts and other stipulations governing the functioning of the scheme are presumed to remain unchanged up to the end of the calculation period.

The projection model studies each pension act separately. Each year pensions are paid to the pensioners, the insured accrue their future pensions and people are transferred between different states (employed, unemployed, pensioner etc.) according to given probabilities. The states in the model and the transitions between them are shown in the figure. Over time the individual early retirement pensions and the unemployment pensions will disappear.



Graph 24 - 1 States of the model and transfers between states, excluding survivors' pensions



The “active people” in the model are working, their earnings accrue a pension and contributions are levied on the basis of the earnings. The “unemployed” are divided into three different states in the model. Persons aged less than 57 who receive earnings-related unemployment allowance are categorised as unemployed. Long-term unemployed persons aged over 57 are entitled to earnings-related unemployment allowance for additional days until the pension starts. These two groups of unemployed accrue an earnings-related pension during their periods of unemployment. The rest of the unemployed receive relatively low flat rate unemployment benefit and they do not accrue a pension (currently about half of the unemployed). They are categorised as inactive. The “inactive” are persons who have accrued a pension under the act under observation but who no longer work in a job covered by this act and who are also not drawing a pension.

In addition to the transitions shown in the figure, new employed persons are annually transferred to the active population in accordance with the population and employment forecast. People also die in each state and part of the deceased leave behind a survivors' pension.

Within the states, people are categorised into different classes according to age and gender. An average technique is applied in these classes. The averages are thus calculated as standardised for age and gender, which means that for instance all 50-year-old men working in employment contracts covered by the same pension act are assumed to be similar to each other. The average technique is much lighter than individual calculation to carry out in practice, but at the same time it produces less information. For instance size distributions of the pensions cannot be calculated.

The average technique does not hinder taking into account the selectiveness associated with the transitions between different states. The following phenomena have been included to the model:

- The accrued pension and the wage of persons entering to a disability pension are typically lower than those of an average worker.
- The mortality risk for disabled persons is higher than the corresponding risk for the population, the mortality risk for non-disabled persons is correspondingly lower.
- The pension accruals of persons who die before old-age pension are lower than on average for the insured.
- For persons drawing an old-age pension a high pension is connected with a low mortality risk when age and gender are standardised.

It would be possible to take into account also other corresponding phenomena, but adding to the details makes the model more complex and presenting reliable estimates of the size of the selectiveness is problematic.

#### **24.4.1.2** *Data requirements and application of AWG and other assumptions*

For the model the following data (specified by pension act as well as by the age and gender of the insured) is needed as a description of the initial situation:

- division of the population between different pension acts and within each act between different states
- wages/salaries of the insured
- amounts of pension accruals
- liabilities and assets of the pension institutions
- amounts of the pensions payable
- transition probabilities between states

The numbers describing the initial situation are mainly obtained from the employment and pension registers of the Finnish Centre for Pensions. Most of the starting data are from 2003 and 2004.

*Major assumptions for the calculation period are the following:*

##### **Population forecast**

The Eurostat 2005 population forecast is applied.

##### **Employment forecast**

An employment trend follows the AWG-assumptions. The number of employed and their distribution in the beginning of the calculation period however differs slightly from the AWG-assumptions. These numbers are obtained from the employment register of the Finnish Centre for Pensions. According to the employment register the level of the employment is slightly lower than according to the AWG-definition.

In the model the labour force is divided to number of pension acts. No changes are expected in the labour force shares between the different pension acts, except that the number of farmers is halved by 2020. The number of private-sector employees is expected to increase correspondingly.

##### **Change in the effective retirement age**

The effective retirement age is assumed to change according to the following table. This postponement of the retirement fits with the AWG-employment assumption.

**Table 24 - 3 The change in the expected effective retirement age for employees**

<b>Year</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2025</b>	<b>2050</b>	<b>2075</b>
A Change (years)	0	0.7	1.2	2.0	3.0	3.0

### **Growth in the earnings level**

It is assumed that the earnings level specified by age, sex and the pension act grows according to the assumed AWG labour productivity growth rate. Middle-aged and old workers earn more than young workers. During the calculation period the labour force grows slightly older. Consequently the wage level of the economy grows slightly faster than the assumed AWG labour productivity. Assumed decrease in the number of farmers has similar effect (farmers earn less than employees).

### **Return on pension assets**

The real return on pension assets is 3% in accordance with the AWG-assumptions.

## **24.4.2 The national pensions model**

The Social Insurance Institute is responsible for the semi-aggregated simulation model using comprehensive pension and social benefit registrars and data. The model is intended mainly for conducting projections, varying the time span, on the number of beneficiaries, on the benefit expenditure, contribution and other income of the national pension scheme. It is also intended for estimating the effects of changes in the national pension legislation. Because the national pension scheme guarantees a minimum pension level to all pensioners, the model produces the number of all pensioners including pensioners receiving only an earnings-related pension.

All residents in Finland belong to the national pension system and the model is based on this population, which is aggregated by age, sex, mortality rate, migration, etc. Because the earnings-related pension is calculated before the residence-based minimum pension, information of labour force and wage profiles are not needed in the model. The contribution projection is based on the total wages.

In the pension contribution projection the future development of payroll of various employers' sectors (private, state, etc.) have been taken into account. The number of all pensioners has been estimated by the ratio of new pensions to the non-pensioners in the last years. The number of national pensions is based on the distribution of estimated earnings-related pensions.

The average national pension for pensioners with earnings-related pension is based on the development of average earnings-related pension, which have been estimated by earnings-related pension model.

The number of years of receiving a pension is based on mortality of whole population. Mortality has been calibrated to coincide with the observed deviation between national pension recipients and total population.

The model takes into account that there will be no more new unemployment pensions after the year 2010. Changes in the earnings-related pension system are taken into account in the earnings-related pension model.

The national pension expenditure used in the AWG projections excludes housing allowances and other benefits of a compensative nature. A corresponding adjustment is made in the contribution income projection.

This aggregated model produces the number of beneficiaries of separate pension types. Therefore a slight adjustment is needed to derive the total number of the beneficiaries of the statutory pensions. The model consistency (concerning the take-up rates of pensions and the influence of the earnings-related pension expenditure to the national pension expenditure) between the earnings-related pension model and the national pension model is relatively rough, because the models are integrated only on a very aggregated level.

As mentioned above, the total number of beneficiaries of the statutory pensions has been derived from the results of the national pension model. An additional adjustment has been made based on a comparison of the total number of beneficiaries of the earnings-related pension which have been derived from the figures produced by the earnings-related pension model.

## **24.5 Results of the Pension Projections**

### **24.5.1 Population, employment and production**

The projections of pension expenditure are based on assumptions on population, employment and productivity commonly agreed by the Ageing Working Group of the Economic Policy Committee. In the population projection, the fertility rate is assumed to remain at the present level of 1.8 children per woman and average life expectancy is assumed to rise by about 6 years by 2050. Net migration is assumed to be 6000 persons per year. The employment rate is assumed to rise from the present 68 per cent to 73½ per cent by 2020 and to rise to 74½ per cent by 2035, and remain thereafter fairly constant. The rise in employment is due to extension of working life and a decline in structural unemployment. The unemployment rate will decline in the projection to 6.5 per cent by 2015 and to remain at that level until 2050.

In Finland, population ageing during the next twenty years is faster than in any other EU Member State. This is due to the exceptionally big post-war cohorts and increased longevity. Working-age population will start to diminish in 2010, when the first large cohort (those born in 1945) reaches the age of 65. The number of employed will start to diminish five years later, in 2015 in spite of the increase in employment rate.

At the same time as working-age population shrinks, the number of senior citizens increases rapidly. The old-age dependency ratio (65 and older in relation to those aged 15 – 64) nearly doubles from the present just under 24 per cent to 45 per cent by the year 2030, when it is the highest in the EU. After this, the old-age dependency ratio rises only slightly so that it is below the EU average in 2050. The relation of pensioners to the employed persons rises from the present 53 per cent to 75 per cent by 2030. In other words, at the present there are 1.9 persons employed per pensioners, whereas by 2030 this figure is 1.3 persons.

The growth of total production is solely due to growth in productivity after the year 2015, when the number of the employed will start to decrease permanently. The growth of total production is projected to halve from the previous slightly over 3 per cent (long-term growth rate of total production in Finland) to 1½ per cent a year on the average.

**Table 24 - 4 Growth of GDP 2000 - 2050 decomposed to employment and productivity growth, % per year**

	<b>2000-2005</b>	<b>2006-2020</b>	<b>2021-2030</b>	<b>2031-2040</b>	<b>2041-2050</b>
Employment	0.5	0.0	-0.4	-0.2	-0.3
Productivity	2.7	2.1	1.9	1.7	1.7
GDP	3.2	2.1	1.5	1.5	1.4

Source: EU Economic Policy Committee

### **24.5.2 Pension expenditure projection: baseline projection**

In the baseline projection, pension expenditure in relation to total production increases from 10.4 per cent in 2005 to 14.1 per cent in 2035, after which the figure turns to a slight decrease. The growth of pension expenditure in relation to GDP is solely due to the increase in pensioners in relation to those employed.

The role of income-tested basic pensions (national pensions) will diminish in total pension expenditure, while that of earnings-related pension expenditure will rise. The need for basic pensions is limited by increased coverage and level of earnings-related pensions. These two schemes are closely linked, with the amount of the basic national pension depending on the earnings-related pension benefits. The increase of earnings-related pension reduces the basic national pension by 50 per cent of the increase in the earnings-related pension.

The benefit ratio (average gross pension / average gross wage) is influenced by a number of factors. Lengthening the working careers increase benefit levels. On the other hand, the benefit ratio is diminished by the indexation rule and the so-called longevity coefficient.

It is important to note that Finland has prepared for increased pension expenditure by partial funding, due to which pension contributions will rise in the future much more slowly than pension expenditure. The funding of pensions has in practise no bearing on pension expenditure due to the defined-benefit nature of the Finnish pension system, in which pensions are determined by the length of the employment history and the level of wages. The aim of partial funding is to even out the pension contributions over time and therefore to focus the costs of pensions fairly between generation.

The annual surplus of the pension funds (revenue – expenditures) is roughly 2½ per cent of GDP and the market value of pension funds assets (excluding the State pension fund) the was 52.4 per cent of GDP at the end of 2004. At the moment, pension fund assets are equivalent to 5-6 years' pension expenditure. According to the baseline scenario, the market value of pension funds rises to 72½ per cent of GDP by the year 2050. Partial funding strengthens markedly the sustainability of the pension system. The more the rate of return on pension fund assets surpasses the GDP growth rate, the greater is the benefit of funding as compared to a pure pay-as-you-go system. In the baseline projection, the rate of return of pension fund assets is 1½ percentage points higher than the long-term GDP growth rate.

### **24.5.3 Sensitivity calculations**

In the following section is a brief commentary on results of the sensitivity tests most noteworthy from the point of view of Finland.

### **24.5.3.1**

#### ***Employment***

In the long term, pension expenditure in relation to GDP reacts only slightly to changes in employment. This is because the Finnish old-age pension system is nearly actuarially fair in the sense that the pension benefits are determined by life-time earnings without a ceiling and the life expectancy coefficient lowers the level of pensions if retirement is not postponed as life expectancy is increasing. The longer the working career, the higher is the earnings-related pension, and vice versa. Even if employment has little bearing on pension expenditure as percentage of GDP in the long run, in the short run a rise in employment decreases pension expenditure as percentage of GDP. In interpreting the results, it is important to note that increased employment and economic growth increase all income items. As in the sensitivity test results are compared only to GDP, the comparison depicts only the fact that the pension system reacts actuarially neutrally to changes in employment.

### **24.5.3.2**

#### ***Productivity***

Pension expenditure as a percentage of GDP is sensitive to changes in productivity. This is due to the indexation systems of pensions. National pensions are adjusted by consumer prices whereas earnings-related pensions are adjusted by an index, in which the weight of prices is 80 per cent and that of wages 20 per cent. In other words, those enjoying an earnings-related pension receive through index adjustments one-fifth of productivity (real wage) increases while those on a national pension receive nothing of productivity increases. However, national pensions are adjusted discretionarily every so often to increase their purchasing power. In this projection exercise, it is assumed that national pensions are adjusted only by the consumer price index and not by discretionary adjustments.

In calculating the reference wage of the earnings-related pension, an index is used in which the weight of wages is 80 per cent and that of prices 20 per cent. Therefore the so-called initial pension level is determined by, along with the length of the working career, 80 per cent of real wages growth (productivity growth).

If the growth of productivity were 0.25 percentage points higher than in the baseline projection, the share of pensions as a percentage of GDP would be lowered by 0.5 percentage points in the long term. By the same token, slower productivity growth (by 0.25 percentage points in relation to the baseline) would increase the share of pension expenditure as a percentage of GDP by 0.5 percentage points.

### **24.5.3.3**

#### ***Interest rate***

As mentioned above, neither partial funding of pensions nor yields of funded pension assets have a direct effect on pensions. The reason for funding is to slow down the rise of pension contributions. Therefore the higher is the yield (real interest rate) of invested pension assets, the lower is the pension contribution rate in the future. Just less than a half of pension fund assets is invested in bonds, a third in shares and the rest in enterprise loans, real estate and money market instruments.

An assumption of 3 per cent was used for real yields of pension fund assets, and the same assumption was used for risk-free government debt. According to the sensitivity scenarios, a one per cent rise in the rate of return lowers the contribution rate by about 2 percentage points in the long run. Similarly, a one per cent lower rate of return than in the baseline scenario raises the contribution rate by two percentage points.

## Annex 1: The coverage and categories of pensions in the projection model

**Table 24 - 5 Total expenditure on pensions and the coverage of the projections, 2004, EUR million**

	<b>Included in the projections</b>	<b>Not included in the projections</b>
National pensions 1)	2 738	524
Employment pensions, mandatory schemes		
private sector 2)	8 144	
government	2 873	
municipalities	2 296	
other 3)	174	
Pensions under special schemes and life annuities 4)	694	694
Voluntary pension provisions 5,6)	414	414
<b>Total</b>	<b>17 333</b>	<b>1 632</b>

1) The supplementary pension components, such as pensioner's housing allowances and the pensioner's care allowance are not included in the model projections. The latter, however, is included in the long term-care expenditures in the age-related public expenditure projections by AWG.

