

**UPDATES OF CURRENT AND PROSPECTIVE
THEORETICAL PENSION REPLACEMENT RATES
2006-2046**

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INTRODUCTION

The Indicator Sub-Group (ISG) of the Social Protection Committee (SPC) has defined a set of common adequacy indicators within the realm of the Open Method of Coordination in order to monitor the progress towards the agreed streamlined objectives in the field of pensions. Most of the indicators for pension adequacy are based on household income data, which generally also comprises other sources of income than from pensions, through own entitlement or through sharing of resources with other household members. These indicators allow only for an assessment of the current conditions and situation of pensioners and pension schemes. Since pensions are a long term undertaking, where the pension promise can stretch over the time span of several generations, the ISG has, therefore, also defined a measure to complement these indicators and study both the current and future adequacy of this pension promise.

Theoretical replacement rates provide the possibility to look at individual case studies and evaluate to what extent current and future pension systems ensure that the elderly have the resources to support adequate standards of living. Theoretical replacement rates measure the extent to which pension systems enable typical workers to preserve their previous living standard when moving from employment to retirement. The indicator developed by the ISG assesses how changes in pension rules can affect pension levels over time, especially in light of an ageing population and added pressures being exerted on pension expenditure given different career and earning profiles.

Furthermore, theoretical replacement rates provide different information than that obtained through the projection exercise of the Ageing Working Group (AWG) Economic Policy Committee. Their calculations of benefit ratios and replacement rates project future benefits using assumptions such as the increases in women's participation, whereas theoretical replacement rates allow for the possibility to study the singular effect of reformed pension rules on the adequacy of pension income.

This report presents an update of the results published earlier in the 2006 Progress Report on replacement rates¹, but now depicts the changes in replacement rates between 2006 and 2046 as opposed to 2005 and 2050 earlier. This report also shows changes in replacement rates between cases with different assumed profiles, rather than a depiction over time for a singular profile.

This report also presents new results of calculations for broken, atypical careers. Calculations showing the effects of broken careers for childcare and unemployment breaks on an individual's pension are presented and analysed for the first time within the realm of the ISG. It is an interesting development to study to what extent social protection systems not only protect the current loss of income due to care responsibilities or in the event of unemployment, but also protect future incomes in the form of pension entitlements. This is becoming increasingly important as the number of contributory years needed for a full pension is being extended in many Member States.

The calculations presented here for the current replacement ratios are carried out by Member State. The calculations for prospective replacement ratios are carried out using the APEX (Analysis of Pension Entitlements across Countries) model infrastructure of the Organisation for Economic Co-operation and Development (OECD) for all Member States except BE, IT, CY, MT and AT who have carried out the calculations in their national models. Prospective

¹ http://ec.europa.eu/employment_social/spsi/docs/social_protection/isg_repl_rates_en.pdf

net theoretical replacement rates for France are also calculated in a national model. The APEX model is a modelling tool originally developed by Axia Economics.

The ISG has made progress in further developing the concept of replacement rates especially in the field of interpreting and presenting the results. These considerations are presented in section 1 of this paper. Updates of the calculations for an agreed upon average earner profile, the so-called base case, are presented and analysed in section 2 of this paper for the period 2006-2046. The other career and income profiles (variant cases) with a comparison to the base case are analysed in section 3 of this paper. In the final section, the report aims to point out further development needs in order to meet policy requirements.

1. METHODOLOGICAL AND ANALYTICAL CONSIDERATIONS

Following the results for calculations presented in 2004, the ISG agreed on a clear framework for Member States to follow in the calculation of current and prospective replacement rates. The methodology was refined in 2005 through discussions within an ad-hoc group of the ISG. Further discussions, thereafter, have led to an agreement regarding the specific presentation and interpretation of the results, primarily for the base case scenario (for details please see section 2). The outcome was a table which displayed the change in replacement rates from the current situation to the prospective situation in conjunction with information needed to interpret these results accurately. This information includes coverage of the pension schemes included in the calculations, the nature of the scheme, contribution rates and the change in pension expenditure during the period of calculation. This presentation is used in the section on the results of the base case (section 2.2.2).

1.1. Definitions of adequacy indicators

1.1.1. Current and prospective theoretical replacement rates

Replacement rates are case study based calculations that show the level of pension income the first year after retirement as a percentage of individual earnings at the moment of take-up of pensions. In these calculations the year of retirement is 2006 making the last year of earnings 2005. However, the difference in income between these years is in real terms and adjusted for inflation.

Theoretical replacement rates are calculated for an assumed hypothetical worker, with a given earnings and career profile and a corresponding affiliation to pension schemes. Replacement rates also rely on specific assumptions on the key economic and demographic parameters that are relevant for the calculation of future earnings and benefit entitlements. The calculations are made according to a set of hypothetical cases and assumptions based on currently legislated reforms.

Current replacement rates for 2006 describe the situation of people who retire today while prospective replacement rates for 2046 describe the pension income of people retiring in the future thus also reflecting the effects of eventual pension reforms. Results for 2006 present the pension outcome under current legislation (enacted by 2006), including transitional rules to be implemented gradually that may be legislated in enacted reforms. This includes the currently legislated indexation rules for different benefits. The calculations do not reflect reforms that can have been decided since 2006. The calculations for 2046 typically reflect reformed pension systems in full maturity. In this way the calculations allow for an assessment of adequacy of pensions, taking into account changes that have been decided in many countries as a result of recent reforms.

The calculations take into consideration social security contributions to statutory and supplementary pension schemes or funds. Taxes and means-tested social benefits are included in the calculations. This makes it possible to determine the contributions of the different components of the pension system, of the tax system and of other social benefits to the pensioner's income replacement at the point of retirement.

The gross replacement rate is defined according to the pre-taxed income (after employer contributions, but including employee contributions). The net replacement rates show how different tax treatment of income from work and pension income are taken into account while evaluating income replacement provided by pension provision. The net replacement rate is calculated as net of income taxes and employee contributions.

1.1.2. Other comparative measures of adequacy

It is important to note the difference between Theoretical replacement rates and other comparative measures of pension adequacy.

Aggregate replacement ratios are often used as an indicator of current adequacy. It is defined as the ratio of median personal (non-equivalised) income from pensions of persons aged 65-74 relative to median personal (non-equivalised) income from earnings of persons aged 50-59.

In the projection exercise of the AWG, calculations of the *Benefit ratio* and *Gross average replacement rates* are carried out. These calculations have currently been carried out only on a voluntary basis and do not cover all EU member States. The definition of the replacement ratio and the benefit ratio differ from that of the theoretical replacement rates.

The *Benefit ratio* is defined as the gross average pension benefit as a share of the economy-wide gross average wage and includes statutory pensions including old-age and early pensions and other pensions, which cover survivor's, and disability pensions. Private pensions, statutory or occupational, are not included.

The *Gross average replacement rate* in the AWG exercise depicts the average first pension as a share of the economy-wide average wage and includes pensions from only statutory schemes including old-age and early pensions, which cover survivor's and disability pensions. Private pensions, statutory or occupational, are not included.

The latter two calculations are carried out on an aggregate level rather than an individual level. This means that in case of AWG exercise average rates for all insurance schemes are shown. In case of theoretical replacement rates by the ISG, the most general schemes for private sector employees are used in the calculations. This can present differences with regards to retirement ages. For example if the retirement age for men and women in a Member State differs, the ISG calculations show result typically for a male, while the AWG calculations show results for an economy-wide average.

The AWG calculations also tend to assume labour market or other macroeconomic changes during the projection period. In contrast, the theoretical replacement rate calculations assume a constant steady state of these assumptions, thus isolating the effects of the pension legislations on an individual's pension.

1.2. Interpretation of the results

In order to enable a correct interpretation of the results and reflect on the sustainability and adequacy of pensions simultaneously, considering the link between the evolution of theoretical replacement rates and the evolution of pension expenditure is important. This illustrates how pension promises can involve a heavy future cost in light of an ageing society, in particular, if labour market patterns remain constant. In other words, any country with an

ageing population will show either a decreasing replacement rate in defined contribution schemes or rising contributions in defined benefit schemes – given a fixed age of retirement and schemes remaining financially balanced.

It is essential to present the projected evolution of adequacy and sustainability together and these evaluations should, as far as possible, be based on a common set of macroeconomic assumptions. The projections of theoretical replacement rates presented here and the recent projections of pension expenditures by the AWG rely on the same set of macroeconomic assumptions for, for example, wage and demographic developments.

However, it can be noted that even though assumptions are common, the results are not necessarily strictly comparable (please also see section 1.1.2). The projections of theoretical replacement rates generally rely on a less extensive set of macroeconomic assumptions than the AWG projections of pension expenditure from statutory schemes. This is a result of that theoretical replacement rates generally do not rely on an evolution of the number of pensioners and consequently on changing employment rates for workers, including older workers and women.

The pension expenditure projections of the AWG used in this exercise (please refer to table 6) include the expenditure for old age pensions from statutory schemes including early retirement schemes and statutory mandatory private schemes². Occupational and supplementary pension have been excluded here. It should also be noted that the change in pension expenditure reflects the period 2007-2045 instead of the period 2006-2046 as in the change in theoretical replacement rates in this exercise.

In order to make the calculations more transparent and useful for policy making, the replacement rates are clearly broken down into individual components of statutory and complementary provision. The costs of these pensions on an individual basis in terms of contribution rates to the pension system are also shown.

1.3. Comparability of the results

In order not to misinterpret the results it is vital to consider theoretical replacement rates with the associated information on representativeness and the assumptions, as they are calculated for a hypothetical worker. The choice of specific common assumptions about the hypothetical worker used for the calculation, such as the age of retirement and the length of the contributory period before retirement, inevitably imply that only a share of individuals are actually represented by this career scenario.

The base case, for example, is chosen in order to reflect as closely as possible current actual situations and institutional frameworks. However, the base case may not necessarily be representative of some workers, when they reach retirement age. Given the diversity of situations, theoretical replacement rates need to be analysed in the light of background information aimed at showing in particular how "representative" the hypothetical worker is in a specific Member State.

Context information aims at showing how representative the hypothetical worker is given the different situation in Member States. This also makes it easier to establish how similar the theoretical case is to typical real-life situations. In particular, this requires information on the

² For more information please refer to the 2009 Ageing Report
http://ec.europa.eu/economy_finance/publications/publication14992_en.pdf

average actual career length, the retirement age, the coverage/membership and the contribution rates to each scheme considered in the base case.

Comparability between Member States of current and projected replacement rates depends on the degree to which the commonly defined individual case is representative in different Member States. This varies considerably across Member States, impairing the direct comparability of the results based on actual replacement rate levels. Therefore, the results focus on differences in theoretical replacement rates over time or between different profiles, rather than on levels.