2) Pensions paid under the Employees' Pension Act, the Temporary Employees' Pension Act, the Farmers' Pension Act, the Self-Employed Persons' Pension Act, the Seamen's Pension Act, and the Pension Act for Performing Artists and Certain Other Employee Groups.

3) Pension paid under the Åland islands pension legislation, the Evangelical-Lutheran and the Orthodox Church Pension Acts, staff pensions of KELA, Postipankki and Bank of Finland.

4) Employment Accident Insurance Act, Third-Party Motor Insurance Act, Military Injuries Act, Pension Scheme for Outgoing Farmers.

5) Additional pensions under private sector employment schemes (see note 2) and pensions paid by funds and foundations under private schemes.

6) Voluntary individual pension schemes are not included in the total expenditures in the table.

*Source: Statistical Yearbook of the Social Insurance Institution 2004*

The model covers about 90 per cent of all pension expenditure. Supplementary benefits such as pensioner's housing and care allowances, which are paid within the pension system but are not pensions by definition, are excluded from the projections. Also, private voluntary and occupational pensions as well as pensions and life annuities related to the traffic and accident insurance system are excluded. The remaining pensions are defined as the social security pensions.

## 25. Sweden

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### 25.1 The Swedish Public Pension System

Sweden introduced a new public old age pension system in 1999. The system was fully implemented in 2003. The former Swedish pension system consisted of a flat-rate pension provided in full to everyone with at least 40 years of residence in Sweden between the ages of 16 and 65. Further, it included an earnings-related pay-as-you-go (PAYG) component providing a benefit based on 60 per cent of an average of the contributors best 15 years of earnings, with 30 years required to receive a full benefit.

The new earnings-related old age pension system consists of a notionally defined contribution (NDC) PAYG component and a fully funded, defined contribution (DC) pension system. Both are based on lifetime earnings and individual accounts. In addition, there is a guaranteed minimum benefit financed with general taxes from the central government budget.

There is no distinction in Sweden between public and private sector employees or between employees and self-employed in the public pension system. The same rules apply to all persons regardless of occupational sector.

Pension rights are credited to the individual accounts for 18.5 percent of the annual pensionable income up to the pension ceiling amounting to 8.07 income base amounts<sup>140</sup>. Out of his 16 percentage points are paid to the NDC PAYG system and 2.5 percentage points to the funded DC system. The insured pay a pension contribution amounting to 7 percent of the gross pensionable income. The employer's contribution fee to the pension system amounts to 10.21 per cent of the pensionable income net of the employees' part.<sup>141</sup> Contributions over the pension ceiling goes to the central government budget as general tax and has no connection to the income-based pension system.

Contributions are also paid by the central government to cover pension entitlements credited for income replacement social insurances, e.g. for unemployment, sickness, disability and parental leave. Self-employed are also included in the system.

The new Swedish old age pension system covers individuals born 1938 and later, with transition rules for persons born 1938-1953. The transition rules are formulated so that those born in 1938 have 4/20 of their benefit calculated according to the new rules and 16/20 according to the old rules. Individuals born in 1953 have 19/20 of the benefit calculated according to the new system and 1/20 according to the old rules. As a result, it will take a couple of decades until all beneficiaries have all of their benefit calculated according to the new rules.

The Swedish pension system has accumulated a substantial fund since the beginning of the 1960s. As a part of the reform, around 30 per cent of this fund was transferred to the central government in order to cover central government's extended obligations. The remainder of the fund has been transformed into a buffer fund within the reformed system.

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<sup>140</sup> The income base amount for 2005 is SEK 43 300, and is indexed yearly with change of average incomes. Consequently the public pension ceiling is about SEK 324 750 or 35 000 Euro.

<sup>141</sup>  $(0.07+0.1021)/(1-0.07) = 0.185$



### **25.1.1 The DC PAYG system**

The DC PAYG system is self-financing and autonomous in relation to the central government budget. Insured and employers pay a total contribution of 16 per cent of pensionable earnings. The DC PAYG system is a defined contribution insurance scheme. The two main differences between the Swedish system and a conventional fully funded defined contribution system are that individual accounts are not funded and the rate of return is based on the average wage growth rather than a market rate of return.

Furthermore, contributions are used to pay current pensions, as in any PAYG setting, and individual account values represent only a claim on a future pension. The account value at the end of each year consists of contributions accumulated during the year plus the accumulated value from the previous years; the latter (as a primary rule) is indexed by the average rate of growth of earnings per contributor. Although there is no pre-funding, the system may accumulate a buffer fund due to demographic changes.

The retirement age is flexible and individuals can claim benefits from the age of 61. The DC PAYG pension system works on an actuarial basis. At the time of retirement an annuity is calculated by dividing the individual's account value by a divisor reflecting unisex life expectancy at the specific date of retirement. The PAYG-pensions is on average indexed by wages. The system is front-loaded, though, and the pensioners receive a share of the real economic growth in advance. Technically this is achieved by calculating the annuity factor with a 1.6 per cent discount factor, resulting in a higher initial benefit than a straightforward application the actuarial principles imply. The indexation is then reduced during the pay-out time by subtracting 1.6 per cent from the yearly income indexation.

The potential financial instability created by ageing is, to a large extent, counteracted by the divisor reflecting the changing life expectancy. The individual can counteract the negative effect on the annuity caused by increasing life expectancy by postponing the date of retirement.

In addition, the system is also equipped with an automatic balancing mechanism that will secure the financial stability of the system. This is achieved by reducing the rate of indexing, if necessary. The automatic activation of the balancing mechanism is based on the pension system annual reports that are published by the Swedish Social Insurance Administration. If the current liabilities of the system are greater than the calculated assets the balancing mechanism is activated. There are also plans to implement legislation for redistribution of pension fees if the PAYG system becomes over-consolidated.

### **25.1.2 The funded premium pension system**

There is also a defined contribution fully funded system, based on individual financial accounts, following the general transition rules and based on a contribution rate of 2.5 per cent on earnings. Individuals choose, from a large number of mutual funds, how their contributions should be invested during the saving period. The individual mutual funds earn a market rate of return. At retirement, at any age from 61 years, individuals can choose a fixed or variable annuity, in part or in full.

Due to a recent decision from Eurostat, the premium pension has been reclassified from 2007 as belonging to the private sector rather than to general government. The reclassification will bring about a reduction of general government net lending by approximately 1 percentage point, as measured by the European system of national accounts - ESA-95.

### **25.1.3 Basic security and the guarantee pension**

There is a minimum guarantee benefit that is financed by general revenues from the central government budget. The benefit is graduated to make it possible to have a small guarantee component, while receiving the main part of a benefit from the two earnings-related systems. The benefit is

proportionally reduced if the number of residence years in Sweden falls short of 40. E.g. a person with 39 years of residence achieves 39/40-parts of the full benefit. The guarantee pension together with a means-tested housing allowance is higher than the minimum income standard. All forms of basic security benefits for the elderly can be received from the age of 65, not earlier.

The guarantee pension is price indexed and fully taxed. The benefit amounts to maximum 2.13 price base amounts (PBA) (SEK 83 922 year 2005) for single households and 1.90 PBA:s per person (SEK 74 860 year 2005) for cohabitants.<sup>142</sup> The guarantee pension is reduced for individuals having other types of public old-age pension income or survivor benefits, but is not reduced by wage income, capital income, occupational pension or private pension insurance. For low incomes the benefit is fully reduced, and for higher incomes the benefit is reduced with 48 per cent. Thus the guarantee pension is fully phased out when the income pension reaches 3.07 PBA:s for single households and 2.72 PBA:s for cohabitants.

There is also a program, maintenance support for the elderly, which ensure that pensioners with very low income, usually immigrants with few years of residence in Sweden, not becomes dependent, in the long term, on social assistance from social services. This support is means-tested, tax free, and its size depends on the income and housing costs of the beneficiary and his/her partner.

#### **25.1.4 Tax status**

The main part of the benefits is subject to income tax from 2003. The former pension system contained a special tax deduction for pensioners, which was abolished from 2003. In the new system, the special tax deduction and the flat-rate pension have been replaced by the taxable guarantee benefit. The level has been set so that the benefit after tax will be at least as high as before the reform. The conversion from net to gross guarantee benefits explains why the guarantee level, and hence total pension benefits, increased strongly in 2003.

#### **25.1.5 Early retirement, disability and survivor's pension**

The majority of the population retires at age 65 due to legislation in the former pension system and earlier labour market agreements. Under the Employment Protection Act, an employee is entitled to stay in employment until his/her 67th birthday. The average age for withdrawal from the labour market is, however, estimated to age 63.1 in year 2003.<sup>143</sup> It is possible to retire at the age of 61 in the new pension system, but the loss is twofold for the individual. First, the benefit is based upon lifetime contributions, which implies that all years with earnings are important. Second, the level of the benefit is calculated in proportion to cohort-specific life expectancy from the date of retirement. Leaving early implies a lower (notional) pension capital and a longer period for payments and therefore the benefit will be lower per annum compared with a later retirement age.

The reformed pension system is individual-based. All benefits that derive from another individual's earnings, usually a husband, are being phased out. The previous widow's pension has been replaced by a new, temporary and gender-neutral, so called adjustment allowance. However, due to the long transition period, widow's pensions will continue to be paid out for several decades. In the new system, a survivor will receive adjustment allowance for 12 months, but the adjustment allowance payments continue as long as the survivor has children younger than 12 years. The size of the adjustment allowance as well as the widow's pension is based upon the deceased's earnings.

Disability benefits, which are equivalent to disability pensions in most European countries, are not covered by the pension scheme but by the sickness insurance scheme. Also persons with disability

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<sup>142</sup> The price base amount 2005 is SEK 39 400.

<sup>143</sup> Average age of persons leaving the work force, including disability pensioners (calculated of the workforce who were working at age 50). The average age for withdrawal of public pension was 64,7 years at the same time. Source: The Swedish Social Insurance Administration.

benefits accumulate pension entitlements in the DC PAYG and the funded premium pension system. Contributions are paid from the central government budget. Old-age pension benefits for disabled persons, as for everyone else, are based on lifetime earnings.

### **25.1.6 The process behind the reformed Swedish pension system**

The reform of the Swedish pension system was drafted in 1991-94 by the Pension Working Group, which consisted of representatives of all the parties in Parliament. Following an agreement between the governing four non-socialist parties and the Social Democratic Party, the Government presented a bill to Parliament, which was passed in June 1994. The bill contained proposals for guidelines and principles relating to the reform of the national pension system. The bill did not propose any legislation and left some details open for further discussion. Parliament adopted most of the remaining legislation on the new scheme in June 1998.

## **25.2 Occupational Pensions**

Most employees in Sweden are covered by central agreements between the unions and the employers' confederations. These central agreements include occupational pension schemes financed through employers' contributions, which provide pension in addition to the public system, but also pension compensation for incomes above the public system pension ceiling. Thus, these schemes are most important for high-income earners. The defined benefit pensions are normally proportionally reduced if the requirement for service years is not met. If a person changes labour market sector, his accumulated occupational pension rights are normally converted to an annuity that will be paid out upon retirement.

There are four major occupational plans: blue-collar workers in the private sector, white-collar workers in the private sector, central government employees and local government employees. Recently, these four occupational systems, in general, have been reformed in the same direction as the public system - from defined benefit to defined contribution. As in the public system there are a substantial transitional periods. The basic design of these plans and the most important characteristics of the current rules are given below.<sup>144</sup>

For blue-collar workers the new system is a fully funded pension scheme where 3.5% of gross earnings are paid into individual personal accounts. Each employee has the possibility to choose how to invest the accumulated pension contributions in mutual funds.

White-collar employees in the private sector are covered by a defined benefit (DB) as well as a fully funded defined contribution (DC) system. The benefits from the DB system are 10% of the pensionable income the year before retirement up to 7.5 income base amounts (IBA), 65% between 7.5 and 20 IBAs, and 32.5% between 20 and 30 IBAs. The contribution to the defined contribution system is approximately 2 percent of earnings up to 30 IBA. The employee is free to choose how to invest their contributions in mutual funds. The DC pension is normally claimed as monthly payments over a five-year period after retirement.

For Central Government employees there are two schemes. One fully funded DC scheme and a mixed DC- and DB system. In the DC system 2.0 percent of the annual pensionable income is invested in mutual pension funds. The mixed system includes a DC tier based on a 2,3 percentage contribution, and a DB tier for income over the public pension ceiling. The benefits are similar to the DB system for white-collar employees over the ceiling, but based on the last five years average earnings instead of the last. The system for local government employees is similar to the system for central government.

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<sup>144</sup> The transitional rules for the older systems will not be described here, but are implemented in the calculations.

## 25.3 Private Pensions

Private pension savings – whether in insurance schemes or pension savings accounts – differ from other forms of private savings in that they are tax-deductible. The maximum deduction allowed is half a price base amount (PBA) plus 5 percent of the portion of earned income exceeding 10, but not 20 PBA.<sup>145</sup> Depending on the individual's earned income, the deduction allowed therefore amounts to the interval SEK 19 700 to SEK 39 400 in 2005. The tax deduction for private savings thus makes it easier for individuals to smooth their income before and after retirement. In 2003, approximately 43 per cent of the women and 35 per cent of the men between 20 and 64 years, made tax-deductions for private pension savings. Since self-employed persons, whose economic activity takes the form of private business or partnership, are not employed in their company – a necessary condition for an occupational pension – the regulations governing their pension savings come under private pensions savings rules. A tax-deduction of half a PBA plus 35 per cent of business income is allowed. The total deduction may not exceed 10.5 PBA:s.

## 25.4 The Ministry of Finance Microsimulation Model SESIM

### 25.4.1 Introduction

The SESIM dynamic microsimulation model is developed at the Swedish Ministry of Finance, in close cooperation with researchers at Swedish universities. The work started in 1997 as a tool to evaluate the Swedish education financing system. Since year 2000 the focus has shifted from education to forecasts and analysis of the reformed Swedish old-age pension system and the effects of the ageing population on the public finances. This new focus has also implied that SESIM has been developed into a general microsimulation model that can be used for a broad set of analyses. However, the most important purpose remains to analyze the financial sustainability of the pension system. SESIM has later been extended for other purposes, for example for analyses of health amongst elderly. More detailed documentation can be found in Flood et.al [2005], or at [www.sesim.org](http://www.sesim.org).