Comparability of gross replacement rates also depends on the way in which pension contributions are shared between employers and employees. For a given total labour cost, a higher share of contributions paid by the employer implies lower gross earnings of the employee and hence a higher gross replacement rate. This is one of the reasons why information on gross replacement rates is also systematically complemented by net replacement rates.

2. CURRENT AND PROSPECTIVE THEORETICAL REPLACEMENT RATES – BASE CASE

A common specification of the base case assumption is used for the calculations of all the Member States. The results calculated for the base case can be correctly interpreted only once the representativeness of the base case assumptions in each individual Member State is established and when the specifics of the pension system are put into context regarding the sustainability of the given pension promise.

The statistical information showing the representativeness of the base case often depicts the current situation, whereas the information describing the sustainability of the pension system often tends to be based on projections. The base case is often used as a point of comparison when studying variant cases or if doing sensitivity analyses with replacement rates.

2.1. Specification and representativeness of the base case

2.1.1. Professional and personal status

The base case individual is assumed to be covered by the most general schemes for private sector employees. This can include statutory pension schemes and private occupational schemes for which the assumptions of the work sector are necessary if there are different schemes for different professions or sectors.

The base case worker is assumed to be a single male that works full-time. This has, of course, certain implications for the representativeness of the results for the female part of the population, who often tend to have more atypical careers, lower earnings and can have other legislative restrictions, such as a lower retirement age than men.

2.1.2. Career length

The main assumption for the career length (so-called seniority) of the base case is 40 years where it is assumed that workers in all countries enter the labour market at age 25 and retire at 65. The replacement rate results are sensitive to the career-length assumption. For example, if the number of years needed for a full pension is lower in a Member State than the forty years assumed working longer or taking a career break or working for less than forty years may not affect the results as the criterion for a full pension will already have been reached (e.g. CY, EL, MT (for 2006 only)).

For those Member States that have a higher retirement age than the assumed age of 65 (e.g. DK, DE, UK) or higher seniority requirements for a full pension (e.g. BE), the results may be lower than if the assumption was higher and the vice versa applies for those Member States with a lower legislated retirement age. In BE, for example, 45 years of seniority is required for a full pension which has downward effect on the replacement rate calculations that are based on a career of 40 years.

The actual age of retrieving retirement benefits and the average number of contributory years (so-called seniority) are important tools for interpreting the representativeness of the results. Table 1 reports on the actual legislated pension eligibility age for all EU Member States, subdivided across men and women. Furthermore, current statistical data on the actual average age of new retirees claiming an old age pension and the average current seniority of current retirees shows the representativeness of the assumed age of retirement at 65 in the calculations.

Table 1. Standard pension eligibility age and actual retirement age subdivided across men and women in statutory pension schemes

	Actual legislated pension eligibility age				Average age at retirement of new flows of retirees retrieving a statutory pension	Seniority (including non contributory periods) at retirement of new flows of retirees total (men/women)
	Males		Females (where different from males)		Total (men/women)	Total (men/women)
	2006	2046	2006	2046	2006	2006
BE	65	65	64		NA (64/61.6)	NA (42.6/30.5)
BG	63	63	59	60	NA	NA
CZ	62	65	60*		59.3 (61.1/57.7)	42 (44.4/39.9)
DK	65	67*			62.1 (62/62.3)	27.7 (35.7/20.3)
DE	65	67			NA	NA
EE	63	63	59		60.3 (61.5/59)	43.7 (45.6/42.9)
EL	65	65	60*		60.4 (61.4/58.6)	25.1 (27.5/20.8)
ES	65	65			62.9 (62.9/63)	38 (40.3/30.4)
FR	60	60			60.2 (59.8/61.5)*	35.75 (40/31,75)*
IE	65	66			65,0	NA
IT	65	65	60	60	60.3 (60.5/60)	32.1 (34.9/27.9)
CY	65	65			63.6 (NA/NA)	32.2 (NA/NA)
LV	62	62			60.3 (61.4/58.3)	30 (30/29)
LT	63	63	60	60	60 (61.4/58.4)	35.8 (37.5/34.2)
LU	65	65			59.5 (59.3/60.1)	42.2 (42.9/38.8)
HU	62	62	61		58.5 (59.9/57.5)	38.8 (39.9/38)
MT	61	65	60		59.6 (59.9/58.2)	26.3 (29.1/23.5)
NL	65	65			65 (65/65) *	NA
AT	65	65	60		60.4 (62.7/58.9)	NA
PL	65	65	60	60	57.8 (60.5/56.4)	34.3 (36.5/33.3)
PT	65	65			63.7 (63.3/64.3)	28.5 (32.3/23.9)
RO	62	65	57	60	NA	NA
SI	63	63	61	61	63.2 (63.7/62.7)	28 (30/24)
SK	62	62	56*		57.8 (60.2/56.8)	35.8 (40.4/34.0)
FI	63	63			59.5 (59.4/59.6)	31.9 (33.3/30.6)
SE	61	61			64.7 (64.8/64.7)	37 (40/34)
UK	65	68	60		62.3 (62.7/61.9)	35 (42/26)

Source: National data

Note: The Current actual average age at retirement and seniority at retirement for new flows of retirees provide elements on the representativeness associated with the base case. This refers to the actual age at the point of take up of benefits of new flows of retirees in statutory pension schemes; the actual age of take up of benefits in other schemes is not available.

* In CZ and SK the retirement age for women decreases depending on the number of children born. In CZ 65 and 62 respectively are used in the calculations. In DK the retirement age will be 67 by 2027. Furthermore, the retirement age in DK is to be indexed to the mean life expectancy for 60-year olds with effect from 2030. For FR the figures pertain to 2004. In EL lower legislated pension eligibility ages apply for females who entered the system before 1993 only.

It is interesting to note in the table above that the statutory retirement age is usually higher than the actual average age at which an old age pension is drawn. Only a few Member States appear to currently have average ages at retirement close to 65 for both men and women retrieving a statutory pension (e.g. IE, NL, SE) (according to common practice occupational pensions may be taken earlier). Table 1 shows that, in most Member States, the current average age at retirement is closer to 60, which is a reflection of the flexibility in pension systems allowing for an earlier withdrawal of pension benefits, often with an associated reduction of the pension.

Furthermore, current levels for seniority are generally close or over 40 years in only a few Member States (e.g. CZ, EE, ES, LU, HU, SE) which adds to the overestimation of levels of theoretical replacement rates provided for the assumed base case for those countries that do not and will not fulfil the 40 year contributory period assumed in the exercise.

There are also significant differences in seniority and age of retirement between Member States and within Member States between men and women. For example, In MT only 30 years seniority is required for a full pension for persons born on or before the 31st of December 1951, although this is being extended to 40 years for younger cohorts.

If the actual current average age at retirement and seniority are lower than assumed in the calculations, then the base case calculations of theoretical replacement rates provide overestimated values of the average pension generally received unless, in practice, working lives are extended in the future.

2.1.3. Coverage

All mandatory and occupational pension schemes are included in the calculations. For each country, the main schemes for private-sector employees are modelled. Special schemes for civil servants, public-sector workers and special professional groups are excluded. It is assumed that all income during retirement comes from the pension schemes included in the calculations. Statutory pensions include classical pay-as-you-go schemes (Defined-benefit (DB) or Notional defined contribution (NDC)), and the mandatory Defined-contribution (DC) funded tier of the statutory scheme existing in some Member States (e.g. BU, EE, LT, LV, HU, PL, RO, SK and SE).

An increasing number of countries have a broad coverage of voluntary, occupational pensions, either through collective agreements or through the employer. These pensions play an increasingly important role in providing retirement incomes. Therefore, for those Member States where these pensions, that can be either of a DB or DC type, play a significant role, they are included in the base case calculations (e.g. BE, DK, DE, IE, IT, NL, SE, UK)

Resource-tested benefits for which retired people may be eligible are also modelled. These can be means-tested, where both assets and income are taken into account, purely income-tested or withdrawn only against pension income. The calculations assume that the base case individual takes up all the entitled benefits. The income test is taken as binding.

Table 2a gives a brief description of the components modelled and those excluded, Table 2b shows the details of components of the reformed pension systems covered in the calculations for each Member State for the prospective replacement rates. The components in the current replacement rates can differ in some Member States if systemic reforms have been implemented. In some of these cases, a mixture of two components may also apply depending on the extent and design of transitional rules.

Table 2a. Types of schemes included in the calculations of theoretical replacement rates

	Covered in this study	Type of scheme
Statutory schemes	Yes	Minimum pension provision – all Member States
		Means tested benefits for pensioners, such as housing
		Universal flat rate linked to residency or to social insurance contributions
	Yes	Earnings related PAYG (with or without reserve fund)
Occupational schemes	Yes	Earnings related, totally funded (by social contributions) – funded tier of general statutory schemes. Partly funded schemes.
		Mandatory for employer (sectoral or cross-sectoral) or resulting from collective agreement (which makes membership mandatory)
		Resulting from collective agreement (membership not mandatory but coverage is wide)
	No	Possibility to subscribe to pension scheme through one's employer
Individual schemes	No	Resulting from collective agreement (membership not mandatory)
		Contractual or unilateral by employer (including book reserve or group plans)
	No	Voluntary individual schemes (no employment link is necessary to become member), that can be adhered collectively (for instance through associations or Unions)
		Individual contracts with pension funds, life insurance companies or pension savings institutions that deliver annuities
No	Long term savings not specifically for pension purpose	

Table 2b. Components of the pension systems included in the calculations of prospective theoretical replacement rates (2046) for each Member State

	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6
BE	Minimum pension	Minimum credit	Earnings-related	Pension bonus	DC	
BG	Minimum pension	Earnings-related	Defined contribution			
CZ	Basic	Earnings-related				
DK	Supplement	Basic	ATP	SP	Occupational DC	
DE	Minimum	Earnings-related	Defined contribution			
EE	Basic	Earnings-related	Defined contribution			
EL	Minimum	Earnings-related	Supplement			
ES	Minimum	Earnings-related				
FR	Minimum overall	Minimum public	Public	ARRCO		
IE	Basic	Occupational				
IT	Social assistance	Notional accounts	Occupational DC			
CY	Basic	Supplementary	Minimum			
LV	Minimum	Notional accounts	Defined contribution			
LT	Basic	Earnings-related	Defined contribution			
LU	Minimum	Flat rate component	End-of-year allowance	Earnings-related		
HU	Minimum	Earnings-related	Defined contribution			
MT	Basic	Earnings-related				
NL	Basic	Occupational				
AT	Income tested	Public				
PL	Minimum	Notional accounts	Defined contribution			
PT	Minimum	Earnings-related				
RO	Points	Defined contribution				
SI	Targeted	Minimum credit	Earnings-related			
SK	Minimum	Earnings-related	Defined contribution			
FI	National	Earnings-related				
SE	Guarantee	Notional accounts	Defined contribution	Occupational DC		
UK	Guarantee credit	Savings credit	Basic	S2P Minimum	S2P	Occupational DC

Not only information on which schemes are included in the calculations is important, but also the extent to which the working population is covered by these schemes. This helps determine the representativeness of the base case. An important aspect is to reflect on the income situation of people that may not be covered by all the schemes included in the calculations.