### 25.4.2 Overview

SESIM can be characterized as a mainstream dynamic microsimulation model in the sense that the variables (events) are updated in a sequence, and the period between the updating processes is a year. The start year is 1999 and the initial sample of the Swedish population is approximately 110 000 individuals.<sup>146</sup> All individuals are then subject to a large number of possible events, reflecting real life phenomena, such as education, marriage, parenthood, work or retirement.

SESIM has a recursive structure consisting of a set of modules executed in a predetermined order, see [Graph 25 - 1](#) below. The unit of simulation is the individual but the household also plays a significant role. Many of the simulated processes refer to household as well as individual properties. The simulation sequence starts with a set of demographic modules (mortality, adoption, migration, household formation and dissolution, disability pension, rehabilitation and regional mobility).

After that follows a module for education. The next module deals with the labour market: unemployment, employment, absence due to sickness and employment sector. The employment sector is required e.g. for calculations of second pillar occupational pensions. It is possible for an individual to change labour market sector and, therefore, the occupational pensions are adjusted in accordance with the rules in the new sector. Accumulated pension rights are transferred to the new sector.

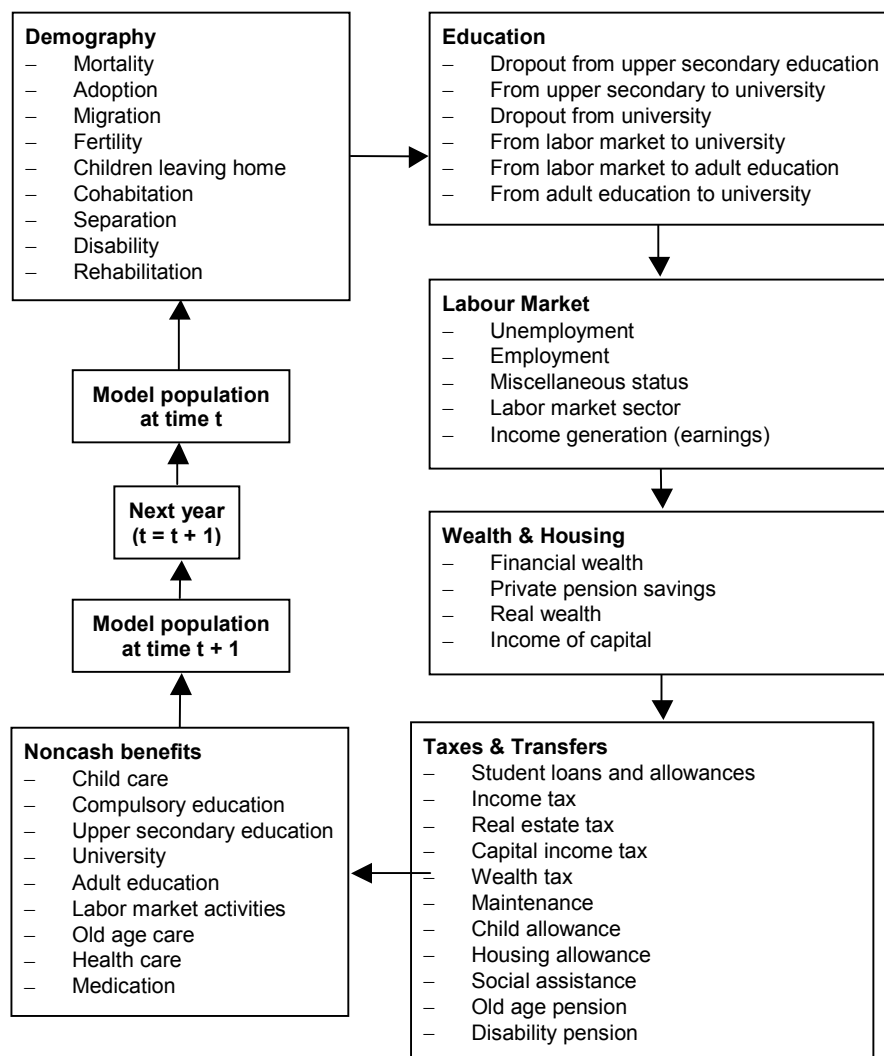
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<sup>145</sup> The price base amount for 2005 is SEK 39 400, and is indexed by the change of the consumer price index.

<sup>146</sup> If necessary the sample can be extended.

The date of retirement can be decided according to an endogenous retirement model, but in these calculations the retirement age is fixed at 65 (it is also possible to exogenously allow for some variation around this age). Thus, no dynamic effects on the labour supply are taken into account in these calculations, although it's realistic to assume a higher effective retirement age as an effect of the pension reform and a rise in the longevity.

**Graph 25 - 1 Structure of the SESIM model**



Every year the individuals are assigned a status. Each individual can only have one out of nine different statuses during a specific year.<sup>147</sup> Every status is related to a source of income. Working results in earnings; retirement brings pensions etc. For employed individuals an earnings equation is used to determine the income. For other kind of statuses, for example unemployment, different rules are applied to obtain the income. After the calculation of income, a module for wealth capital income and housing is entered. Four separate assets are considered in the household portfolio: financial wealth, owned home, other real wealth and private pension savings.

<sup>147</sup> The different statuses are: Child (0-15 years old), Old age pension, Student, Disability pension, Parental leave, Unemployed, Employed, Miscellaneous, Emigrated (individuals living abroad with Swedish pensions rights).

After the wealth/housing calculations follow a large module that contains all relevant tax, transfer and pension rules. The rules for all three pillars of pensions have been implemented in all relevant details (i.e. public, occupational and private pensions). This means that all components and parameters mentioned in the previous sections about the pension systems are implemented in the model calculations. All persons are assumed to be full time pensioners, since the model does not handle mixed statuses in the current version. Also the automatic balancing mechanism is implemented. All calculations, including income and pensions, are made in the same model, and with the same assumptions to ensure consistency.

Given the information above the household disposable income can be defined. SESIM allows for an extensive definition of income since the value of various non-cash benefits can be included, e.g. education, childcare and health care. The value of the subsidy is assumed to equal production costs net of fees. Only benefits that can be attributed to a specific individual are included.

An important update in the latest model version is the health module, where the health status and the need for care are calculated. In order to evaluate the potential for informal care the geographical distance to relatives is imputed.

### **25.4.3 Data Issues**

The primary database for SESIM, concerning estimation of statistical models as well as construction of the base population, is the Statistics Sweden longitudinal database LINDA. This database is created from administrative registers and covers about 3.5 percent of the Swedish population. In 1999, the primary sample was, thus, 308 000 individuals, and including their household members the total sample size was 786 000 individuals. The selected individuals are followed over time and all relevant information is collected. Some information, for instance pension rights, can be traced as far back as to 1960. Selected individuals, who are omitted from the data due to death or emigration, are replaced by new individuals so as to maintain statistical representativity.

As LINDA is completely created from administrative registers, no interviews are needed and, therefore, a major advantage is that there are no problems of attrition bias. The database is created by merging a large number of registers, and includes data on income and wealth, earnings, pension rights, sickness- and unemployment benefit, schooling etc. The base population used in SESIM is formed by a random draw of individuals from LINDA. Considerable work has been done with the initial dataset to make it consistent with macro outcome data, e.g. when assigning the individuals' initial statuses.

In the construction of the base population in SESIM two main adjustments have been made:

*Adjustment of the household definition:* The households in LINDA are not defined in an economically optimal sense. Firstly, individuals are assumed to live in the municipality where they are registered according to the national tax registry. Secondly, adults living together without being married or having common children are considered as separate households. Also the number of young people, aged 18 to 29 years, who still live in their parents' household, are over-reported. Therefore, other data sources are used to impute a more realistic family structure.

*Adding emigrants with pension rights:* Individuals with Swedish pension rights will keep these entitlements even if they have emigrated. As LINDA does not include individuals living outside Sweden, information from the National Social Insurance Board regarding these individuals has been added.

Apart from the sources mentioned above, some additional data is used for estimation or imputation. The Statistics Sweden income distribution survey, HEK, which is based on interviews merged with register information is, apart from being used in the correction of the household composition, used in the estimation of public consumptions and housing variables. Regional mobility and tenure choice is

based on a database named GEOSWEDE<sup>148</sup>. The Statistics Sweden household expenditure survey is used for calculation of indirect taxation. The health and care modules are based on other surveys.<sup>149</sup>

#### **25.4.4 Assumptions and simulations**

The most important exogenous economic macro variables in SESIM are inflation, real income growth per capita, short- and long interest rates and return on stocks. All relevant macro numbers are implemented in line with the AWG assumptions. In the calculations the model is aligned in order to achieve exogenous average unemployment and participation rates. The age profiles for the labour supply, as well as the income, are endogenous and not aligned to the AWG-assumptions for different cohorts. Regardless of this the calculated numbers seem to replicate the AWG-assumptions very closely.<sup>150</sup>

All calculations are made in current prices. In all calculations the exogenous retirement age is 65 years, although it's very likely that the new pension system and the increasing life expectancy will lead to an increase in the retirement age. The indexation rules are implemented in detail in the model, normally in line with legislation. Exceptions are the housing allowance for pensioners and the guaranteed pension that by law should be price indexed, but is indexed with income growth from 2009 onwards. It is also assumed that the rate of return on the funded assets in the individual public DC funds and the individual occupational pension accounts will be the same for all individuals, and that all assets are invested in stocks. Upon retirement it is assumed that all individuals choose to get their public DC pension benefits as a fixed annuity. The automatic balancing mechanism was not activated during the simulations, which implies financial stability.

### **25.5 Results from the Calculations**

#### **25.5.1 The baseline scenario**

##### *Demographic assumptions*

Eurostat's demographic assumptions imply that the population older than 65 in Sweden will increase by 59 per cent in the period 2004 to 2050. If persons entitled to Swedish earnings-related pensions abroad are also included, the increase will be somewhat slower, 56 per cent, during the same period. The old-age dependency ratio, calculated as the ratio of the population older than 64 years to working age population (age 15 to 64), will increase from 26 per cent to 41 per cent. During the same period the total dependency ratio, defined as the inactive population (total population less labour force aged 15 to 64) as a percentage of the labour force 15 to 64 years, will increase from 98 to 108 per cent.

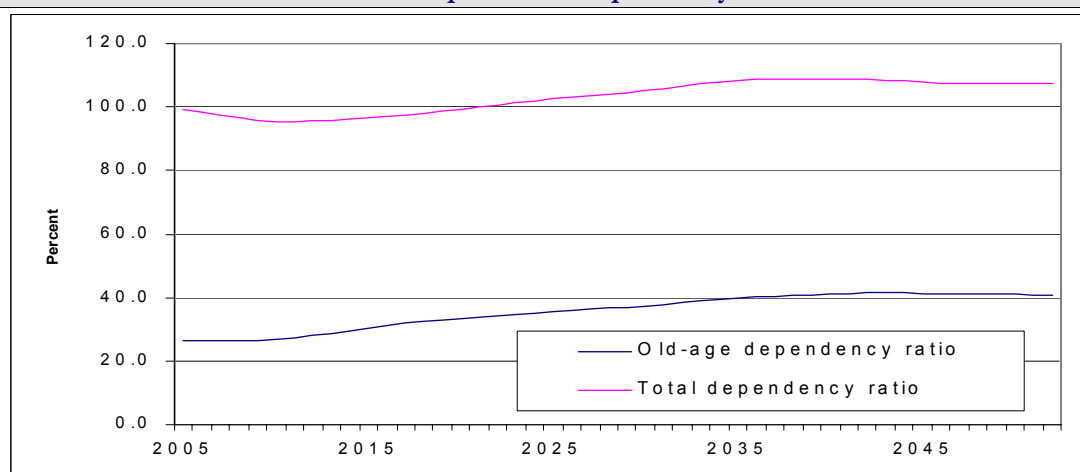
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<sup>148</sup> A database constructed from labour markets statistics (Louise), geography database, tax assessed values etc.

<sup>149</sup> The Kungsholmen study by Mårten Lagergren and Statistics Sweden, Level of Living Survey (ULF).

<sup>150</sup> For more details see Sundberg[2005]

Graph 25 - 2 Dependency ratios



### Macroeconomic assumptions

The assumptions for the labour market lead to a participation rate of 81.1 per cent year 2050, which is an increase of 3.6 percentage points from today's level. Given the assumed rate of unemployment at 4.3 per cent (which is a fall of 1.0 percentage points from 2004), the employment rate will increase from 73.4 to 77.6 per cent throughout the period.

GDP growth follows demographic growth through the employment rate and the assumed productivity growth. During the period until 2010 GDP growth will be on average 2.8 per cent per year; thereafter a period of decreasing growth down to 1.6 per cent in 2030. For the rest of the period growth fluctuates around 1.8 per cent per year. The slower growth rate after 2010 is due to the decrease in the working age population in combination with the stabilization in the participation rates. The growth of the GDP deflator is assumed to be the same as the growth of CPI, 2 per cent, during the period 2009-2050 (before 2009 in line with the Ministry of Finance's calculations or outcome).

Table 25 - 1 Macroeconomic assumptions, baseline scenario

Average for the period	2004	2005-2010	2011-2020	2021-2030	2031-2040	2041-2050
Real GDP (growth rate)	2.1	2.8	2.7	2.1	1.8	1.9
Labour input (growth rate)	0.0	0.7	0.2	0.0	0.0	0.2
Labour productivity (growth rate)	2.1	2.2	2.5	2.0	1.7	1.7
TFP (growth rate)	1.7	1.8	1.8	1.3	1.1	1.1
Capital deepening (contribution to labour productivity)	0.4	0.4	0.7	0.7	0.6	0.6
GDP / capita (growth rate)	1.7	2.4	2.3	1.7	1.6	1.8
Real GDP/ capita (1000 of 1995 PPS per head)	22.6	24.6	29.7	36.0	42.1	50.0
GDP in 2004 prices (in millions euros)	278 410	307 131	383 181	484 524	578 591	696 980
Employment growth (15-64)	1.2	0.8	0.2	0.0	0.0	0.2
Population growth (working age:15-64)	0.7	0.5	-0.2	0.1	0.0	0.2
Participation rate (15-64)	77.5	77.9	80.1	80.8	80.7	81.1
Employment rate (15-64)	73.4	74.4	76.6	77.3	77.3	77.6
Unemployment rate (15-64)	5.3	4.5	4.3	4.3	4.3	4.3
Real interest rate	3.0	3.0	3.0	3.0	3.0	3.0
Inflation	0.4	1.9	2.0	2.0	2.0	2.0
Euro/SEK rate	9.1243	9.1243	9.1243	9.1243	9.1243	9.1243



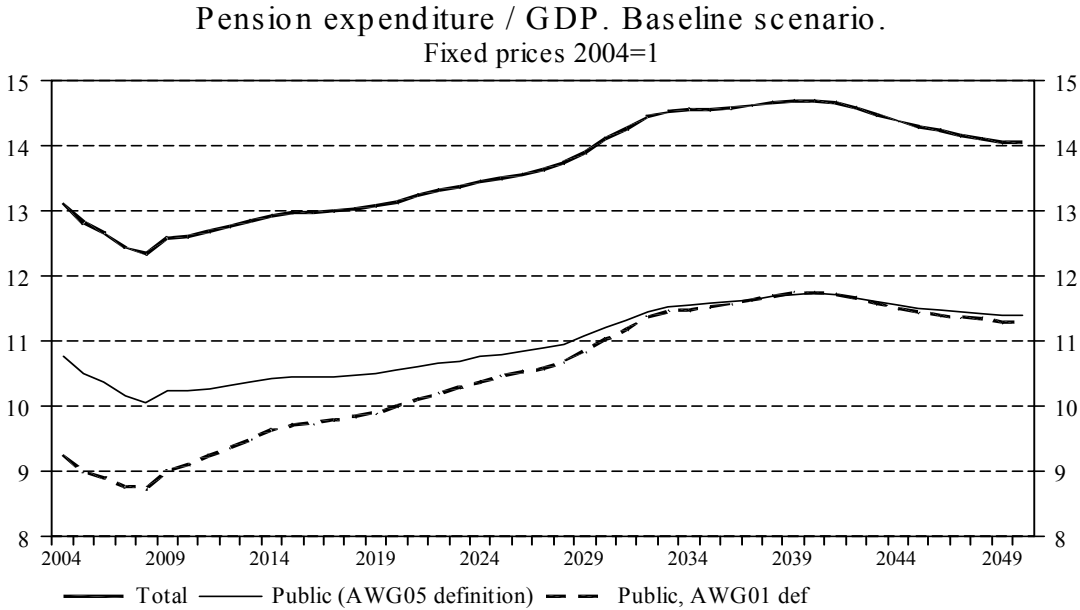
Note that reported net pensions are calculated with a uniform tax rate, 27 percent, applied to all types of taxable pension income and for all years. The simulations are closed assuming primary income and primary expenditure other than pensions to be a constant share of GDP from year 2009 and onwards. In doing so, no consideration is taken of the fact that an increasing ratio of pensions to GDP implies a rising tax ratio, since pension benefits are taxable in Sweden from 2003. Furthermore, private savings for pensions are tax deductible. When they are paid out as pensions they are taxed. A tax claim on future private pension payments has been built up which, during the simulation period, is expected to generate income to the public budget.

**Pension expenditure**

Total pension expenditure (or old-age related expenditures) as a share of GDP will increase from 12.9 per cent in 2004 to 13.9 per cent in 2050 with a 14.5 per cent peak round 2040, see diagram 1. The pensions included in the calculations are public old-age pensions, occupational pensions from all sectors, housing allowance for pensioners, plus survivors’ and disability pensions, without any lower age limit.<sup>151</sup>

Public pension expenditure (or old-age related expenditures) as a share of GDP will increase from 10.6 per cent in 2004 to 11.2 per cent in 2050 with an 11.6 per cent peak round 2040. There are several explanations to the decrease in the beginning of the projection period. The GDP growth is fast, the demographics favourable. Before 2009 the guarantee pension is price indexed in the calculations but is income indexed thereafter.

**Graph 25 - 3 Pension expenditures as a share of GDP 2004-2050**



As a comparison, also the definition used for the AWG 2001 calculations is presented in Graph 25 - 3 and Table 25 - 2. This definition includes public old-age pensions, housing allowance to pensioners, survivors’ pensions and occupational pensions to employees in the public sector. In AWG-01 the disability pensions were excluded, since they were considered to be a health insurance and not an old-age pension. Thus, this definition is more focused on old-age pensions and public finances than the

<sup>151</sup> The presented diagrams also include “maintenance support for the elderly” (a type of social assistance mainly for old immigrants) and are based on an updated database and some minor model changes, resulting in approx 0.2 percentage point’s higher expenditure to GDP share for the whole period.

economy as whole. With the AWG-05 definition the starting level is higher, but the growth is slower, resulting in the same level in the end. The reason is that the new definition includes disability pensions, and the AWG-01 definition included occupational pensions to public employees and excludes disability pensions, and that the different factors even out in the end.

**Table 25 - 2 Comparison of public pension expenditure as a share of GDP with different definitions and the AWG 2001 projections**

<b>Definition</b>	<b>2004</b>	<b>2050</b>	<b>Change</b>
AWG 05, 05-definition	10.6	11.2	0.6
AWG 05, 01-definition	9.1	11.2	2.1
AWG 01, 01-definition	9.1	10.7	1.6

In Table 25 - 2 above also the numbers from the AWG-01 projections is included. Compared to AWG-01 the public pensions to GDP ratio is higher in 2050, 11.2 per cent vs. 10.7 per cent. The most important factor behind the differences is driven by the demographic assumptions.

*Factors driving the development of pension expenditure*

Public pension expenditure is expected to increase as a share of GDP by nearly 0.9 percentage points between year 2005 and 2050, see Table 25 - 3. The development of this quota can be decomposed as follows:

$$\frac{PensExp}{GDP} = \frac{Pop>65}{Pop(15-64)} \times \frac{Pop(15-64)}{EmplNo} \times \frac{PensNo}{Pop>65} \times \frac{PensExp/PensNo}{GDP/EmplNo}$$

The factors are:<sup>152</sup>

- A dependency effect (or a population ageing effect) which measures the change in the dependency ratio over the projection period as the ratio of persons aged 65 and over to the population aged 15 to 64.
- An employment effect which measures changes in the share of the population of working age (15 to 64) relative to the number of the employed, i.e. an inverse employment rate.
- An eligibility effect, which measures changes in the share of pensioners relative to the population aged 65 and over, measuring the take-up of pensions relative to the number of old people.
- A benefit effect which captures changes in the average pension relative to output per employee. It should be noted that the benefit ratio does not measure the level of the pension for any individual relative to his/her own wage and, hence, is not an equivalent to a replacement rate indicator.

<sup>152</sup> The method is described more in detail in. the AWG main report.

**Table 25 - 3 Explaining factors behind the development of old age pension expenditure**

	<b>2005</b>	<b>2050</b>	<b>Change 2005-50</b>	<b>Contribution to growth in benefit ratio, p.p.</b>
Public pension expenditure,	29 640	85 056	187.0%	
GDP	285 953	756 052	164.4%	
<b>Pension expenditure/GDP, level</b>	<b>10.4%</b>	<b>11.2%</b>	<b>8.5%</b>	<b>0.9%</b>
Pop 65+	1 551	2 472	59.4%	
Pop 15-64	5 874	6 046	2.9%	
1: Pop 65+ / Pop 15-64	26.40%	40.89%	54.8%	4.80%
Employed 15-64	4 337	4 694	8.2%	
2: Pop 15-64 / Employed 15-64	135.44%	128.80%	-4.9%	-0.60%
Pensioners	2 132	3 327	56.1%	
3: Pensioners / Pop 65+	15 840	29 934	89.0%	-0.20%
GDP per employed 15-64	64 999	161 083	147.8%	
4: Avg pens / GDP per employed	24.40%	18.60%	-23.8%	-2.80%

*Note: The contributing factors don't add up to the total. The residual can be seen as an interaction effect.*

The findings concerning public pensions can be summarised as follows: The old-age dependency ratio weighs on the increase in pension spending more than the total increase, while the other factors offset part of the increase. The strongest effect comes from the benefit.

The first explaining component shows the population effect. With an increase in the number of the working age population (2.9 per cent) and a dramatic rise in the number of 65 years and older (59.4 per cent), the upward pressure on pension expenditure as a share of GDP is nearly 0.9 percentage points between year 2005 and 2050.<sup>153</sup>

The second component describes the employment effect. It measures the share of the population of working age (15 to 64 years) that are employed. The decline in the working age population is offset by the increase in the employment rate. The employment effect decreases pension expenditure as a share of GDP by 0.6 percentage points between year 2004 and 2050.

The third factor, the eligibility effect, decreases pension expenditure as a share of GDP by 0.2 percentage points between year 2004 and 2050. Most individuals older than 65 are already entitled to public pension in Sweden, and the growth in the number of pensioners is driven by Swedish pension rights to overseas residents<sup>154</sup>.

The fourth component, the benefit effect, captures changes in the average pension relative to output per worker. The average pension increases at a slower rate than GDP per worker, which leads to a decrease in the relative income for pensioners by nearly 24 per cent between year 2005 and 2050, offsetting the increase in the expenditure share to GDP by 2.8 percentage points. All together pension expenditure as a share of GDP rises by 8.5 per cent.

<sup>153</sup> Note: To make the numbers comparable with the numbers published in the AWG main report, the base year is 2005 in this section.

<sup>154</sup> The actual number of pensioners exceeds the population aged 65 and over because there is a large number of persons living abroad that is entitled to Swedish earnings-related pension benefits.

### ***Wage and benefit growth***

The most important reason behind the lower rate of growth in the average earnings-related benefit as compared to the average wage is the development of life expectancy, together with the assumption that the retirement age will remain fixed at 65. If the average age of retirement increases gradually in the next half-century, the decrease in relative income for retired will be counteracted.

### ***Increase in life expectancy***

The major reason for the increase in the number of pensioners is the increase in life expectancy of persons 65 and older, together with the assumption of a fixed retirement age of 65. Currently few individuals work past this age because it has been restricted by centrally negotiated labour market contracts. Today, an employee is entitled to stay on in his/her employment until his/her 67th birthday. In the future it is, however, probable that the time for retirement will be even later in life. As the population in older age groups becomes healthier it is reasonable to expect that the retirement age will increase. The reformed pension system contains incentives to work longer, which makes it even more likely that the retirement age will increase.

With a given pension age of 65, and within the framework of the new system, increased life expectancy leads to lower pensions, everything else being constant. Hence, in the reformed system life expectancy has limited impact on the financial outcome. However, life expectancy is still important in the medium-term, because up until 2018 more than half of the public earnings-related benefits are calculated according to the new system, due to the transition rules

### ***The components in the pension system***

The overall contribution rate for the entire public earnings-related systems is 18.5 per cent on pensionable income. This is also the actual cost of financing the two public earnings-related schemes, excluding the costs for social policy measures and the guarantee pension. Over the coming 50-year period, the funded premium pension system will become more important than its contribution rate suggests, given the assumption of a real market rate of return of 3 per cent. With this assumption, by 2050 approximately 13 per cent of the public income related old-age benefits will be financed by the pre-funded system.

Also the guarantee pension is projected to become more important, 17 per cent. This level is crucially dependent upon the fact that the guarantee pension is income indexed from 2009 in the calculations. This is the normal practice in the Ministry of Finance's long-term calculations, but diverges from the legislation that assumes price indexation. Another factor is that the widow's pension will be phased out, and thus puts a heavier burden on the guarantee pension.

## **25.5.2 Sensitivity test**

An overview of the different sensitivity test and the results are given below. The sensitivity scenarios were all run in relation to the baseline scenario, changing only one parameter in each sensitivity scenario from that in the baseline scenario. The following sensitivity tests were run:

*Higher life expectancy scenario* assumed an increase in life expectancy, which corresponds roughly to an increase in life expectancy at birth of 1-1.5 years by 2050. Specifically, it was introduced by decreasing the age-specific mortality rates by 15% linearly over the period 2004-2050.

*Higher employment rate scenario* assumed that the employment rate will increase by 1 p.p. over the period 2005-2015 and thereafter will remain at a 1 p.p. higher level in the period 2015-2050 compared with the baseline projection. The higher employment rate was assumed to be achieved by lowering the rate of structural unemployment (i.e. the NAIRU).

*Higher employment rate of older workers scenario* assumed that the employment rate of older workers will increase by 5 p.p. over 2005-2015 and thereafter will remain at a 5 p.p. higher level over the period 2015-2050, compared with the baseline projection. The higher employment rate was assumed to be achieved through a reduction in the inactive population.

*Higher and lower labour productivity scenarios* assumed an increase/decrease in the labour productivity growth rate by 0.25 p.p. over 2005-2015 and thereafter remaining at the 0.25 p.p. higher/lower level in comparison with the labour productivity growth rate in the baseline projection.

*Higher and lower interest rate scenarios* assumed interest rates of 4 and 2 per cent vs. 3 per cent in the baseline scenario.

One conclusion from the sensitivity tests is that generally the differences are relatively small when the pensions are measured as a share of GDP. The results are not fully symmetrical. There seems to be a higher sensitivity for the “negative” shocks than the “positive”. The reason for this is that the pensions are more stable than GDP in the scenarios. This is a result of the guarantee pension that secures a minimum standard of living, if the earnings-related pensions decrease.

**Table 25 - 4 Old age pension expenditure as a share of GDP**

	2004	2010	2020	2030	2040	2050
Baseline	10.6	10.1	10.4	11.1	11.6	11.2
Sensitivity tests:	Difference to baseline. p.p					
Higher life expectancy	0.0	0.0	0.1	0.1	0.2	0.4
Higher employment	0.0	0.0	-0.1	-0.1	-0.1	0.0
Higher productivity	0.0	0.0	-0.1	-0.2	-0.2	-0.2
Lower productivity	0.0	0.0	0.1	0.2	0.2	0.3
Higher interest rate	0.0	0.0	0.1	0.1	0.2	0.4
Lower interest rate	0.0	0.0	0.0	-0.1	-0.2	-0.2

## References

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## Annex 1: Technical comments and clarifications to the calculations

### Technical Details about the model

- *Programming*: The model is programmed in Visual basic 6.0.<sup>155</sup> Microsoft Excel and Access is used for handling of macroeconomic and demographic assumptions and parameters. All programming has been carried out by statisticians and economists and no dedicated programmers have been used.
- *System requirements*: To run the model a computer with at least 256 MB of RAM memory is recommended. To edit the model Visual Basic version 6.0 SP5 is required. The system requirements increase with the sample size and the simulation period.
- *Data storage*: The initial population data is stored in binary form. The LINDA database is in SAS-format, and the start data is thus generated with a combination of SAS and Visual basic.
- *Typical run time*: A 100 000 individuals sample and 50 year long simulation takes about 30 minutes to execute on a modern standard PC.
- *Interactivity*: The program can be controlled in three ways: from the "user interface", from the "Excel report generator" or in batch mode. Normally the "user interface" is used in the early stage of development, and the "Excel report generator" is used to produce standard outputs as graphs and tables. More extensive analysis of the results is performed in standard statistical packages like SAS or R.
- It's easy to implement different macroeconomic assumptions in SESIM, but more demanding to change population scenarios. If the files with demographic and macroeconomic assumptions are in place and relevant reports available, it is easy to make several model simulations in batch mode. When the model is run repeatedly, e.g. to assess the sampling variance, it's also appropriate to use the batch mode.
- *Availability of model*: The model is, in principle, open source. The code is freely available on [www.sesim.org](http://www.sesim.org). Because of the official data secrecy legislation no individual start data are provided, though.