Table 3. Coverage rate of different schemes included in the calculations (2006)³

	Coverage rate		
	Coverage of statutory pensions (% of persons enrolled in the labour force)	Active membership of occupational (or private in general) pension schemes (as % of the labour force)	Means-tested benefits (such as housing) (as % of population 65+)
BE	100	55	/
BG	NA	/	/
CZ	100	/	/
DK	100	78	/
DE	90	70	2.3
EE	100	/	/
EL	NA	/	/
ES	89	/	/
FR	100	/	/
IE	100	55	/
IT	100	20.1 (M:22.3, F:16.8)*	/
CY	100	/	/
LV	100	/	/
LT	89	/	/
LU	92	/	/
HU	100	/	0.5
MT	100	/	/
NL	100	91	/
AT	100	/	/
PL	77	/	/
PT	81	/	/
RO	NA	/	/
SI	100	/	/
SK	100	/	/
FI	100	/	10,5
SE	100	90	/
UK	100	53 (M)/56(F)	/

Source: National data

*Figures as of June 2008

It can be noted in the first column of table 3 that the coverage of first pillar schemes is generally quite high covering close to 90 percent of the labour force or more, reflecting universality of access to these schemes. However, this is not necessarily the case for second pillar schemes, where current estimates of coverage range from 20% in IT to close to 90% in SE and NL. This should be borne in mind when considering the contribution of income from these schemes to replacement rates results for the base case.

When interpreting the data on coverage rates, specifically for occupational and voluntary schemes, it is important to consider that a problem of double counting exists in a number of Member States. The problem arises when the same individuals are covered by different occupational schemes but are accounted for as several individuals in the data.

³ For more detailed information regarding the actual coverage of different minimum income pension schemes please refer to table 4 in the SPC report on Minimum income provision for older people and their contribution to adequacy in retirement.
http://ec.europa.eu/employment_social/spsi/docs/social_protection/SPC%20Study%20minimum%20income%20final.pdf

2.1.4. *Earnings profile*

The measure of average earnings is used in the calculations and for the most part corresponds to an “average worker” (AW). The concept and definition of earnings used is standard: gross wage earnings paid to average workers, measured before deductions of any kind, but including overtime pay and other cash supplements paid to employees.⁴ Pre-retirement income comprises all earned income (including overtime pay, bonuses, 13th month, etc.) and social benefits as applicable to the selected case.

The choice of average departing wage to use in the calculations is crucial as this can have a big affect on the results. Often a lower departing wage will result in higher replacement ratios. The use of AW wage instead of, for example, Average Production Worker (APW) wage, as was more widely used in previous exercises, can often result in lower replacement ratios. These types of differences can be especially important in Member States where there are large income gaps. The aim with this exercise, however, is to show the affects of changes in legislation on replacement rates rather than the actual level.

The individual earnings during working career are assumed to grow in line with the economy-wide average. This means that the individual is assumed to remain at the same point in the earnings distribution, earning the same percentage of average earnings in every year of the working life.

Real earnings are expected to grow at a constant rate each year for the entire projected period. The exercise assumes average earnings growth to be equal to the average productivity per hour growth, which is in line with the assumptions used by AWG in their projection exercise⁵. The values shown in table 4 are used to calculate real earnings growth in these calculations over the period 2006-2046.

⁴ For a detailed explanation please see the technical annex of the 2006 Progress Report on Replacement rates.

⁵ Please see table 3.4 in the 2009 Ageing Report: Underlying Assumptions and Projection Methodologies http://ec.europa.eu/economy_finance/publications/publication13782_en.pdf

Table 4. Average wage for 2006 and real earnings growth assumed in the calculations

	Assumed average earnings in national currency, 2006	Assumed annual earnings growth, 2006-2046
BE	32478	1,7
BG	4800	3,0
CZ	234796	2,3
DK	330900	1,7
DE	42382	1,7
EE	116652	2,9
EL	23037	2,1
ES	21150	1,8
FR	30992	1,7
IE	29960	1,8
IT	25183	1,5
CY	13344	2,0
LV	3628	2,9
LT	17736	2,8
LU	43621	1,8
HU	1988652	2,4
MT	6307	2,1*
NL	39729	1,7
AT	22872	1,7
PL	29271	2,5
PT	15337	1,9
RO	12924	3,1
SI	3279288	2,4
SK	231216	2,8
FI	33543	1,9
SE	324618	1,8
UK	24550	1,8

Source: National data, EPC/AWG projections

* The assumption used by MT differs slightly from the AWG/EPC projections due to rounding in the national model.

2.1.5. Taxes and social security contributions

The tax and social security contribution rules and parameters used to calculate the net theoretical replacement rates have been updated to 2006 regulations. The modelling assumes that tax systems and social-security contributions remain unchanged in the future. This means that parameters with a nominal value, such as tax allowances or contribution ceilings, are adjusted annually in line with average earnings, while percentage parameters, such as the personal income tax schedule and social security contribution rates, remain unchanged.

The personal tax system plays an important role in old-age support. Pensioners often do not pay social security contributions and, as personal income taxes are progressive and pension entitlements are usually lower than earnings before retirement, the average tax rate on pension income is typically less than the tax rate on earned income. In addition, most income tax systems give preferential treatment either to pension incomes or to pensioners, by giving additional allowances or credits to older people. Therefore, net replacement rates are usually higher than gross replacement rates.

2.1.6. Economic and demographic assumptions

A majority of assumptions for economic variables are the same across all Member States. In this way, differences across countries in pension levels reflect differences in pension systems and policies alone. However, it is essential that in some cases country-specific assumptions are used to establish a more accurate representation of reality especially where there are big differences to the commonly assumed level.

The baseline assumptions are:

Real earnings and (productivity) growth: Rather than create an average across all Member States, country-specific assumptions have been adopted ranging from 1.2% to 2.8% (see table 4 for more specific information). In order to enable cross-country comparison of pension systems the baseline assumptions would ideally be the same for each country. Whilst this is practical for price inflation and discount rate it is not sensible for earnings growth. The considerable variation in wage growth reflects a catching up effect for many Member States. Country specific variables provide an assumption increasing the relevancy of the calculations for each individual country. As mentioned above, the exercise assumes average earnings growth to be equal to the average productivity per hour growth, which is in line with the assumptions used by AWG in their projection exercise

Price inflation: 2% per year.

Real rate of return: Long run rates of return of 2.5% net of administrative charges and taxes are assumed (3% of gross real rates of return minus 0.5% of administrative charges)⁶.

Projected pension expenditure: The pension expenditure projections used are based on the AWG 2009 projections figures, and include the statutory old age pension, early retirement pensions and the funded tiers of statutory schemes (see also section 1.2).

2.1.7. Schematic assumptions

Pension income that is included in the calculations comprises pension benefits that are relevant in the national framework, which include statutory schemes and may include supplementary schemes (typically occupational) pension schemes, but also, in some cases, other monetary social benefits as applicable to the selected case (e.g. housing benefits) (please see section 2.1.3).

Certain assumptions have also been made with regards as to how different types of pension schemes should be treated in a uniform manner. It is assumed that when defined contribution benefits are received upon retirement they are paid out as an annuity. Annuities are calculated according to government policies, which entail price indexing for all Member States except Hungary. The interest rate assumed to calculate the annuity is 1.7% rather than the 2.5% used during the accumulation stage (please see section 2.1.6) in order to account for the cost of buying the annuity, administrative and managing expenses.

Annuity coefficients used take into account changes in life expectancy are based upon the demographic projections by Eurostat and do not remain the same over the entire period of projection.

The notional annuity rate in notional accounts schemes is (in most cases) calculated from mortality data and using the indexation rules and discounting assumptions employed by the respective country.

⁶ The common assumption of 2.5% for real long run rates of returns (3% gross minus 0.5% corresponding to administrative costs) may not necessarily reflect the circumstances of some countries. These points should be borne in mind especially when analysing the outcome of funded schemes as the assumed rate of return has a substantial affect on the replacement rates for these types of schemes.

2.2. Results for the base case

2.2.1. Current replacement rates

Pension schemes (in particular statutory and widely developed private ones) generally manage to ensure adequate income replacement levels after a full career in most Member States. Studying the change in current theoretical replacement rates since the 2006 exercise can help to shed light on the more immediate effects of changes in legislation or the gradual maturing of pension schemes. The 2006 exercise reflects person retiring in 2005 with the last year of work income in 2004 adjusted for inflation⁷. The current exercise shows calculations for a person retiring in 2006 with the last year of work income in 2005 adjusted for inflation. Many of the changes in theoretical replacement rates observed between these two years are due to changes in legislation or the assumptions used in the calculations.

Table 5. Change in gross and net replacement rates between 2005 and 2006

	NET	GROSS		
	Total	Total	Statutory pensions	Occupational and voluntary pensions
BE	2,2	0,8	0,5	0,3
BG	NA	NA	NA	*
CZ	0,0	0,0	0,0	*
DK	0,0	0,0	0,0	0,0
DE	0,0	0,0	0,0	0,0
EE	-0,1	0,3	0,3	*
EL	0,0	0,0	0,0	*
ES	0,0	0,0	0,0	*
FR	-0,3	-0,3	-0,3	*
IE	4,0	6,0	5,0	1,0
IT	1,2	1,3	1,3	0,0
CY	2,0	3,0	3,0	*
LV	0,0	0,0	0,0	*
LT	2,0	1,0	NA	*
LU	0,0	0,0	0,0	*
HU	-1,5	-2,3	-2,3	*
MT	-8,7	-6,9	-6,9	*
NL	-0,2	0,0	0,0	0,1
AT	3,6	3,9	3,9	*
PL	0,0	0,0	0,0	*
PT	0,0	0,0	0,0	*
RO	NA	NA	NA	*
SI	0,0	0,0	0,0	*
SK	0,0	0,0	0,0	*
FI	6,4	7,2	7,2	*
SE	-4,1	-3,2	-3,0	-0,2
UK	-7,4	-5,6	18,9	-25,4

Most Member States do not show any change in the current theoretical replacement rate between 2005 and 2006 (e.g. CZ, DK, DE, EL, ES, LV, LU, PL, PT, SI, and SK). Legislated reforms are often accompanied by extensive transitional rules that allow for a gradual phasing in of the reform. This often entails that current replacement rates do not necessarily change other than nominally from one year to the next, despite many extensive reforms. These nominal changes often reflect the indexation of pensions or earning ceilings, or other types of annual increments to pensions.

⁷ Please note that for BE the calculations depict a person retiring in 2004 with the last year of work income in 2003.

Some Member States show a small increase in current theoretical replacement rates since 2005 (e.g. BE, IT, CY, LT, AT.). In BE, the increase in the statutory scheme is due to a change in the income pattern during the career of the populations, while the increase in occupational pensions reflects the increasing maturity of the scheme as two extra years of contributions are taken into consideration in the pension calculation. In CY, the results for 2005 were calculated from the actual years of contribution to the Social Insurance Scheme, without considering extra contributions for non-working years, for example for education. These have now been included in the current and prospective calculations giving a difference between 2005 and 2006. In LT this increase is due to a discretionary increase in pensions beyond the normal wage indexation between 2005 and 2006.

IE and FI have shown more substantial increases in replacement rates. In IE, apart from an increase in the generosity of the Social Welfare Pension, the increase in current replacement rates is also due to a change in the modelling. In the current exercise the base case profile now typically encompasses earnings from a DC occupational scheme as opposed to the DB occupational scheme used in the previous calculations. In the integrated DB scheme the occupational pension was reduced in line with increments to the Statutory Social Welfare Pension. In the DC scheme the extra benefits are aggregated. In FI, the change between 2005 and 2006 of 6 pp. is a result of the pension reform of 2005 and the abolition of the earnings ceiling which limited overall pension to 60% of the highest wage for the accrual of pension entitlements in the statutory pension. In FI, there has also been a higher accrual rate of pension rights for those over the age of 63 from 2.5 to 4.5% for each extra year worked.

Other Member States experience a decrease in current replacement rates between 2005 and 2006. There is only a decrease of 1.5 p.p. in HU due to the delayed earnings indexation of pension benefits and due to certain modifications in the income tax rules. The slight decrease in FR corresponds to the gradual phasing in of the 1993 reform.

More substantial decreases are experienced in MT, SE and the UK. In the case of MT, the methodology in calculating the average wage for the base case has been changed. The updated calculation is based on the average wage derived from the system of national accounts thus now including overtime, bonuses etc as in the commonly agreed assumptions. This also affects the net replacement rate as the higher wage also affects the income tax bracket applicable. The latest calculations also depict the reforms enacted in December 2006 allowing for the legislated gradual increase in the maximum pensionable income to take effect. In SE, the decrease is a result of the annual increment in the life-expectancy based annuity divisor used in the pension calculations of the statutory scheme. Over and above this, SE has also implemented the use of a higher average wage in the new calculations which results in a lower replacement rate from the statutory scheme. In the case of the UK, the difference in the total gross replacement rate is the effect of a change in the assumptions regarding the modelling of private pension saving. Formerly, an individual was assumed to contract-out of the state DB pension into an occupational DB pension, whereas now he is assumed to remain contracted in the state DB pension and contribute towards a DC pension.

2.2.2. Prospective replacement rates

Future levels of pensions in relation to earnings (income replacement levels) will depend on different factors, notably the pace of accrual of pension entitlements (which is linked to evolutions in the labour market), the maturation of pension schemes and the effect of enacted reforms. However, given the assumptions described in the previous section, most Member States display results where reforms of statutory schemes will lead to a decrease of replacement rates at given retirement ages. This is most probably a reflection of reforms that have lowered future benefit levels at a fixed retirement age in order to cope with increasing longevity and the expenditure it would otherwise entail. As a result many Member States have also proceeded to increase incentives to work longer.

Most Member States have statutory pension schemes providing earnings-related pensions. Benefits under these pension schemes are related to earnings either during a specified number of years during the career, or as is increasingly common practice, during the entire length of the career. The contribution period taken into account in the calculation of pensions, the pace of indexation of current pensions and the statutory retirement age are generally features that are adjusted during reforms.

Several countries have extended — or are still in the process of extending — the period of an individual's earnings history that is used for calculating the pension entitlement in the statutory pension schemes (e.g. AT, CZ, ES, FR, HU, PT, FI, IT). Thus, instead of using the years of highest earnings towards the end of the career for the pension benefit calculation, earnings during a much longer period or even the entire career (e.g. DE, PL, SE) are taken into consideration. This change will usually lead to lower replacement rates, particularly if accrued entitlements are not fully adjusted for (nominal) wage growth. This type of reform also has implications in terms of redistribution as homogeneous career profiles will benefit more from such changes than career profiles with rising earnings in the last years before retirement.

Pension levels can also be lowered through adjustments in the pension formula used to calculate benefits. One significant development has been the introduction of a demographic adjustment factor. For countries which have introduced life expectancy adjustment factors in their statutory pension systems (e.g. DE, AT, FI, FR, IT, PL, PT, SE), this can translate into a decrease of theoretical replacement rates. Thereby, they provide incentives for people to postpone their retirement in accordance with rising life expectancy and offer opportunities for achieving adequate pension levels (see also section 3.2.2).

Increasing the retirement age between 2006 and 2046 can also result in falling replacement rates where a retirement age of 65 is assumed in the calculations. For instance, the state pension age in the UK is set to rise from 65 in 2006 to 68 in 2046. Under the assumption that working lives will be prolonged accordingly and individuals will contribute for more years towards their defined-contribution supplementary pension scheme, the theoretical replacement rate would rise. In DE the rise of the legal retirement age from 65 in 2006 to 67 in 2046 gives deductions of 3.6% per year of early retirement before the age of 67, and explains some of the fall in theoretical replacement rates from the statutory pension scheme.

Furthermore, a number of countries have increased privately managed pension provision to complement income replacement from public pensions and the contribution to retirement incomes of such schemes will rise between 2006 and 2046. A number of Member States that are developing a funded tier within their statutory schemes (e.g. BG, DK, EE, LV, LT, HU, PL, RO, SK, SE), which will contribute to a rise in replacement rates from these schemes as they mature (first payments will occur at the end of the decade).

In other Member States such schemes are being developed under occupational regimes (e.g. BE, DK, DE, IE, IT, NL, SE, UK). Member States either further develop privately managed pension provision (e.g. DE, IT) or they simply increase contribution rates towards private pensions in order to achieve future projected levels of replacement rates of second pillar pensions (e.g. BE, DK, NL, UK). In the UK, the small drop in replacement rates from occupational pensions is a result of the increasing life expectancy factors used in the annuity calculations. This effect is, however, somewhat counteracted by increasing contributions to these pensions. In IE, the big drop in gross replacement rates from occupational pensions reflects the increasing life expectancy factors in the annuity calculations as well. The drop, however, is supported by the assumption that the scheme is already mature in 2006. In SE, the drop in occupational pensions partly reflects the change in occupational schemes from defined benefit ones as used in the calculations for 2006 to defined contribution as used for 2046. In DK, DE and IT the increase in the replacement rates of supplementary pensions is a result of the maturing of these schemes.

Contributions to occupational pensions will, however, benefit only those who are actually covered by these schemes and thus a significant share of pensioners may rely on the contribution provided solely by statutory schemes. It is therefore important to pay special attention to the coverage rates of occupational schemes (please refer to Table 6).

In these countries, achieving good coverage rates of such private schemes and adequate benefit levels are particularly important goals for policy-makers. Instruments for promoting private pension provision are diverse and include notably collective bargaining, tax incentives or direct financial support in the form of subsidies, or rules that make membership in such schemes mandatory (or quasi-mandatory), possibilities to opt out (e.g. LT, UK) or a silent assent (as in the case of the diverting of the TFR deferred wage component to private pension funds in IT).

Table 6. Change in theoretical replacement rates for a worker with average earnings retiring at 65 after 40 years, 2006-2046

	Change in Theoretical replacement rates in percentage points (2006-2046)						Assumptions					
	NET		GROSS Replacement Rate				Coverage rate (%)		Contribution rates**			Evolution of statutory pensions expenditures between 2007 and 2045 (source EPC/AWG)***
	Total	Total	Statutory pension	Type of Statutory Scheme (DB, NDC or DC), 2046	Occupational and supplementary pensions	Type of Occupational or Supplementary Scheme (DB or DC), 2046	Statutory pensions, 2006	Occupational and Voluntary pensions, 2006	Statutory pensions (or in some cases Social Security): Current (2006) and Assumed (2046)	Occupational and voluntary pensions: Estimate of current (2006)	Occupational and voluntary pensions: Assumption (2046)	
BE	4	5	0	DB	5	DC	100	55	16.36	NA	4.25	
BG	15	15	15	DB and DC	/		NA	/	NA	/		2,9
CZ	-21	-16	-16	DB	/		100	/	28	/		1,8
DK	7	20	-10	DB	30	DC	100	78	0.9	8.8	12.7	0,8
DE	1	2	-9	DB	11	DC	90	70	19.5	NA	4	1,7
EE	11	9	9	DB and DC	/		100	/	22	/		0,8
EL	-7	-12	-12	DB	/		NA	/	20	/		8,6
ES	-12	-9	-9	DB	/		89	/	28.3	/		5,9
FR	-17	-16	-16	DB	/		100	/	20	/		1,3
IE	-11	-10	-2	DB	-9	DC	100	55	9.5	10-15	10	3,1
IT	3	-3	-17	DB and NDC	14	DC	100	22(M)/17(F)*	33	5.7	6.91	1,6
CY	14	11	11	DB	/		100	/	16.6	/		6,2
LV	-12	-11	-11	NDC and DC	/		100	/	20	/		2,8
LT	-3	1	1	DB and DC	/		89	/	26	/		4,3
LU	0	-1	-1	DB	/		92	/	24	/		11,1
HU	5	13	13	DB and DC	/		100	/	26.5	/		3,9
MT	-9	-8	-8	DB	/		100	/	30	/		4,7
NL	11	11	2	DB	10	DB	100	91	7	9.8	11.5-12.5	4,3
AT	5	1	1	DB	/		100	/	22.8	/		1,6
PL	-19	-16	-16	NDC and DC	/		77	/	19.52	/		-0,7
PT	-20	-20	-20	DB	/		81	/	33	/		1,3
RO	52	39	39	DB and DC	/		NA	/	29	/		7,7
SI	2	-4	-4	DB	/		100	/	24.35	/		6,9
SK	2	1	1	DB and DC	/		100	/	28.75	/		2,2
FI	-11	-12	-12	DB	/		100	/	21.6	/		4,2
SE	-13	-13	-11	NDC and DC	-2	DC	100	90	17.2	4.5	4.5	1,8
UK	-4	-2	-3	DB	0	DC	100	53 (M)/56(F)	19.85% (17.25%)	9	8	1,8

Source: ISG calculations done in the OECD APEX model or national models, EPC/AWG projections

*Note: Figures as of June 2008

**Note: Contribution rates used for statutory schemes and also eventually occupational or private schemes included in the base case, thus giving elements on the representativeness associated with the base case. Contribution rates correspond to overall contribution rates as a share of gross wages (from employees and employers) used as assumptions for the calculation of theoretical replacement rates. Contribution rates may differ from current levels reflecting for instance projected increases in contribution rates, in particular as regards assumptions used for second pillar schemes. DK refers to contributions, to the ATP (statutory Supplementary Labour Market Pension, though it should be recalled that the financing of the first pillar mainly comes from the general budget. For CY one fourth (4%) comes from the general State budget. For LU one third (8%) also comes from the general State budget. For MT this corresponds to a repartition of 10% from the employee, 10% from the employer and 10% from the State. For PL this corresponds to old-age contributions (19.52% of wage) and disability and survivor's contribution (13% of wage). For PT this corresponds to a general estimate (ratio between overall contributions and aggregate wages declared to social security).