### Comments to the calculations

SEK/Euro exchange rate = 9.1243 for all years, in line with the reporting framework. Note that this differs from the implicitly calculated rate GDP in SEK 2004 / GDP in Euro 2004 in AWG assumptions, that is 9.0154. The difference may also be the result of different outcome data. From 2004, the growth rate from AWG is used. This means that there will be a discrepancy between the GDP-series used in the model, and the one presented in the assumptions.

All figures are deflated with CPI, 2004=1.

Some adjustments of the AWG assumptions have been made to make them fit into the SESIM model structure. Unemployment in SESIM is defined for the age group 16-64 years.

The real interest rate, 3 percent, is used in the baseline calculations. No deduction for administrative costs for the funds is assumed, but the authorities' costs for the insurance administration is taken into account.

In the public pensions the housing allowance for pensioners (BTP) is included. The reported numbers are not calculated in SESIM but in the Ministry of Finance's calculations for the convergence program.

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<sup>155</sup> Also some Fortran subroutines are used for e.g. sorting and random number generation.

Funds and assets: The AP-fund and the funded DC premium pension funds (the notional funds in the income pension system not included) are calculated. Occupational pension funds only include funded DC-parts.

Pension expenditures and public contributions adjusted to national account levels until 2004, but not occupation pension contributions and any assets. From 2005 on the growth rates from the model calculations are used.

In SESIM, only occupational pensions to individuals with public pensions are calculated. Thus, different types of early retirement option programs in collective agreements, agreed disability pensions etc are not included. To adapt to the NA-level the reported numbers are adjusted with an additive factor for all years (2004 level fixed price).

No contributions reported for pension systems that are financed by general tax income, i.e. disability pensions.

Only DC contributions to occupational pensions are reported, but not DB contributions that are financed by the employers on actuarial ground.

## Annex 2: Results for the baseline scenario

Pension expenditure and contributions - in millions EUROS, fixed prices of 2004						
Scenario: AWG base						
	2004	2010	2020	2030	2040	2050
<b>GDP (ECFIN projection, in 2004 prices)</b>	<b>278410</b>	<b>329156</b>	<b>428881</b>	<b>526495</b>	<b>626421</b>	<b>756052</b>
GDP (used in projections, in 2004 prices)	278410	329155	428881	526494	626420	756051
<b>Pension expenditure</b>						
<b>Social security pensions, gross, in millions €</b>	<b>29507</b>	<b>33332</b>	<b>44725</b>	<b>58597</b>	<b>73030</b>	<b>86550</b>
Old-age and early pensions	21615	25233	36310	49443	63878	76383
Of which: earnings-related pensions	18124	22595	32002	41709	52166	60252
Private sector employees	10849	13374	18018	22576	28182	32893
Public sector employees	7275	9220	13984	19133	23984	27358
Other pensions (disability, survivors)	7891	8099	8415	9154	9152	10167
<b>Occupational pensions, gross, in millions €</b>	<b>6535</b>	<b>7817</b>	<b>10921</b>	<b>14613</b>	<b>17676</b>	<b>18994</b>
Private mandatory pensions, gross, in millions €	0	0	0	0	0	0
<b>Total pension expenditure, gross, in millions €</b>	<b>36042</b>	<b>41149</b>	<b>55646</b>	<b>73210</b>	<b>90705</b>	<b>105543</b>
<b>Social security pensions, net, in millions €</b>	<b>21540</b>	<b>24332</b>	<b>32649</b>	<b>42776</b>	<b>53312</b>	<b>63181</b>
Old-age and early pensions	15779	18420	26506	36093	46631	55760
Of which: earnings-related pensions	13230	16494	23361	30447	39091	43954
Private sector employees	7919	9763	13153	16480	20573	24012
Public sector employees	5311	6731	10208	13967	17508	19971
Other pensions (disability, survivors)	5761	5913	6143	6683	6681	7422
<b>Occupational pensions, net, in millions €</b>	<b>4771</b>	<b>5706</b>	<b>7973</b>	<b>10667</b>	<b>12903</b>	<b>13865</b>
Private mandatory pensions, net, in millions €	0	0	0	0	0	0
<b>Total pension expenditure, net, in millions €</b>	<b>26311</b>	<b>30039</b>	<b>40622</b>	<b>53443</b>	<b>66215</b>	<b>77047</b>
<b>Number of pensioners, in 1000</b>						
<b>Social security pensions</b>	<b>2128</b>	<b>2285</b>	<b>2727</b>	<b>3084</b>	<b>3298</b>	<b>3357</b>
Old-age and early pensions	1599	1762	2233	2595	2823	2849
Of which: earnings-related pensions	1440	1684	2214	2593	2823	2849
Private sector employees	844	996	1272	1436	1535	1548
Public sector employees	596	687	942	1157	1288	1301
Other pensions (disability, survivors)	861	815	722	669	575	547
<b>Occupational pensions</b>	<b>1126</b>	<b>1333</b>	<b>1786</b>	<b>2181</b>	<b>2531</b>	<b>2687</b>
Private mandatory pensions	0	0	0	0	0	0
<b>All pensions, in 1000</b>	<b>2128</b>	<b>2285</b>	<b>2727</b>	<b>3084</b>	<b>3298</b>	<b>3357</b>
Of which: aged -54	229	222	218	220	223	209
aged 55-59	119	101	99	88	90	107
aged 60-64	150	159	143	143	134	159
aged 60 +	1630	1803	2267	2632	2852	2882
<b>Contributions (employee+employer)</b>						
<b>Social security pensions, in millions €</b>	<b>21658</b>	<b>25515</b>	<b>32923</b>	<b>40181</b>	<b>47245</b>	<b>56954</b>
Old-age and early pensions	21658	25515	32923	40181	47245	56954
Of which: earnings-related pensions	21658	25515	32923	40181	47245	56954
Private sector employees	13741	15601	19860	24211	28633	34563
Public sector employees	8361	9913	13063	15970	18612	22391
Other pensions (disability, survivors)						
<b>Occupational pensions, in millions €</b>	<b>3740</b>	<b>4374</b>	<b>5699</b>	<b>6841</b>	<b>7933</b>	<b>9571</b>
Private mandatory pensions, in millions €	0	0	0	0	0	0
<b>Total pension contributions, in millions €</b>	<b>25398</b>	<b>29888</b>	<b>38622</b>	<b>47022</b>	<b>55178</b>	<b>66525</b>
<b>Number of contributors (employees), in 1000</b>						
<b>Social security pensions</b>						
Old-age and early pensions						
Of which: earnings-related pensions	5315	5462	5515	5578	5649	5806
Private sector employees	3291	3349	3334	3377	3445	3537
Public sector employees	2024	2112	2181	2201	2204	2269
Other pensions (disability, survivors)						
<b>Occupational pensions</b>	<b>3859</b>	<b>3937</b>	<b>4049</b>	<b>4025</b>	<b>4044</b>	<b>4169</b>
Private mandatory pensions	0	0	0	0	0	0
<b>All pensions, in 1000</b>	<b>5315</b>	<b>5462</b>	<b>5515</b>	<b>5578</b>	<b>5649</b>	<b>5806</b>
<b>Assets of pension funds and reserves</b>						
<b>Social security pensions, in millions €</b>	<b>85065</b>	<b>127529</b>	<b>192196</b>	<b>257852</b>	<b>299414</b>	<b>342619</b>
<b>Occupational pensions, in millions €</b>	<b>17735</b>	<b>43700</b>	<b>86943</b>	<b>121587</b>	<b>134161</b>	<b>136742</b>
Private mandatory pensions, in millions €	0	0	0	0	0	0
<b>All pensions, in millions €</b>	<b>102800</b>	<b>171229</b>	<b>279138</b>	<b>379439</b>	<b>433574</b>	<b>479360</b>
<b>B. Additional information</b>						
<b>Additional information</b>						
Euro SEK exchange rate X 100	902	902	902	902	902	902
CPI (2004=1) X 100	100	112	136	166	202	247
Assumed implicit taxrate for pensioners	0,27	0,27	0,27	0,27	0,27	0,27
Premium pension expenditure, in million €	5	114	895	2648	5482	8054
Number of premium pensions, in 1000	176	786	1816	2464	2767	2813
Premium pension contributions, in million €	2432	3049	4122	5033	5914	7135
Number of premium pens contrib, in 1000	5320	5477	5509	5567	5633	5792
Assets in premium pension funds, in million €	18686	39716	89212	150456	209839	264245
Survivors pensions, in million €	1885	1742	1582	1409	1002	568
Occup. pens, public sector emp, in million €	1833	2521	4377	6539	8038	8333
Occup. pens, private sector emp, in million €	4646	5130	6439	8161	9844	10920



## 26. The United Kingdom

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### 26.1 Overview of the UK State Pension System and Public Service Pensions

#### 26.1.1 The Basic State Pension

The Basic State Pension (BSP) in financial year 2005-06 is £82.05 per week for a single person and £131.20 for married couples. A married couples pension is payable when the wife has an insufficient contribution record to receive more than 60 per cent of the full amount in her own right. The state pension is currently payable at 65 for men, 60 for women, but will equalise at 65 between 2010 and 2020.

Receipt of the BSP is based on someone's National Insurance (NI) contribution history, not on citizenship or residency. Contributions of 11 per cent are paid by employees on earnings between the Primary Earnings Threshold and the Upper Earnings Limit (UEL) and 1 per cent over the UEL.<sup>156</sup> However if someone has earnings between the Lower Earnings Limit (LEL) and the Primary Earnings Threshold they are treated as if they have made contributions. The self-employed make compulsory weekly contributions of £2.10 plus contributions of 8 per cent on profits between £4,895 and £32,760 per year and 1 per cent above £32,760 per year.

At present a man will receive a full BSP after making contributions, or being treated as if he had made contributions, for 44 of the 49 years between 16 and 65. If someone does not have a full contribution record then they receive a partial award. However if they have made contributions that would give them a pension of less than 25 per cent of the full amount then they receive nothing. As the State Pension Age (SPA) for women is 60, a woman's working life is considered to be 44 years, and a woman needs to make contributions for 39 years in order to receive a full pension. Once SPA is equalised at 65 in 2020, both men and women will need 44 years of contributions to receive a full pension.

To help mitigate the effects of a broken work record on pension entitlement, a range of credits are available which credit contributions to an individual even when they did not have earnings in a specific week. The main reasons for receiving a credit are being unemployed, claiming certain NI benefits, or being a man aged 60-64. In addition to credits, Home Responsibilities Protection (HRP) is available for those who are not in work because of caring for children or the long-term sick or disabled. HRP is available to someone who does not have earnings but is in receipt of Child Benefit for at least one child aged 16 or under. HRP reduces the number of years for which someone has to make contributions in order to receive a full pension. A woman who has made contributions for 20 years is entitled to 50 per cent of the full rate, but the effect of 10 years of HRP is to increase that to two-thirds of the full rate. However, in a given year you can either accrue a year of contributions or be awarded a year of HRP. Therefore individuals who have earnings in part of the year do not receive the benefit of their contributions.

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<sup>156</sup> The Lower Earnings Limit (LEL) (£4,264 per year or £82 per week in 2005-06) is the point at which individuals accrue entitlement to National Insurance benefits, but employees and employers do not make contributions until earnings reach the Primary Earnings Threshold (£4,895 per year or £94 per week). The Lower Earnings Threshold (LET) (£12,100 per year) and the Upper Earnings Threshold (UET) (£27,800 per year) affect the accrual of S2P. The Upper Earnings Limit (UEL) (£32,760 or £630 per week) is the point at which National Insurance contributions for entitlement to benefits cease to be paid.

The majority of men aged 65-69 receive full BSP. Women aged 65-69 on average have smaller state pensions, and significantly when looked at pension entitlement based only on personal contribution history, which is the so-called Category A pension. In the future women should increasingly receive higher levels of BSP in their own right, as the impact of HRP matures (it has only been available since 1978) and as the historic impact of married women making reduced rate NI contributions even when in work (the choice to make reduced contributions was only available up to 1977) works out of the system.

Over the last 20 years the BSP has increased by less than average earnings. The existing law requires that the BSP is increased in line with prices, however in recent years there have also been occasional increases greater than the level of inflation.

If someone wishes to defer their entitlement to their pension (both BSP and SERPS/S2P, discussed below), they are able to do so. There is no requirement for an individual to be in work to defer their claim. In return for delaying a claim, the amount of pension is increased, at present, by approximately 7½ per cent per year of delay. The maximum reward for deferment is 37 per cent, which is achieved by deferring for five years. If someone with full BSP defers their pension for five years, their BSP per week becomes around £125 per week instead of £82.05. Anyone deferring by at least 12 months also has the option of taking their deferred pension as a taxable lump sum rather than as a weekly increase to their state pension. The lump sum is based on the pension the person would have been entitled to had they not deferred, plus a rate of return that is applied weekly and compounded. The rate of return for the calculation of the lump sum is an interest rate 2 per cent higher than the Bank of England base rate. As an example, if someone has a total state pension entitlement of £100 per week and delays their claim for five years they could receive an increased state pension of £152 per week or a lump sum of £30,000 assuming a 6 per cent rate of return (this lump sum would be taxable).

The Department for Work and Pensions (DWP) estimates that 20,000 people in Great Britain currently defer their claim to their state pension each year and on average they defer for around two years.

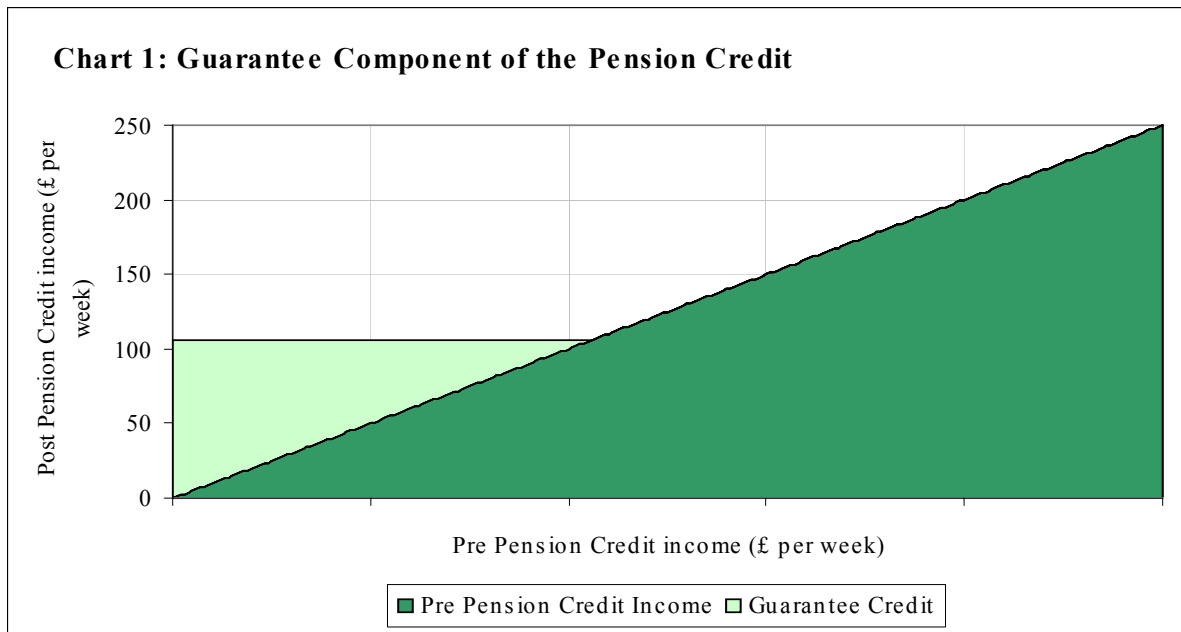
### **26.1.2 Pension Credit**

The contribution-based but non-means-tested BSP is not the minimum income which the Government guarantees to pensioners in the UK. Rather this is determined by means-tested benefits, of which the Pension Credit is the most important.

Pension Credit is a means-tested benefit available to people aged 60 and over. This means that it tops up the income of people with low and moderate incomes. It has two elements: the “Guarantee Credit” and a “Savings Credit” which is only available to people aged 65 and over. These two components add up to a benefit which tops people’s income up to a level of income and then is tapered away at 40 pence for every £1 extra of pre-benefit income above a particular level.

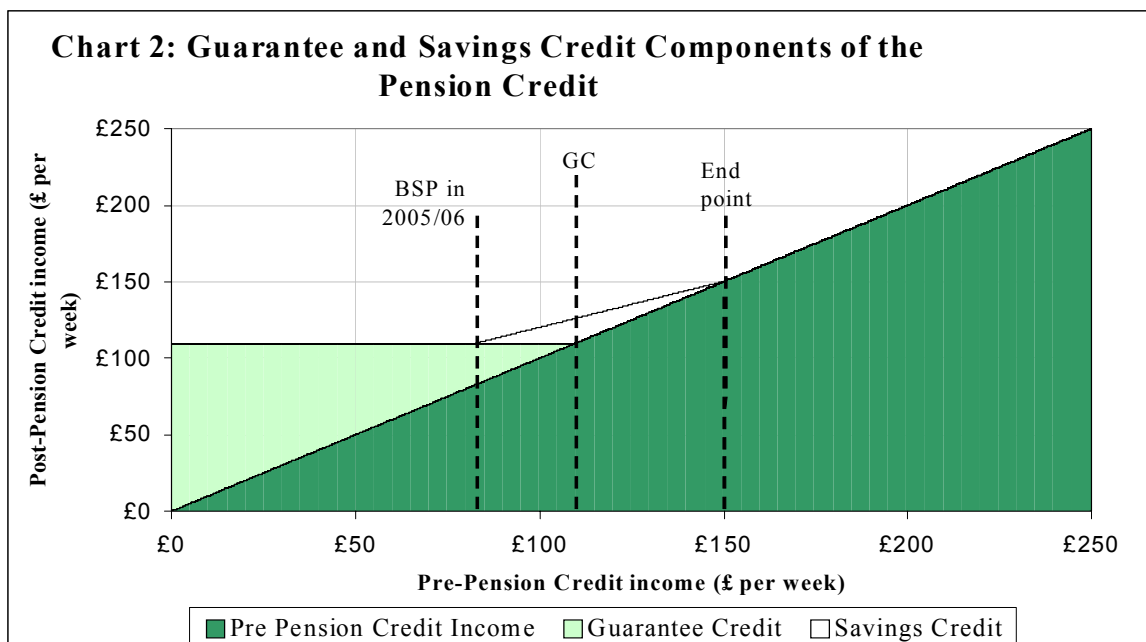
The impact of the Guarantee Credit is shown in Chart 1. It simply tops people’s income up to a particular level (£109.45 per week for a single person in 2005-06) with a pound for pound (100 per cent) withdrawal rate for any pre-benefit income. For example, someone with £90 pre-benefit income (including BSP, SERPS/S2P and private pension income) ends up with £109.45 post-benefit income, as does someone with £100 in pre-benefit income. Since people aged 60-64 can receive the Guarantee Credit but not the Savings Credit, this is the situation they face. This was also roughly the situation faced by all people over 60 before Pension Credit was introduced in 2003, under what was then called the Minimum Income Guarantee (MIG). The Savings Credit is an additional means-tested benefit relating to income above the level of the BSP. Its value is calculated in such a way as to mean that the effective withdrawal rate of the Pension Credit (Guarantee Credit and Savings Credit) is 40 per cent if pre-benefit income is above the BSP.

Graph 26 - 1 Guarantee component of the pension credit



The addition of the Savings Credit initially affects only people with pre-benefit income in a fairly narrow range either side of the Guarantee Credit, as shown in Chart 2. For example someone with £90 pre-benefit income now receives a further boost to her income resulting in a total post-benefit income of £114.22 per week. However, for every extra pound of pre-benefit income, she would now face a reduction of 40pence in the total Pension Credit received. Thus the person who has £100 in pre-benefit income now receives £120.22. Compared with the situation where only the MIG existed, therefore, this person has a greater incentive to save, since they keep 60 per cent of their private income, whereas previously they kept none.

Graph 26 - 2 Guarantee and savings credit components of the pension credit



### 26.1.3

### State Second Pensions, SERPS/S2P, including contracting out

Since 1978, the UK has had a mandatory second tier earnings-related pension system for employees but not for the self-employed.<sup>157</sup> This system requires all employees either to be members of the State Second Pension (S2P), or to make equivalent private savings in a contracted-out funded pension. All employees (and their employers) are compelled to make contributions either to S2P or to a contracted-out alternative, on all earnings between the Primary Earnings Threshold and the UEL.

S2P, which was introduced in April 2002, is a reformed version of the State Earnings Related Pension Scheme (SERPS) which came into effect in April 1978. The SERPS regime changed a number of times between 1978 and 2002, therefore what a pensioner will receive from the state will depend on the year the pensioner reaches SPA and this will continue to be the case for many years, even if no further changes are made to S2P accrual.

In order to understand how S2P operates, it is helpful first to understand how SERPS accrual operated. SERPS accrued on earnings between the LEL and the UEL. The amount of SERPS that an individual accrued in each year is calculated in two stages. First, the value of a given percentage of earnings between the LEL and UEL in each year is calculated, revalued to take into account average earnings growth up to the point of retirement. The percentage is between 20 per cent and 25 per cent of earnings depending on when someone reaches SPA. Second, this amount is then divided by a number, which depends on when someone reaches SPA:

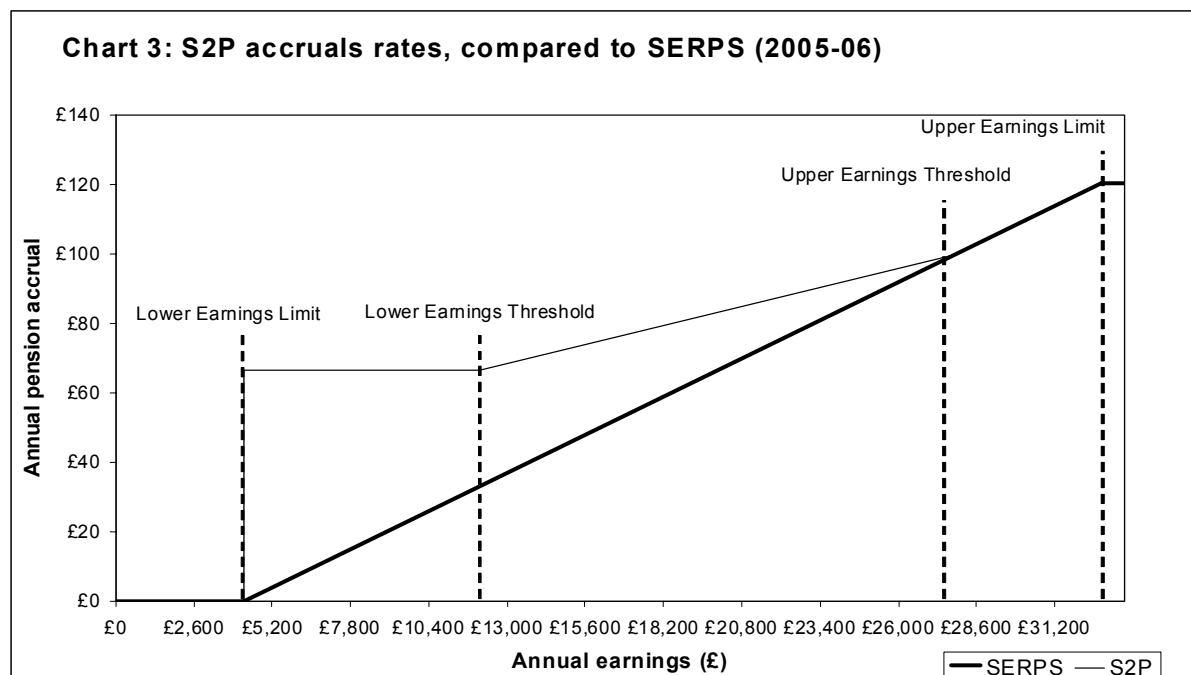
- If someone reached SPA prior to 1999 then it is divided by 20 years.
- If someone was 16 or older when SERPS was introduced, but did not reach SPA before 1999, the number of years is the number of years between 1978 and the year they reach SPA.
- If someone was younger than 16 when SERPS was introduced, the number of years is the number of years between 16 and SPA.

S2P is based on this framework, but introduces different bands of accrual between the LEL and UEL. S2P introduces two important new thresholds into the calculations, the Lower Earnings Threshold (LET) and the Upper Earnings Threshold (UET), as illustrated in Chart 3.

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<sup>157</sup> Between 1961 and 1975 the Graduated Retirement Benefit scheme was in operation. This gave benefits based on the level of National Insurance contributions an individual made but these benefits were initially fixed in cash value. It was also possible for firms to contract-out of Graduated Retirement Benefit if they offered equivalent pension benefits in their own scheme. Because the benefits from Graduated Retirement Benefit were initially fixed, during the 1970s their value was eroded by inflation. In 1978, the benefits became indexed to inflation.

Graph 26 - 3 State Second Pension accrual rates, compared to those of SERPS (2005-06)



- For earnings between the LEL and LET for the purposes of S2P employees are treated as if they are earning at the LET. The accrual rate at this point is 40 per cent.
- For earnings between the LET and the UET the accrual rate is 10 per cent to compensate for the higher accrual rate on the first band on earnings, so that higher up the earnings distribution the benefits are more equivalent to what would have been accrued under SERPS.
- For earnings between the UET and the UEL the accrual rate is 20 per cent: that is the same as SERPS.

In addition to treating individuals who have earnings below the level of the LET as if they had earnings at the LET, S2P, unlike SERPS, also gives credits to certain groups who do not have earnings. Credits mean that someone with no earnings above the LEL is treated as if they are earning at the LET. Credits are available for some groups of disabled people and carers. The effect of the changes made to SERPS accrual and the introduction of S2P means that the level of additional pension an individual receives is dependent on the year of retirement.

Employees must either be members of SERPS/S2P or they and their employers must make equivalent contributions to funded pension schemes. If they choose the contracted-out alternative, both employers and employees receive a rebate of National Insurance contributions. The level of these rebates is set by the Government Actuary's Department (GAD) with the aim of ensuring that the contracted-out pension will secure equivalent benefits, given reasonable assumptions about rates of return and the costs of investing.

The operation of contracting-out is complex. Different arrangements are in place depending to whether someone contracts-out into an occupational salary-related (i.e. Defined Benefit (DB)) scheme, an occupational "money purchase" (i.e. Defined Contribution (DC)) scheme or into an Approved Personal Pension. The rules and interactions between different parts of the system have changed many times.

#### **26.1.4 Public service pensions**

Public sector employees are offered membership of an occupational pension scheme as part of their remuneration package. Nearly all public service schemes are defined benefit. Unlike private sector schemes, which are governed by Trust, public service schemes are statutorily based with rules approved by Parliament. The benefits are effectively guaranteed either by Government or the employing local authority.

There are around 10½ million members of public service schemes in the UK. Around half are current employees or “active members”. The main public service schemes are those for civil service, health workers, teachers, armed forces, police officers, fire fighters and local government employees. There are over 200 public service schemes in total, mostly small schemes, which follow Public Civil Servants and Local Government Pension Scheme arrangements. These schemes are, except for the local government scheme, unfunded.

### **26.2 Description of Modelling Techniques and Use of Assumptions**

In the UK GAD and DWP produce the pension projections. GAD is responsible for the part of the pension projections relating to the National Insurance Fund, while DWP produces the Pension Credits and other types of benefits. In 2004 HM Treasury also commissioned GAD to produce public service pension projections. This section discusses how these projections are generated and outlines how the EPC commonly-agreed assumptions have been incorporated.<sup>158</sup>

#### **UK state pension system**

GAD estimates benefit expenditure separately for each of the contributory benefits, and separately for the basic flat-rate (BSP) and the additional (SERPS and State Second Pension) elements. In general, for flat-rate benefits, numbers are estimated from recent data on beneficiaries projected forward with allowance for awards and cessations in future years based on past experience and taking into account demographic factors. The average rate of benefit is projected based on past data and observed trends, making allowance for dependency.