***Note: AWG projections figures include funded tiers of statutory schemes and statutory early retirement schemes

Results for the base case indicate that for most Member States overall net replacement rates are projected to decline over the coming decades in 12 Member States (CZ, EL, ES, FR, IE, LV, MT, PL, PT, FI, SE, UK⁸), while the situation would not change significantly in 7 other Member States (a change of +/- 3 percentage points) (BE, DE, IT, LT, LU, SI, SK) and an increase is projected for 8 Member States (BG, DK, EE, CY, HU, NL, AT, RO).

Net replacement rates are often higher than gross replacement rates in most Member States as a result of lower taxation on pension income, but also due to the fact that often social contributions are not paid to the same extent on pension income.

The tendency towards a decline in prospective replacement rates at a given age is a result of pension reform, often in the form of a methodological change in how the pension is calculated. The evolution of gross and net replacement rates reflects different contributions, the one from statutory schemes (pay-as-you-go and including also possibly a funded tier) and also in some Member States from private pension schemes, occupational or individual.

Taking into account, however, that occupational and voluntary pensions generally do not have a full coverage of the population, it should be noted that the decline is even more significant when focusing solely on the evolution of gross replacement rates of statutory schemes where gross theoretical replacement rates are projected to decline in 14 Member States, while the situation would not change significantly in 8 other Member States (a change of +/- 3 percentage points) and an increase is projected for 5 Member States.

It should also be noted that replacement rates evolutions can be affected by the common assumption used for rates of returns. While calculating the evolution of replacement rates, Member States with large and/or maturing defined contribution funded schemes tend to show a positive evolution of theoretical replacement rates due to the assumption on rates of return (e.g. BG, DK, DE, EE, IT, HU, NL, RO, SK), since the 2.5% assumed real rate of return is often higher than the assumed level of growth of wages. With regard to DC funded schemes, it is important to follow up how the returns on contributions are expected to develop, given that the rate of return is assumed to be the same in the calculations.

3. PROSPECTIVE THEORETICAL REPLACEMENT RATES – VARIANT CASES

One of the uses of theoretical replacement rates is to study the affects of reforms on individuals with different career and earnings profiles. Calculations for variant cases can function as a sort of sensitivity analysis, providing useful information on how the replacement rate varies for different departures from the main assumptions. Therefore, the variant cases refer to key assumptions of the base case (earnings profiles and length of contributory period) and illustrate how the results of the base case are affected when those one departs from those assumptions. The other assumptions regarding coverage and economic and demographic developments remain constant.

Previous exercises have presented trends for the variant cases showing the change in replacement rates for each case between two years, as in the base case. This showed how cases with different conditions are more or less affected by reforms. The results in this exercise are, however, presented instead as a difference from the results of the base case for prospective replacement rates for the year 2046.

⁸ Please note that, as mentioned above, the drop in replacement rates for the UK is due to the fact that retirement is assumed at the age of 65 instead of the state pension age which will be 68 in 2046.

3.1. Variant case of worker ten years after retirement

Indexation allows pensions to keep a certain value over time, ensuring maintained of standards of living for a group that typically cannot affect their income level in the years following retirement. Historically, pensions have tended to be indexed to inflation, which is typically lower than the development of nominal average earnings, as is assumed in our exercise. While protecting retirees from inflation, less than indexation to earnings means that the living standards of a pensioner will drop over time relative to the rest of the population and pensions in payment most often lag behind the evolution of wages. This can translate into significant declines of the level of theoretical replacement rates during the period of retirement.

The basic definition of theoretical replacement rates reflects the income replacement at the time of retirement. Adequacy is not just about replacement levels at the time of retirement and pension take-up but also about how the value of benefits relative to prices and wages is maintained over time, especially considering that the retirement period is currently likely to last for more than 15 years for men as longevity increases.

Table 7 below reflects the indexation of disbursed pensions in payment that has been used in the calculations for this exercise.

Table 7. Assumed indexation of disbursed pension benefits in the different components of pension systems *

	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6
BE	prices	prices	prices/ welfare adaptations		prices	
BG	50% wages	50% wages	prices			
CZ	33% wages	33% wages				
DK	wages - 0.3%	wages - 0.3%	prices	prices	prices	
DE	wages	wages	prices			
EE	50% wages	50% wages	prices			
EL	prices	prices	prices			
ES	prices	prices				
FR	prices	prices	prices	prices		
IE	wages	prices				
IT	prices	prices	prices			
CY	wages	prices	wages			
LV	50% wages	50% wages	prices			
LT	wages	wages	prices			
LU	wages	wages	wages	wages		
HU	50% wages	50% wages	50% wages			
MT	wages	wages				
NL	wages	wages				
AT	prices	prices				
PL	20% wages	20% wages	prices			
PT	prices and GDP	prices and GDP				
RO	prices	prices				
SI	wages	wages	wages			
SK	50% wages	50% wages	prices			
FI	prices	20% wages				
SE	prices	wages - 1.6%	real rate of return	prices		
UK	wages	prices	wages	prices	prices	prices

*For a description of the different components please refer to table 2b.

In most Member States this is in accordance with legislation, but in some cases the indexation is assumed to be to prices in countries where actual increases to the pensions are carried out on an ad hoc basis (e.g. EL, IE, LT, NL, PT⁹). For these most of these

⁹ In Portugal pension increases were carried out on an ad hoc basis until 2007. The legislation concerning the new rule for updating pensions was enacted by the Portuguese parliament in December 2006 and came into force in January 2008.

Member States the indexation assumed depends on the typical size of the discretionary increases in the past. In BE, once the statutory pension from the earnings-related component and the pension bonus are established the pension is indexed to pensions, but with two year intervals a legally based adaptation to general living standards above price indexation is also added to this indexation. In PT, however, the assumed indexation is a reflection of recent changes in legislation made at the end of 2006, where the use of automatic annual indexation rather than ad hoc increases should be implemented from 2008 onwards.

Table 8 shows the retirement income entitlement 10 years after take up for an individual retiring in 2046 (the value of the pension in 2056) the earnings of an average earner in 2055 adjusted for inflation. The difference of this to the base case shows how the relative income level of a base case pensioner is maintained during the initial period in retirement compared with the working population.

Table 8. Theoretical replacement rate for a pensioner ten years after retirement in 2046*

	NET	GROSS		
	Total	Total	Statutory	Occupational
BE	-11	-10	-8	-2
BG	-10	-9	-9	*
CZ	-8	-6	-6	*
DK	-7	-7	-2	-5
DE	-2	-2	0	-2
EE	-9	-7	-7	*
EL	-16	-17	-17	*
ES	-13	-13	-13	*
FR	-11	-8	-8	*
IE	-3	-5	0	-5
IT	-12	-10	-8	-2
CY	-5	-4	-4	*
LV	-10	-10	-10	*
LT	-5	-4	-4	*
LU	0	0	0	*
HU	-10	-9	-9	*
MT	-12	-10	-10	*
NL	0	0	0	0
AT	-16	-11	-11	*
PL	-11	-9	-9	*
PT	-15	-12	-12	*
RO	-23	-17	-17	*
SI	0	0	0	*
SK	-12	-9	-9	*
FI	-6	-7	-7	*
SE	-6	-6	-4	-2
UK	-11	-10	-2	-8

*Please note that the calculations for BE and AT pertain to ten years after retirement in 2006 and not in 2046 like the other Member States.

According to the calculations, in all but a few Member States (e.g. LU, NL, SI) replacement rates fall significantly in all schemes ten years into retirement. This clearly reflects the wide use of less than earnings indexation in Member States, even in DC schemes once they have been converted into an annuity. This suggests the need to further look at policy regarding the protection of pensioners' living standards over time.

In many Member States, 2006-2008 has been a period with higher growth and increasing inflation. Pensions have typically been indexed to prices in order to ensure a constant purchasing power over time. Wage or GDP growth oriented indexation of pensions has, however, been advocated as it allows the incomes of retirees to track more closely the incomes working population or the economic development.

Some countries report a shift towards a higher degree of earnings-linked indexing of statutory old age pensions (e.g. CZ, HU, PL, UK). To what extent this shift curbs the decline in replacement rates after retirement, depends not only on the degree of earnings related indexation used but also on the economic situation. In particular, the coming period 2008-2010 is likely to see weak economic and wage growth and lower inflation, the long-term positive real economic growth is expected.

3.2. Variant cases of different retirement ages

3.2.1. *Variant case of a female base case worker*

According to current legislation the retirement age in 2046 for women is different to that for men in some Member States. This would mean that the possible standard-career is often shorter for women due to a lower legislated retirement age (BG, IT, LT, PL, RO)¹⁰. The calculation for the variant case for a female base case worker looks at the differences in prospective replacement rates between men and women based on the lower retirement age and a consequently shorter contributory period for women in comparison to men in these countries.

In order to capture the difference for men and women, retirement is assumed at the legislated retirement age for both men and women in these calculations and not the assumed retirement age of 65 used in the base case calculations. This means that the age of entry into the labour market is at 25 and the assumed age of retirement is at the legislated country specific retirement age (for more information please see section 2.1.2).

The implication of this is that the length of career differs between men and women according to the statutory retirement age. For example, the contributory period for a woman in Bulgaria will be calculated to be 35 years and for a man it will be 38 years. The seniority considered in Members State can, therefore, differ even for men in this exercise compared with the base case. Probable differences in average earnings that may exist between men and women are not considered here.