Additional pensions are projected in a different way, by considering the earnings on which Class 1 contributions have been paid and applying mortality rates and revaluation factors up to pension age. At pension age, the revalued “survived” earnings are converted into pension amounts by dividing by the relevant accrual rates and this pension is run off in retirement in the normal way, allowing for the award of survivors’ benefits. For retirement pension and bereavement benefits, adjustments are applied to align the estimates for recent years with statistical data.

#### **26.2.1 Basic retirement pension**

GAD supplied estimates for the basic retirement pension to DWP on the basis of the 2003-based national population projections. DWP scaled these projections by the change in numbers over pension age between the Eurostat EPC AWG variant projections and the 2003-based national population projections. Although this method is approximate in that the basic retirement pension model is not “run” with the appropriate population projection, past experience has shown that changes in estimates for RP basic stemming from changes in numbers in the population over pension age can be approximated to a simple scaling by the population numbers with a high degree of accuracy.<sup>159</sup>

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<sup>158</sup> With the exception of the differences in assumptions, the national projections are generated in the same way as the projections for the AWG.

<sup>159</sup> An additional adjustment is made to allow for retirement pensions paid to non-residents. It is assumed that, reflecting recent trends, the percentage of the number of all new retirement pensions that are paid to non-residents will rise from around 8½ per cent at present to around 11 per cent by 2020 before stabilising at that level, with the average pension paid to overseas residents around half of that paid to those in Great Britain.

This approach implicitly assumes that the basic retirement pension is not affected significantly by changes to labour market participation and that the only factors that can influence the numbers and costs are numbers over pension age in the population.

To project the basic retirement pension on the basis of the 2003-based national population projections, the estimated expenditure was obtained by multiplying the projected number of recipients by the estimated average amounts of basic retirement pension. In doing this, the first stage is to calculate the future cost in respect of those already retired (allowing for future deaths), who are in receipt of known amounts of pension. Average amounts are assumed to remain constant for each cohort, with allowance for higher rates payable to those who deferred receiving their pension and on award of widows' retirement pensions when a married male pensioner dies. To this estimate is then added the cost of pensions to future new awards based on the projections of the numbers of pensioners and the estimated average amounts at award for future cohorts of pensioners.

For men resident in Great Britain, it has been assumed that 99 per cent of those in the population reaching age 65 in each future year will be eligible for retirement pension, including those who defer their pension beyond pension age. For men retiring now, excluding deferrers, the mean rate of pension is 97.3 per cent of the standard Category A pension. This percentage is assumed to fall slowly, reaching 96½ per cent in 2020 and stabilising at this level. This reduction reflects a continuation of past trends, which, in turn, reflects the fact that the advantageous effects of crediting entitlement prior to 1948 and in respect of contributions paid up to 1975 are becoming steadily less important.

The position is more complicated for women since it is necessary to make allowance for changes resulting from the increasing number of women who are economically active, the introduction of Home Responsibilities Protection and the phasing out of the married women's reduced rate contribution option.<sup>160</sup> The result of this will be that increasing proportions of women will be entitled to retirement pension on their own contribution record rather than relying solely on that of their husband, and the average rate of pension will increase. As a result, increasing proportions of women are becoming eligible for some retirement pension based on their own contributions when they reach pension age (rather than having to wait until their husband retires).

In spite of the projected increase in the proportion of women who are entitled to basic pensions on their own contribution records, the number of male pensioners increases at a faster rate than for women. This is due chiefly to the increase in pension age for women, which is being phased in between 2010 and 2020.

Graduated Retirement pension, which ceased for accruals in 1975, is modelled in a similar fashion to Additional pension (see below). Graduated Retirement pension is a significant element of pension expenditure.

## **26.2.2 Pensions Credit**

In order to model Pension Credit, the incomes of each individual on the Family Resources Survey are uprated to a given year, say 2050. Incomes are uprated using an index produced by a dynamic microsimulation model, which takes into account both state and private pensions and savings. These individuals are then fed through a static microsimulation model, which calculates benefit receipt and tax liabilities for each individual. Lastly, aggregate expenditure is calculated and adjustments for take-up and demographic growth are made. This calculation is repeated for 10-year intervals.

For the purposes of the EPC AWG projection exercise, the commonly-agreed assumptions were used and the domestic projections were adjusted to take account of the differences between Eurostat and national population projections.

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<sup>160</sup> Only married women who were paying the reduced rate of contributions in 1977 retained the right, under certain conditions, to continue to pay such contributions.

### 26.2.3

### Additional pension (SERPS and State Second Pension (S2P))

Additional pension comprises SERPS, which accrued from 1978 to 2002, and the State Second Pension that has accrued since April 2002. Employees who are members of a contracted-out pension arrangement forgo all or part of their additional pension, which is deemed to be replaced by the pension from the contracted-out pension scheme. In order to quantify clearly the effects of contracting out, the projections have first been carried out assuming no employees are contracted-out. A deduction is then applied (“the contracted-out deduction”, COD<sup>161</sup>) in respect of employees who are assumed to be contracted-out and this represents the part of the additional pension to which they are not entitled as a result of being contracted-out.

The additional pension at award is generally calculated by first “surviving” the revalued earnings factors for each year with modified population mortality rates. For past years, the revalued earnings factors are based on actual earnings data and for future years the earnings factors are consistent with the earnings used in projecting Class 1 contribution income. Allowance is also made for accruals of credited earnings from 2002-03 onwards. The total additional pension at award in each future financial year is then calculated by multiplying the total revalued earnings factors by the relevant accrual rates. The projected expenditure in each future year from these amounts of new awards is then derived each year by allowing for mortality and survivors’ benefits, taking account of inheritance provisions.

As stated above, the method adopted in projecting expenditure on additional pension is first to project the “gross” entitlement to additional pension, i.e. assuming that no one is contracted-out, and then to apply a “contracted-out deduction” (COD) which represents the additional pension employees do not earn as a result of being contracted-out. The CODs is calculated in a similar manner to the estimates for additional pension described above, based on the earnings factors for the contracted-out population.

As discussed earlier, estimates for additional pensions depend on earnings factors generated by the National Insurance Contribution (NIC) model. As such they are affected by the underlying earnings (productivity growth) assumptions. Box 1 presents more details on the NICs and how they have been projected for the purposes of the EPC projection exercise.<sup>162</sup>

#### **Box 1: NATIONAL INSURANCE CONTRIBUTIONS (NICs)**

Among the input needed for the NIC model are:

- Population projections
- Age-specific assumptions on employment and labour-market participation
- Assumptions on prices and earnings.

For the EPC baseline projections and variants the relevant Eurostat population projections and EPC assumptions on employment rates and real earnings growth (productivity growth) are used. The 2005 Budget long-term assumptions are used for prices.

All other assumptions (e.g. on contracting out, earnings distributions, etc) are the same as used for the 2005 Budget and/or the update of the Quinquennial Review.<sup>a</sup>

For the variants all assumptions other than those provided for EPC variants were the same as for the baseline.

<sup>a</sup> Government Actuary’s Department, *Update of the Quinquennial Review of the National Insurance Fund*, 2005.

<sup>161</sup> Strictly under legislation the COD only exists in respect of SERPS accruals up to April 1997. However, a notional COD has been assessed for post 1997 additional pension accruals in order to show explicitly the impact of contracting out. This approach does not have any effect on the net expenditure on additional pensions.



The EPC assumptions used for the NIC model feed directly into the model used to generate the additional pensions (SERPS/S2P) projections. For each of the EPC variants the appropriate EPC assumption was used. All other assumptions were the same as for the EPC baseline projections. The projections also require input for:

- mortality rates;
- assumptions on prices and earnings; and
- assumptions for S2P “Credits”

The mortality rates used were derived from the Eurostat population projections. For real earnings growth (productivity growth) the EPC commonly-agreed assumptions were taken, while the long-term assumptions for prices are in line with those used for the 2005 Budget.

For S2P “Credits” assumptions on numbers with children, Carers and long-term sick are needed. For all of the projections the Eurostat population projections and EPC commonly-agreed labour participation rates were used to produce estimates for S2P “credits”, consistent with those used in the NIC model. Other assumptions used (for example for marital status, inheritance, mortality rate loading, etc) were the same as used for the latest national projections.

#### **26.2.4 Public service pensions**

Since 2004 GAD has produced long-term public service projections for HM Treasury. These projections cover the three largest unfunded schemes: National Health Service (NHSPS), Public Civil Servants (PCSPS) and Teachers (TPS). A “one-size-fits-all” approach to the projection assumptions is used for all three schemes. These three schemes account for 70 per cent of total unfunded public service pensions past service liabilities. To derive aggregate projections, the projections for the three schemes are scaled up by a constant factor of  $y$ .

Projecting public service pensions requires a number of assumptions, independent whether they are produced for national purposes or for the purposes of the EPC exercise. These assumptions include, *inter alia*:

- Pensioner mortality
- Progression of pensionable pay
- Turnover rates
- Age retirements
- Ill-health retirements
- New entrants
- Employment

The **pensioner mortality rates** were based on the 2003-based GAD population projections with allowance for working population generally has lighter mortality than general population. At the time of preparing the national projections, the 2004-based GAD population projections were not yet published.

Assumed **salary progression** (progression of pensionable pay), over and above general salary inflation, is based on the experience of administrative staff within NHSPS and PCSPS. It is assumed that promotional salary increases are steeper at younger ages. Males can expect an average increase of 4 per cent per year in excess of general earnings increases from age 20 to age 40, and 0.7 per cent per year from age 40 to age 60. The corresponding increases for females are 3 per cent per year from age 20 to age 40 and 0.4 per cent per year from age 40 to age 60.

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<sup>162</sup> As stated earlier, the general approach is the same as for national projections, the differences between the EPC AWG and national projections arises from the use of different assumptions.

Assumed **turnover rates** are age and gender specific based on the recent experience of administrative staff within NHSPS and PCSPS. For example, 10.4 per cent of males and 11.5 per cent of females aged 25 are likely to withdraw in the following year. This compared to 0.2 per cent and 0.8 per cent for males and females at age 55 respectively. No allowance was made for deferred members to take transfer value elsewhere and extinguish their liabilities with the public service schemes.

The underlying assumptions regarding **age retirement** are that just under a third of males aged 60 in public service employment go into retirement the following year, while the fraction for females is 40 per cent (other fraction apply for other older age groups). The average retirement age for males is 62.1 years and for females 61½ years.

Public service pension schemes currently pay enhanced benefits on ill-health retirement. The assumed **ill-health retirement** rates increase with age and gender specific (but converge towards older ages). At age 25, the assumed retirements are closed to negligible while at age 55, the assumed number of ill-health retirements per 10,000 members is 120 for males and females respectively.

The **new entrant** profiles are important to calculate wage bills and wage progressions. In general terms, younger new entrants replace older, retiring scheme members. With the former on lower salaries than the latter, everything else equal, this will put downward pressure on overall wage-bill growth. GAD uses age and gender-specific tables for the three main schemes, which provide information on the proportion joining at a specific age and their starting salary.

For the public service pension projections it is assumed that the number of scheme members remains constant beyond 2008. This implies that, as total **employment** in the economy changes over time, the share of public service employment in total employment varies too. This is in line with the interpretation of “current policy” in the UK.

For the purposes of the EPC exercise, the existing national projections were modified to incorporate the different productivity growth assumptions. All other assumptions are left unchanged.

It has been assumed that the total paybill of each of the three modelled schemes will go up in line with the EPC productivity growth assumptions, taking account of expansion or contraction in the size of workforce. Due to the different membership characteristics, this implies variable earnings growth rates for each scheme.

## 26.2.5 Overview of contributions

### Classes of contributions to the National Insurance Fund

For the purpose of assessing contribution liability, the population of Great Britain over school-leaving age and under pension age is divided into three main categories:

- employed persons, i.e. all persons gainfully occupied under a contract of service or as an office-holder, and certain other persons;
- self-employed persons; and
- other persons, not employed or with low earnings.

Employed and self-employed persons whose earnings are above specified minima are required to contribute to the National Insurance Fund (NIF). Those with earnings below these minima and non-employed persons may do so if they wish. [Table 26 - 1](#) summarises the existing structure.

**Table 26 - 1 Contribution structure to National Insurance Fund**

Class 1	Earnings related contributions paid by employees and employers. Employees with earnings above the Lower Earning Limit are covered for all National Insurance benefits.  Lower rates of contributions are paid by those contracted out. This gives no title to Additional pension.  Reduced Rate contributions may be paid by married women (abolished in 1977, but some are still paying). These give no title to any benefits.
Class 2	Flat rate weekly contributions paid by self employed. Gives entitlement to National Insurance benefits, but not Additional Pension or JSA.
Class 3	Voluntary flat rate weekly contributions. Can be paid by non-employed, overseas residents, and others who can “make up” a deficient year to a full year. Gives title to Basic Retirement pension and Bereavement benefits only.
Class 4	Earnings related contributions paid by self employed on profits above the Lower Profits Limit. Gives no title to benefits.
Credits	People claiming certain benefits are “credited” with contributions. Those with caring responsibility may also be covered by Home Responsibilities Protection.

### **26.2.6 Contribution projections**

Estimates of future contribution income are derived separately for each contribution class. Actual known receipts in recent years are used to adjust modelled estimates for future years. For the main contribution classes, the estimated contribution income is obtained by projecting the number of contributors in each class, allowing for demographic and other changes, and by applying this to a distribution of earnings on which contributions are based in the class. These projections are carried out by age and sex.

The projected future numbers of contributors is generally obtained in three stages. First, estimates of the future numbers economically active is obtained by applying activity rates, varying according to age and sex, to the future numbers in the population projection. Second, the resulting numbers economically active is broken down into employees, the self-employed, and the unemployed. Finally, employees and the self-employed are sub-divided according to whether or not they were liable to pay contributions.

For the purposes of the EPC AWG budgetary projection exercise, the commonly-agreed assumptions regarding future employment trends have been taken.