Table 9. Theoretical replacement rate for women compared with men average earners retiring at the legislated retirement age, 2046

	NET	GROSS		
	Total	Total	Statutory	Occupational
BG	-5	-5	-5	0
IT	-18	-18	-15	-3
LT	-4	-3	-3	0
PL	-16	-13	-13	0
RO	-4	-3	-3	0

The gross and net replacement rate results are lower for women than for men in all Member States. The most notable gender differential in gross replacement rate is observed for IT (around 20 pp.) and PL (around 15 pp.) which both have NDC systems with actuarial reductions of the pension the earlier it is retrieved. The lower replacement rates are a result of women retiring earlier than men. In IT, for example, the calculations for women present retirement at age 60 with 35 years of work seniority as compared with retirement at 65 with 40 years seniority for men. It is however important to note that in IT women may continue to work age of 65 or beyond. The difference in the results

¹⁰ The pension eligibility age is also different for men and women in SI, but the contributory requirements are adjusted in a manner that women receive the same gross replacement rate as men despite retiring two years earlier at age 61. The calculations have, therefore, not been carried out for SI.

between men and women in BG and LT are lower reflecting better protection for shorter careers for women.

3.2.2. Variant cases with a shorter and longer career

A decline in future pension levels and the subsequent replacement rates at a given pension age can be observed in calculations of theoretical replacement rates (section 2.2.2). This reflects that reforms of statutory pensions will contribute to meeting the challenges caused by increases in life expectancy by lowering pension levels if individuals still retire at the same age as today, in the future. Member States are projecting to compensate for this decline by extending working lives and increasing supplementary pension savings.

Most countries have incorporated incentives to prolong working life into their pension systems. Many of these incentives take the form of reductions for early retirement or bonuses for later retirement. These may be carried out in an actuarial manner often based on remaining life expectancy and through bonuses and penalties fixed by legislation. Other incentives to work more and longer are generated by increasing the contributory period in pension systems and strengthening the link between pensions and contributions. Such reforms are significant as prolonging working lives does not only entail leaving the labour market later but also entering it earlier and minimizing long career breaks.

In these variants the dynamics of work incentives can be studied by comparing a base case worker who retires at 65 with one that retires at 63 or at 67 thus decreasing and increasing the seniority of the worker.

Table 10. Difference in net theoretical replacement rates for an average earner working until the age of 63 and 67 with 38 and 42 contributory years respectively as compared with working until the age of 65, 2044-2048

	NET		GROSS					
	Total		Total		Statutory		Occupational	
	38 years seniority	42 years seniority	38 years seniority	42 years seniority	38 years seniority	42 years seniority	38 years seniority	42 years seniority
BE	-4	4	-4	3	-3	2	-1	1
BG	-8	8	-7	8	-7	8	*	*
CZ	-8	10	-6	8	-6	8	*	*
DK	-1	1	-1	1	0	0	-1	1
DE	-6	7	-6	6	-4	4	-1	2
EE	-9	9	-7	7	-7	7	*	*
EL	-1	7	-1	8	-1	8	*	*
ES	-10	3	-11	3	-11	3	*	*
FR	-8	4	-7	3	-7	3	*	*
IE	-1	2	-2	3	0	0	-2	3
IT	-10	6	-8	5	-7	3	-2	2
CY	-1	NA	-1	NA	-1	NA	*	*
LV	-6	7	-6	7	-6	7	*	*
LT	-5	6	-4	4	-4	4	*	*
LU	-4	1	-6	1	-6	1	*	*
HU	-13	9	-11	12	-11	12	*	*
MT	0	NA	0	NA	0	NA	*	*
NL	1	7	-3	8	0	0	-3	8
AT	-9	9	-9	9	-9	9	*	*
PL	-3	8	-2	7	-2	7	*	*
PT	-3	14	-2	11	-2	11	*	*
RO	-4	6	-3	5	-4	0	*	*
SI	-7	4	-6	3	-6	3	*	*
SK	-9	10	-7	8	-7	8	*	*
FI	-5	6	-6	6	-6	6	*	*
SE	-5	6	-6	7	-4	6	-1	1
UK	-2	2	-2	2	-1	0	-1	1

Calculations show that in most Member States delaying retirement results in higher theoretical replacement rates, while earlier retirement usually results in lower theoretical replacement rates.

In all but a few Member States (e.g. DK, ES, FR, HU, IT, LU, SI, UK) the increments in pensions for prolonged working lives are higher than the fall in replacement rates with earlier retirement.

In Member States where the pensionable age is planned to be higher than 65 in 2046 (e.g. DE, UK), the effects of deferring retirement beyond the legislated retirement age are not captured by the exercise. In the UK, for example, the deferral of retirement two years beyond the age of 68 will lead to a replacement rate of approximately 8 percentage points.

In Member States where the retirement age is lower than 65 the calculations show how the bonus-malus system would work if the retirement age was set at 65 (e.g. BG, EE, LV, LT, HU, MT, SI, SK).

In NL, it is interesting to note that the replacement rate from the statutory scheme does not change with shorter or longer working lives as the pension is resident based. There are, however, clear changes in the occupational schemes which play an important role in Dutch pension income.

In IT, it is observed that the annuity coefficients used in the public notional defined contribution system currently do not increase above 65 years of age.

Extending working lives enables an increase or decrease of the theoretical replacement rates, to an extent ranging from 1 to just over 10 percentage points for 2 years of shorter or longer working life. Significant changes of 5 pp. or over for two year less or extra of work can be identified in most Member States (e.g. BG, CZ, DE, EE, EL, FR, IT, LV, LT, HU, AT, FI, SE). Those Member States with lower changes (e.g. BE, DK, EL, IE, LU, MT, UK) all have defined-benefit statutory schemes, some of which are complimented with defined benefit or defined contribution occupational schemes.

In defined-benefit schemes, work incentives can be strengthened through a longer contribution period required for a full pension, while applying reductions for early pensions and increases in pension rights for deferred retirement. In a number of Member States higher accrual factors as a reward for later retirement, or lower accruals as penalties for early retirement, were recently introduced or increased (e.g. BE, BG, CZ, ES, FR, EL, HU, NL, PT and UK).

3.3. Variant cases of different earnings profiles

3.3.1. Variant case with a lower wage – 2/3 of average earnings

In this variant case only the earnings assumptions are changed, corresponding to a constant level at 2/3 of average earnings. This is then compared with the base case representing 100% of average earnings. Studying such a case is explicitly important in order to study the effects of reform on those individuals who may work part time or need to be covered by minimum pension schemes.

Table 11. Theoretical replacement rates for low income earners (2/3 average wage) compared with average earners retiring at age 65, 2046

	NET	GROSS		
	Total	Total	Statutory	Occupational
BE	-1	2	2	0
BG	1	0	0	*
CZ	14	13	13	*
DK	22	21	21	0
DE	-1	0	0	0
EE	6	6	6	*
EL	-1	0	0	*
ES	-1	0	0	*
FR	0	0	0	*
IE	15	17	17	0
IT	0	0	0	0
CY	-2	0	0	*
LV	2	0	0	*
LT	7	7	7	*
LU	5	6	6	*
HU	-10	0	0	*
MT	1	3	3	*
NL	6	4	15	-11
AT	-4	0	0	*
PL	0	0	0	*
PT	-4	1	1	*
RO	-4	0	0	*
SI	-3	0	0	*
SK	-3	0	0	*
FI	4	3	3	*
SE	9	8	8	0
UK	15	14	14	0

For workers with low earnings, mandatory schemes may tend to have a more significant role in the replacement income. Gross replacement rates are significantly higher (4 pp. or higher) for low income workers than average earners in many Member States (CZ, DK, EE, IE, LT, LU, NL, SE, UK).

For the remaining Member States the difference is small with only a few Member States with lower gross replacement rates for low earners. This reflects the fact that most countries attempt to protect low income workers from old-age poverty especially in the statutory pension schemes.

When studying net replacement rates, however, more Member States display a lower result for low income earner compared with average income earners. (CY, HU, AT, PT, RO, SI SK). This is because the effect of taxes and social security contributions on net replacement rates for low earners can be higher than for workers higher up the earnings scale. Low-income workers typically pay less in taxes and contributions than those on average earnings. However, in many cases, retirement incomes for those with lower earnings are at a level that does not allow them to benefit from income-tax reliefs (allowances, credits, etc.). This means that in some cases low income earners may pay a larger portion of their gross pension in taxes as compared with an average earner.

3.3.2. Variants of linear increasing wage profiles

In these variant cases only the earnings assumptions are changed, corresponding to a worker with a linear ascending wage profile from 100% to 200% of the average wage rather than for a flat wage profile at the level of the average wage. This profile reflects persons with rapidly ascending wage careers. The second example pertains to a worker with a lower and flatter but increasing wage profile from 80% to 120% of average earnings. These are then compared with the base case with a constant earnings profile of 100% of average earnings. (Please refer to the annex for more information on the increasing wage profiles).

Studying the case of a higher than average wage earner, as in the first example, is explicitly important in order to study the role of private pension provision which is often more pertinent in the income replacement for those with higher earnings. It also shows the restrictions of earnings ceilings that often exist in statutory pension schemes on replacement rates, implying that the formula of pension benefits can be both progressive (lower replacement rates for higher incomes) and have redistributive elements.

Table 12. Difference in theoretical replacement rates for variant with increasing from 100-200% of average wage compared with average earners retiring at age 65, 2046

	NET	GROSS		
	Total	Total	Statutory	Occupational
BE	-10	-7	-6	-1
BG	-10	-9	-9	*
CZ	-8	-7	-7	*
DK	-10	-11	-6	-6
DE	-9	-8	-6	-2
EE	-10	-8	-8	*
EL	-3	-2	-2	*
ES	-1	-1	-1	*
FR	-7	-6	-6	*
IE	-9	-10	-6	-5
IT	-15	-12	-10	-2
CY	-9	-10	-10	*
LV	-11	-8	-8	*
LT	-9	-7	-7	*
LU	-12	-15	-15	*
HU	-13	-13	-13	*
MT	-10	-10	-10	*
NL	-14	-14	-5	-8
AT	-11	-11	-11	*
PL	-9	-8	-8	*
PT	-10	-9	-9	*
RO	-13	-11	-11	*
SI	-12	-10	-10	*
SK	-10	-8	-8	*
FI	-8	-9	-9	*
SE	-7	-9	-7	-2
UK	-11	-10	-6	-4

In all Member States those with a higher earnings profile display significantly lower gross and net replacement rates compared with average earners in all Member States, except in SE. Those with higher departing earnings are expected to be better protected by occupational private pension provision in SE, since in the defined contribution scheme modelled for private sector workers, the effective contribution rate for earnings above a given ceiling are equal to 30% of earnings.

This less favourable situation for high wage earners in all other Member States reflects the progressive nature of the formula of pension benefits. Furthermore, in many pension schemes the length of earnings history used in the benefit calculation is being extended, where earnings from more years are used to calculate the pension. This is often a relatively unfavourable development for those with increasing wage profiles and high departing salaries.

Table 13. Difference in theoretical replacement rates for variant with increasing from 80-120% of average wage compared with average earners retiring at age 65, 2046

	NET	GROSS		
	Total	Total	Statutory	Occupational
BE	-10	-7	-6	-1
BG	-10	-9	-9	*
CZ	-8	-7	-7	*
DK	-10	-11	-6	-6
DE	-9	-8	-6	-2
EE	-10	-8	-8	*
EL	-3	-2	-2	*
ES	-1	-1	-1	*
FR	-7	-6	-6	*
IE	-9	-10	-6	-5
IT	-15	-12	-10	-2
CY	-9	-10	-10	*
LV	-11	-8	-8	*
LT	-9	-7	-7	*
LU	-12	-15	-15	*
HU	-13	-13	-13	*
MT	-10	-10	-10	*
NL	-14	-14	-5	-8
AT	-11	-11	-11	*
PL	-9	-8	-8	*
PT	-10	-9	-9	*
RO	-13	-11	-11	*
SI	-12	-10	-10	*
SK	-10	-8	-8	*
FI	-8	-9	-9	*
SE	-7	-9	-7	-2
UK	-11	-10	-6	-4

In the lower wage worker with an ascending wage profile from 80% to 120% of average wage, the theoretical replacement rates is substantially lower than for the base case profile. The exceptions are EL and ES (less than 3 pp.).

The lower replacement rates as compared to the base case partly reflects long contributory periods in the calculation of the pension formula that is less advantageous for those with a higher departing salary giving progressively lower replacement rates the higher the departing salary.

Another issue that arises is that of the compounding affect of yields in defined contribution funded schemes that more and more Member States are developing. In this case, the individual has a lower salary earlier on in the career as compared to the base case. In such systems, the capital that is compounded over a longer period of time is lower than for the base case, affecting the final replacement rates. This can be exemplified by studying the results for the defined contribution occupational or voluntary schemes.

3.3.3. Variant of concave increasing wage 75 to 105% of average earnings

A third rising earning profile that has been defined is a concave earnings profile with a starting salary at 75% of average earnings and ending at 105%, of average earnings so that the work life average earning is 100% of average earnings. (Please refer to the annex for more information on the increasing wage profiles). Concave earnings profiles are more representative of typical careers where a lower than average wage as a starting salary accelerates to then slow in the years before retirement.

Table 14. Difference in theoretical replacement rates for variant with increasing from 75-105% of average wage compared with average earners retiring at age 65, 2046

	NET	GROSS		
	Total	Total	Statutory	Occupational
BE	-2	-2	-2	0
BG	-3	-3	-3	*
CZ	-2	-2	-2	*
DK	-3	-3	-2	-2
DE	-3	-2	-2	-1
EE	-4	-3	-3	*
EL	0	0	0	*
ES	3	3	3	*
FR	0	0	0	*
IE	-3	-3	-2	-1
IT	-4	-3	-3	0
CY	-9	-9	-9	*
LV	-3	-2	-2	*
LT	-2	-2	-2	*
LU	-3	-4	-4	*
HU	-3	-4	-4	*
MT	-3	-3	-3	*
NL	-3	-4	-1	-2
AT	-6	-6	-6	*
PL	-3	-2	-2	*
PT	-3	-3	-3	*
RO	-4	-3	-3	*
SI	-3	-3	-3	*
SK	-3	-2	-2	*
FI	-2	-3	-3	*
SE	-2	-2	-2	-1
UK	-3	-3	-2	-1

As compared to the base case, the theoretical replacement rate is in most cases somewhat lower for a worker with a concave wage profile than for the base case profile. This is probably due to similar reasons as described in the case for a worker with a ascending wage profile from 80% to 120% of the average wage (please see section 3.3.2).

In ES, the replacement rates are higher for the concave earnings profile than the average wage earner suggesting that at the level of the departing salary is taken more into account in the calculation of the benefit formula.

3.4. Variant cases with career breaks

Many Member States have reinforced the link between contributions and benefits in pension reforms. This, however, also has to be combined with a careful monitoring of the accrual of pension rights during breaks in careers that reasonably should not be penalized, such as child care, other caring responsibilities, unemployment, sickness or education leave.

In earlier work carried out by the ISG, the variant case showing a career break has encompassed an individual who leaves the labour market without being covered by any other benefit systems.

Current developments in the work with theoretical replacement rates show calculations for two variant cases - one case where the individual leaves the labour market for childcare years and another case where a break due to unemployment is made.

These calculations give an indicator of how pension accruing income and pension entitlements are insured for those who leave the labour for these purposes under social security and/or pension schemes.

Retirement at the legislated retirement age for both men and women is assumed here and not the assumed retirement age of 65 used in the base case. This means that the age of entry into the labour market is at 25 and the assumed age of retirement is at the legislated

country specific minimum retirement eligibility age (for more information please see section 2.1.2). The seniority considered in Members State can, therefore, differ even for men in this exercise compared with the base case.

The reason for departing from the ISG assumption of retirement at age 65 is so as to be able to better illustrate the effects of a career break. If in the case of a career break, the retirement age was fixed at 65 in Member States where the legislated statutory retirement age is lower than 65, the loss of pension entitlements due to a career break would be recovered in the years that the individual is assumed to work beyond the actual legislated retirement age. This would somewhat counteract the effects the exercise attempts to illustrate. Furthermore using the legislated retirement age also adds to the representativeness of the exercise.

Calculations show that in most Member States absences from the labour market for either unemployment or childcare, even though partially protected, generally lead to decreases in theoretical replacement ratios.

3.4.1. Career break for childcare years

In this exercise replacement rates are shown for women. Table 15 shows the cumulative difference in replacement rates for a single woman who enters the labour market at 25 and leaves at the legislated retirement age for women (as referred to in section 2.1.2) and a woman with the same profile but with career breaks.

The exercise assumes childcare covering periods of 0 to 3 years of absence. For the models we assume two children are born two years apart. Since a constant relative position in the earnings distribution is assumed throughout one's career, it does not matter when in the career childcare absences are modelled for the results, but typically the children are assumed to be born at the age of 25 and 27. The assumption is that full benefits can be received by the individual.

Table 15. Difference in theoretical replacement rates for a female, average earner who makes a career break for childcare years compared with one with a full career, 2046

	Change in Replacement rate															
	Number of years of childcare															
	0				1				2				3			
	NET		GROSS		NET		GROSS		NET		GROSS		NET		GROSS	
Total	Total	Stautory	Occ	Total	Total	Stautory	Occ	Total	Total	Stautory	Occ	Total	Total	Stautory	Occ	
BE	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	0	-1
BG	0	0	0	*	-2	-2	-2	*	-3	-3	-3	*	-4	-4	-4	*
CZ	0	0	0	*	0	0	0	*	0	0	0	*	0	0	0	*
DK	0	0	0	0	-1	-1	0	-1	-2	-1	0	-2	-2	-2	1	-3
DE	1	1	1	0	0	0	1	0	-1	-1	0	-1	-2	-2	-1	-1
EE	0	0	0	*	0	0	0	*	-1	-1	-1	*	-1	-1	-1	*
EL	0	0	0	*	0	-1	-1	*	-1	-1	-1	*	-1	-2	-2	*
ES	0	0	0	*	0	0	0	*	0	0	0	*	0	0	0	*
FR	1	1	1	*	1	1	1	*	1	0	0	*	0	0	0	*
IE	0	0	0	0	-1	-1	0	-1	-1	-2	0	-2	-2	-2	0	-2
IT	1	0	0	0	0	0	0	0	0	0	0	-1	-2	-2	-1	-1
CY	0	0	0	*	-1	-1	-1	*	-2	-2	-2	*	-3	-3	-3	*
LV	0	0	0	*	-1	-1	-1	*	-3	-2	-2	*	-4	-3	-3	*
LT	0	0	0	*	-1	-1	-1	*	-2	-1	-1	*	-2	-2	-2	*
LU	0	0	0	*	0	0	0	*	0	0	0	*	0	0	0	*
HU	0	0	0	*	-1	-1	-1	*	-2	-2	-2	*	-4	-3	-3	*
MT	0	0	0	*	0	0	0	*	0	0	0	*	0	0	0	*
NL	0	0	0	0	-1	-1	0	-1	-3	-2	0	-2	-4	-3	0	-3
AT	0	0	0	*	2	3	3	*	1	1	1	*	-1	-1	-1	*
PL	0	0	0	*	-1	-1	-1	*	-2	-2	-2	*	-3	-3	-3	*
PT	0	0	0	*	-1	-1	-1	*	-3	-2	-2	*	-4	-3	-3	*
RO	0	0	0	*	-2	-2	-2	*	-5	-4	-4	*	-7	-5	-5	*
SI	0	0	0	*	-2	-1	-1	*	-3	-2	-2	*	-5	-3	-3	*
SK	0	0	0	*	-1	0	0	*	-1	-1	-1	*	-2	-1	-1	*
FI	0	0	0	*	0	0	0	*	1	1	1	*	0	0	0	*
SE	0	0	0	0	0	-1	0	0	-1	-1	0	-1	-1	-2	-1	-1
UK	0	0	0	0	-1	-1	0	-1	-2	-2	0	-1	-3	-2	0	-2

In most Member States, childcare years do not give or reduce pension credits if there are no years of absence from the labour market. DE, FR, and IT have systems which provide extra pension entitlements following the birth of a child, which means that even if no actual period of childcare leave is taken, the pension will still be greater than for women with no children (in FR the increase in pensions would be greater with a third child, but this is not included in the calculations).

In many Member States, absences from the labour market for childcare are typically protected to a certain extent for the first years of absence and usually the protection is equally spread over these years. In a few Member States, pension rights for up to three years of absence are so well protected that calculations show insignificant or no drop in replacement rates during a career break of up to three years (e.g. CZ, ES, LU, MT, FI) (In BE there is no drop during career break of up to two years). While this improves the adequacy of benefits accruals during childcare absences, it is important to consider the incentives to work as well as the possibilities of reconciliation of work and family life in the design of social protection schemes involved in family policy.

In all other Member States, child care years result in a drop in replacement rates compared with a woman with no children, from the first year of absence. This can be due to the features of the pension system where the link between the contributory periods and the pension where non-contributory years for child care are not taken up entirely.

In the CZ, the retirement age for women is decreased depending on the number of children they bear. The years of retirement before the age of 65 are thus accredited giving no change in the replacement rates.