In order to derive the numbers of contributors from the numbers employed and self-employed it is necessary to exclude those who, although classed as active, will not be paying contributions. In the main, these are employed people with earnings below the Primary Threshold (who are mainly part-time workers) and the self-employed with earnings below a certain level. The numbers of contributors are those who pay contributions in a typical week. They are therefore lower than the numbers who pay at any time in the financial year, as that would include all those who only pay contributions for part of the year. The self-employed persons account for about 11 per cent of contributors.

## LIST OF GRAPHS

Graph 3 - 1	Maltese system interdependencies	51
Graph 3 - 2	Number of pensioners from the wage earner scheme by category of pension	58
Graph 3 - 3	Benefit ratio in the wage earner scheme	59
Graph 4 - 1	Retirement age by the year of birth	70
Graph 4 - 2	Simplified diagram of the model structure	73
Graph 4 - 3	Cross-sectional profiles of old-age pensions	76
Graph 4 - 4	Cross-sectional profiles of full disability pensions	76
Graph 4 - 5	Cross-sectional profiles of partial disability pensions	76
Graph 4 - 6	Cross-sectional profiles of widower's/widow's pensions	77
Graph 4 - 7	Number of pensions: old-age and widow's pensions	77
Graph 4 - 8	Number of pensions: full and partial disability pensions	77
Graph 4 - 9	Total spending disaggregated by type of benefits	80
Graph 4 - 10	Ratio of average pension to average wage – old-age pensions	80
Graph 4 - 11	Ratio of average pension to average wage -	80
Graph 4 - 12	Ratio of average pension to average wage	80
Graph 5 - 1	Assets and revenue from private sector pensions	91
Graph 6 - 1	The demographic pension model	100
Graph 6 - 2	The financial pension model	102
Graph 7 - 1	The structure of the pension model	109
Graph 8 - 1	Annual growth rates of GDP and GDP per capita, 2004-2050	120
Graph 8 - 2	Total pension expenditure as % of GDP	121
Graph 8 - 3	Decomposition of the increase in total pension expenditure	122
Graph 9 - 1	Demographic and financial projections of the pension schemes	136
Graph 9 - 2	Decomposition of pension spending projections (basis 100 in 2003)	137
Graph 9 - 3	Additional funding (+) and then, withdrawals (-), in Bn€ 2004	141
Graph 9 - 4	Additional funding (+) and then, withdrawals (-), as a share of GDP	141
Graph 10 - 1	Pension expenditure projections (% of GDP)	154
Graph 11 - 1	The structure of the pension model	170
Graph 11 - 2	Pension expenditure as a share of GDP and its decomposition:	182
Graph 11 - 3	Ratio of the number of pensions to people of 65 and over and its decomposition	183
Graph 11 - 4	Comparison between the EPC-AWG 2001 and 2005 baseline projections: pension expenditure and GDP, employment and productivity growth rates	183
Graph 11 - 5	Pension expenditure as a share of GDP and its decomposition;	184
Graph 11 - 6	Pension expenditure as a share of GDP and its decomposition;	185
Graph 13 - 1	Contribution rate to the state funded pension scheme	209
Graph 13 - 2	Real growth of GDP and total pension expenditure	214
Graph 13 - 3	Number of pensioners and contributors (in 1000)	214

Graph 19 - 1	Projection of the old-age dependency ratio in Austria	262
Graph 19 - 2	Projection of labour force and employment developments	263
Graph 19 - 3	Driving factors of future GDP growth	264
Graph 19 - 4	Public pension expenditure 2004-2050	265
Graph 19 - 5	Number of pensions by age cohorts, in 1000	266
Graph 19 - 6	Total pension deficits, % of GDP	268
Graph 19 - 7	Sensitivity scenarios	269
Graph 20 - 1	Contributors to different pension schemes in 2004	270
Graph 20 - 2	Beneficiaries in different pension schemes in 2004	270
Graph 20 - 3	The structure of the General Pension System	273
Graph 20 - 4	Differences in 2030 between the population projections of Eurostat and the Polish Central Statistical Office	275
Graph 20 - 5	Evolution of the old-age dependency ratio	276
Graph 20 - 6	Comparison of the economic activity rates in 2004 and 2050	278
Graph 20 - 7	Total expenditures on pensions with and without funded pension system	280
Graph 20 - 8	Pension expenditure by schemes	281
Graph 20 - 9	The projected evolution of the pension system deficit/surplus	281
Graph 20 - 10	Sensitivity tests on total pension expenditure	284
Graph 21 - 1	Portuguese Pension System	287
Graph 21 - 2	Projections of CGA expenditure, % of GDP	294
Graph 21 - 3	Projections of CGA pension expenditure, retirement pensions only, % of GDP	294
Graph 21 - 4	Projections of CGA pension expenditure, survivors pensions only, % of GDP	294
Graph 21 - 5	Projection of the number of all CGA pensioners, in 1000	295
Graph 21 - 6	Projection of the number of CGA contributors (closed scheme), in 1000	295
Graph 21 - 7	Projections of the CGA account, baseline scenario, % of GDP	295
Graph 21 - 8	Social security pensions – AWG baseline scenario, % of GDP	300
Graph 21 - 9	Social security pensioners – AWG baseline scenario	301
Graph 21 - 10	Total Pension Expenditure, baseline projection, % of GDP	304
Graph 22 - 1	Pension system in Slovenia	305
Graph 22 - 2	Retirement age and qualifying periods for women	307
Graph 22 - 3	Reduction effects for total accrual rates	308
Graph 22 - 4	Equalization of old and new pensions	308
Graph 22 - 5	Numbers of pensioners and contributors in two scenarios	311
Graph 22 - 6	Decomposition of the difference between the two projections of contributors	311
Graph 22 - 7	Participation rates in 2004, baseline and full employment scenarios	312
Graph 22 - 8	The Slovenian overlapping generations model	312
Graph 22 - 9	Projected evolution of demographics and GDP	313
Graph 23 - 1	Public pension expenditure in the baseline and sensitivity scenarios	328
Graph 24 - 1	States of the model and transfers between states, excluding survivors' pensions	337

Graph 25 - 1 Structure of the SESIM model	349
Graph 25 - 2 Dependency ratios	352
Graph 25 - 3 Pension expenditures as a share of GDP 2004-2050	353
Graph 26 - 1 Guarantee component of the pension credit	363
Graph 26 - 2 Guarantee and savings credit components of the pension credit	363
Graph 26 - 3 State Second Pension accrual rates, compared to those of SERPS (2005-06)	365

## LIST OF TABLES

Table 2 - 1	Contribution rates according to their benefit coverage in 2005	16
Table 2 - 2	Old-age pension benefit formulation in the social security (public) pension schemes in Member States in 2005 and according to reforms enacted by mid-2005	18
Table 2 - 3	Main early and deferred retirement schemes in Member States in 2005 and according to reforms enacted by mid-2005	25
Table 2 - 4	Indexation regimes of the pension schemes in 2005 and according to reforms enacted by mid-2005	29
Table 2 - 5	Taxation regimes of the pension schemes in 2005	31
Table 2 - 6	Contribution rates of public pension schemes in 2005	32
Table 2 - 7	Pension expenditure projection models in the Member States	36
Table 3 - 1	Social policy hypotheses	53
Table 3 - 2	Sources of the pensions data (beneficiaries and expenses)	54
Table 3 - 3	Pension expenditure in % of GDP	55
Table 3 - 4	Explanatory factors of pension expenditure in average annual growth rates - computed by the AWG	56
Table 3 - 5	Population aged 55 and older and number of pensioners by scheme or by age group (in thousands)	57
Table 3 - 6	Coverage rate by scheme or by age group	57
Table 3 - 7	The budgetary cost of ageing in percent of GDP	60
Table 3 - 8	Effect on pensions in percent of GDP, between 2004 and 2050, by sensitivity test and by pension type	61
Table 3 - 9	Effect on pension expenditures in percent of GDP for all sensitivity tests, in selected subperiods	61
Table 3 - 10	Maltese model: sources of data of the whole socio-economic projection	62
Table 5 - 1	The pillars in the Danish pension system and the pension schemes	83
Table 5 - 2	Average effective retirement age from the labour market in 2004	89
Table 5 - 3	Public expenditure on social security pensions in the AWG baseline projection	93
Table 5 - 4	Comparing the 2001 and 2005 projections of public expenditure on pensions	93
Table 5 - 5	Public expenditures to social security pensions in sensitivity scenarios	94
Table 8 - 1	The public pension expenditure by type of pension benefit	115
Table 8 - 2	Public pension expenditure by schemes in 2004	116
Table 8 - 3	Public pension expenditure by models	116
Table 8 - 4	Total pension expenditure in percent of GDP	120
Table 8 - 5	Decomposition of the increase in old-age pension expenditure between 2004 and 2050, in percentage points of GDP	122
Table 8 - 6	Sensitivity test results	124
Table 8 - 7	The impact of key variable changes on pension expenditure, percentage point difference of GDP in 2050 relative to the baseline scenario	124
Table 8 - 8	Total pension expenditure as a share of GDP in the 2001 and 2005 projections	125
Table 9 - 1	Comparison of the assumptions of the COR and the AWG	134
Table 9 - 2	AWG and COR assumptions of participation of the elderly	135
Table 9 - 3	Financial balance of the pension schemes	137
Table 9 - 4	Additional funding (+) and then, withdrawals (-), in amounts term	139

Table 9 - 5	FRR assets at the end of the year, in amounts term	140
Table 9 - 6	Additional funding (+) and then, withdrawals (-), as a share of GDP	140
Table 9 - 7	FRR assets at the end of the year, as a share of GDP	140
Table 10 - 1	Social security pension schemes	146
Table 10 - 2	Demographic assumptions	148
Table 10 - 3	Macroeconomic assumptions	149
Table 10 - 4	Description of coverage and specification of schemes <sup>1</sup>	150
Table 10 - 5	Pension projection results (% of GDP)	153
Table 10 - 6	Higher life expectancy projection results	155
Table 10 - 7	Higher employment rate projection results	155
Table 10 - 8	Higher older employment rate projection results	156
Table 10 - 9	Higher / lower productivity projection results	156
Table 10 - 10	Higher / lower interest rate projection results	157
Table 11 - 1	Calculation method	166
Table 11 - 2	Eligibility requirements	167
Table 11 - 3	Public pension expenditure, as % of GDP, according to Eurostat and National statistics	169
Table 11 - 4	The 2005 EPC-AWG projections: Break-down of pension expenditure relative to GDP under different scenario assumptions	190
Table 12 - 1	Pension expenditure as a percentage points of GDP	199
Table 12 - 2	Estimated results of reforms of the social insurance scheme in Cyprus	200
Table 13 - 1	Changes in the retirement ages in Latvia	202
Table 13 - 2	Total pension expenditures (gross) as a share of GDP	213
Table 14 - 1	Number of pensioners and the average pension by type of pension in 2004	219
Table 16 - 1	Demographic assumptions in the Hungarian projection	233
Table 16 - 2	Macroeconomic assumptions	234
Table 16 - 3	Public pension schemes covered in the projections	234
Table 16 - 4	Pension expenditure and contribution revenues in the baseline projection, % of GDP	237
Table 16 - 5	Factors driving net public pension expenditure	238
Table 16 - 6	Evolution of the benefit ratio (average net benefit/average nationwide wage), %	238
Table 18 - 1	Gross pension payments and income tax revenues from pensions, % of GDP	249
Table 18 - 2	Survey of Dutch pension funds	250
Table 18 - 3	Gross old age pensions and tax revenues from pensions, % of GDP	256
Table 18 - 4	Disability and survivors benefits, % of GDP	257
Table 20 - 1	Macroeconomic assumptions	276
Table 20 - 2	The contribution of decomposed factors to the change (in percentage points) in all public pension expenditure relative to GDP	282
Table 21 - 1	Macroeconomic assumptions of the baseline scenario (growth rates in %)	290
Table 21 - 2	Expenditure on CGA pensions, % of GDP	292
Table 21 - 3	Long-term Projections of the CGA account, baseline scenario, % of GDP	293



Table 21 - 4	Number of CGA retirees and pensioners (2005 = 1.00)	293
Table 21 - 5	Social security data on pensions, 2004	299
Table 21 - 6	Social security balance sheet in 2004	300
Table 21 - 7	Social security projections - AWG baseline scenario, % of GDP	301
Table 21 - 8	Baseline and sensitivity scenarios: social security pension expenditure and contributions (private sector), % of GDP	302
Table 21 - 9	Sensitivity scenarios: Differences from the baseline projection (for the private sector), in percentage points of GDP	303
Table 21 - 10	Total Pension Expenditure, baseline projection, as % of GDP	303
Table 22 - 1	Pension expenditure according to different demographic assumptions	310
Table 22 - 2	Pension funds, taking account of parameters of the Pension and Disability Insurance Act	315
Table 22 - 3	Pension funds, taking account of the increase in employment	315
Table 22 - 4	Contribution of factors to the change in pensions as % of GDP (100% indexation)	316
Table 22 - 5	Contribution of factors to the change in pensions as % of GDP with an increase in employment (100% indexation)	316
Table 22 - 6	Target rates of the socio-economic status of the population in comparison with 2004, in % of the age group, men	317
Table 22 - 7	Target rates of the socio-economic status of the population in comparison with 2004, in % of the age group, women	318
Table 23 - 1	Three pillars of the Slovak pension system	319
Table 23 - 2	Pension brackets and cumulative distributions of pensioners in these brackets in 2000	320
Table 23 - 3	Social security contributions, % of gross wages	321
Table 23 - 4	Switching pattern to contribute to the funded scheme (both men and women)	327
Table 23 - 5	Pension expenditure projection in the AWG baseline scenario, % of GDP	328
Table 23 - 6	Architecture of the new pension system	329
Table 24 - 1	Social security pensions in 2004, Eur million	331
Table 24 - 2	Accrual rates as % of earnings according to the insured person's age	333
Table 24 - 3	The change in the expected effective retirement age for employees	339
Table 24 - 4	Growth of GDP 2000 - 2050 decomposed to employment and productivity growth,	341
Table 24 - 5	Total expenditure on pensions and the coverage of the projections,	343
Table 25 - 1	Macroeconomic assumptions, baseline scenario	352
Table 25 - 2	Comparison of public pension expenditure as a share of GDP with different definitions and the AWG 2001 projections	354
Table 25 - 3	Explaining factors behind the development of old age pension expenditure	355
Table 25 - 4	Old age pension expenditure as a share of GDP	357
Table 26 - 1	Contribution structure to National Insurance Fund	371