In MT, recent legislation credits social security contributions for interrupted careers due to childcare of up to 2 years. In the case of 3 years, 37 years of successive contributions plus 2 credited years would meet the test when the contributions are summed and averaged over a forty years period.

In RO, childcare breaks are less well protected than in most other Member States.

In some Member States the decline depends on whether private pension schemes award care credits or not, since childcare periods get full credits under both the flat rate and the earnings related part of the statutory pension (BE, IE, NL, UK).

In PL, the protection for childcare has been recently been strengthened. The basis for paying pension contributions for parents on parental leave has been changed from the social assistance benefit level to the minimum wage level, which currently around 40% of average wage and legislated to increase to 60% of average wage from 2012. This legislation was not, however, not in place in 2006 and is thus not included in the calculations. The new legislation would give higher replacement rates especially for parents with a longer parental leave.

3.4.2. Career break for unemployment years

In the case of calculating the effects of unemployment on retirement income and theoretical replacement rates, up to three consecutive years of unemployment are considered. The unemployment break is assumed to take place when the individual is allowed maximum unemployment benefits that are entitled by legislation during the entire unemployment period. Although several countries have early-retirement schemes, the effects of such schemes are not taken into consideration in these calculations.

In this exercise replacement rates are shown for men. Table 16 shows the cumulative difference in replacement rates for a single man who enters the labour market at 25 and leaves at the legislated retirement age for men (as referred to in section 2.1.2) and a man with the same profile but with career breaks.

Table 16. Difference in theoretical replacement rates for a male, average earner who makes a career break for unemployment years compared with one with a full career, 2046

	Number of years of unemployment											
	1				2				3			
	NET	GROSS			NET	GROSS			NET	GROSS		
	Total	Total	Stautory	Occ	Total	Total	Stautory	Occ	Total	Total	Stautory	Occ
BE	1	-1	-1	0	1	-1	-1	0	-3	-4	-3	-1
BG	-2	-2	-2	*	-2	-2	-2	*	-2	-2	-2	*
CZ	0	0	0	*	0	0	0	*	-1	-1	-1	*
DK	-1	-1	0	-1	-1	-1	0	-1	-2	-2	1	-2
DE	-1	-1	0	-1	-2	-2	0	-2	-4	-3	-1	-2
EE	-1	-1	-1	*	-2	-1	-1	*	-2	-2	-2	*
EL	-1	-1	-1	*	-1	-1	-1	*	-2	-2	-2	*
ES	0	0	0	*	0	0	0	*	-1	-1	-1	*
FR	0	0	0	*	0	-1	-1	*	0	-1	-1	*
IE	-1	-1	0	-1	-1	-2	0	-2	-2	-2	0	-2
IT	0	0	0	0	-3	-2	-2	-1	-5	-4	-3	-1
CY	-1	-1	-1	*	-2	-2	-2	*	-4	-3	-3	*
LV	-1	-1	-1	*	-3	-2	-2	*	-4	-3	-3	*
LT	-1	-1	-1	*	-2	-1	-1	*	-2	-2	-2	*
LU	-1	-1	-1	*	-3	-3	-3	*	-4	-4	-4	*
HU	-1	0	0	*	-1	-1	-1	*	-2	-1	-1	*
MT	0	0	0	*	0	0	0	*	0	0	0	*
NL	-1	-1	0	-1	-2	-3	0	-3	-2	-4	0	-4
AT	-1	-1	-1	*	-1	-1	-1	*	-2	-2	-2	*
PL	-1	-1	-1	*	-2	-2	-2	*	-4	-3	-3	*
PT	0	0	0	*	0	0	0	*	0	0	0	*
RO	-2	-2	-2	*	-4	-3	-3	*	-7	-5	-5	*
SI	-1	-1	-1	*	-1	-1	-1	*	-3	-2	-2	*
SK	-2	-2	-2	*	-4	-3	-3	*	-6	-5	-5	*
FI	-3	-3	-3	*	-5	-6	-6	*	-6	-7	-7	*
SE	-1	-1	0	-1	-2	-2	-1	-1	-3	-4	-1	-2
UK	-1	-1	0	-1	-2	-2	-1	-1	-3	-3	-1	-2

In many Member States (e.g. CZ, DE, EE, EL, ES, IT, CY, LU, AT, PL, SK, FI, SE, UK) the protection for childcare is better than for unemployment over a three year period. (Please see section 3.4.1). In BE, this has to do with the nature of the calculation. Unemployment is assumed to take place at the end of the individual's career. In BE this entails that the individual loses the entitlement to the pension bonus which is given to those who work beyond the age of 62, as compared with a person who continues to work. If the unemployment is instead assumed to take place earlier in the career the results would be as those for the childcare case (please see table 15).

In all Member States the decrease in replacement rates due to breaks in the career due to unemployment increases over a three year period. In most Member States, the pace of decline in theoretical replacement rates is equal throughout the three years of unemployment. In a few cases the drop is smaller (e.g. BG, NL, FI, UK) or bigger (e.g. BE, DE, ES, IT, CY, PL, LV, LU, SE, SI) after the first or second year of unemployment.

In most Member States, the legislated period of entitlement for unemployment breaks does not stretch out for three years, resulting in a bigger drop in replacement rates during the second or third year of unemployment. In extreme cases these become non-income and non-contributory years.

In most countries unemployment results in a loss of pension entitlements and affects the prospective replacement rate. The results show a decrease of less than 4 pp. in most Member States for three years of unemployment. This implies a considerable protection of pension entitlements in the unemployment benefit system in most Member States. In other Member States the drop in replacement rates can amount to 6 pp. or more (e.g. SK, RO, FI) bringing the adequacy of protection of pension entitlements during

unemployment into question, which has to be balanced with the financial incentives for individuals to return to the labour market.

In SK, unemployment years are not accredited in the pension system and as are regarded as non-contributory years.

In FI, the unemployment benefit period gives no extra accrual of pension rights after the age of 63 and periods of unemployment are, therefore, not compensated in the pension system. The person can, however, retrieve a pension instead of unemployment benefit without any reduction to benefits from the age of 62. Before the age of 63, periods on earnings-related unemployment benefits accrues pension, although the accrual is naturally lower than that of work income. This is because the benefit is based on only 75 % of earnings when calculating the pension accrual. In addition, the accrual rate is lower than for work income, being only 1.5 %, while work income gives an accrual of 1.9 %.

In MT, as long as the unemployed is registering for work and satisfies all the conditions for such registering, social security contributions are paid. In such a case, it may be useful to consider the effects of a high level of protection during unemployment on work incentives.

4. CONCLUSIONS AND FURTHER DEVELOPMENT

4.1. Main findings

This report has indicated that if career lengths remain unchanged over the next 40 years, the theoretical replacement rate calculations show a decline in many countries across Europe. The drop is more pronounced in statutory pension systems, and in nearly half of the EU Member States a double-digit percentage point decline in replacement rates can be expected from these schemes.

By contrast, future retirees are expected to accrue higher occupational and/or supplementary pensions. This development, however, needs to be monitored in light of extending the coverage and the maturity of these schemes.

Despite the decline in system generosity, this report finds that statutory pension systems tend to be progressive, providing significantly better replacement rates for those on lower incomes - thus helping to alleviate the risk-of-poverty. The report also suggests that statutory pension systems, in general, provide very good protection for post-retirement incomes against such lifetime events as childcare and unemployment.

Moreover, the calculations presented in this report indicate that in many countries, pension schemes provide very strong incentives towards later retirement, implying that if the length of the career increases in line with longevity, pension adequacy need not decline.

Theoretical replacement rates can be used to give policy makers indications of how different reforms and varying personal situations affect the pension income of an individual. Comparing differences in outcomes for different typical individuals, over time or at a given point in time is an important aspect of using theoretical replacement rates as they then act as a sort of sensitivity analysis.

4.2. Areas for further work and development

In this new round of calculations of replacement rates, the exercise has been further developed and refined. Member States have increased their understanding of the national models and of the APEX model in which the calculations are carried out. Furthermore, two new cases have been added to the package of variant cases, showing a more realistic

picture of the effects of career breaks, as compared with the ten year break without any source of income that was calculated earlier. In the variant cases the exercise has also compared calculations between the variant case and the base case instead of over time for different cases as in previous exercises. This has given new insights.

4.2.1. Developing administrative data sets and projection tools

It should be stressed that trends in individual theoretical replacement rates will not directly translate into equivalent changes in future pensioners' household income. Rising female labour force participation in all Member States will result in higher average pensions within households. Economic modernisation and changes in employment, as well as later entrance in the labour market, can also lead to different pension outcomes in the future. A full assessment of future pension systems would need a technique that projects work histories, patterns of household formation and sources of income in retirement other than those considered in replacement rates. This could be achieved through more complex dynamic micro-simulation models though at the cost of a higher complexity (especially with regard to the set of assumptions used). These types of modelling tools are, at present, available in only a few Member States¹¹.

4.2.2. Coordination with the work of the Ageing Working Group

It can be interesting to make comparisons with the indicators presented in the work by the AWG and try and find ways to elaborate indicators linked to theoretical replacement rates which would be closer to the more dynamic labour market and economic profiles simulated in their exercise. This would also help to find points of comparison and contrast between the ISG and the AWG exercises. This is especially pertinent given the use of the change in pension expenditure indicator as a comparison to the change in theoretical replacement rates in the ISG exercise, and the development of adequacy indicators in the AWG exercise. Furthermore, Member States experience, as reported in the National Strategy Reports, indicates that it is important to weigh the adequacy effects of different types of indexation carefully against the sustainability impacts.

4.2.3. Improvement in the calculations of the variant cases

One of the weaknesses with the variant case calculations is that there is currently limited data for the complementary background information with regard to the variant cases used. Such information would allow for a better interpretation of the results and improve their usability in policy making. For example, in the variant case of a low income earner, it would be interesting to know what the coverage for such individuals is in occupational schemes, or in minimum pension schemes and means-tested benefits. It would also be interesting to distinguish more systematically the impact of various components of pension schemes on the overall replacement rates for different typical cases, especially given variations in the economic assumption. The impact of reforms over time for the variant cases is not either covered in this new exercise as it was in previous exercises. These could be areas for further development.

4.2.4. Refining the presentation of the results

Whiles important to ascertain adequate pensions it is important to consider the work incentives within pension systems. Developing a more systematic approach to show the change in replacement rates for longer or shorter careers can also help to study the work incentives for different profiles. It can also be useful to show the results for different

¹¹ For more information on available tools please review the Feasibility Study: PENMICRO Monitoring pension developments through micro socio-economic instruments based on individual data sources, <http://ec.europa.eu/social/main.jsp?langId=en&catId=443&newsId=490&furtherNews=yes>

components of the pension schemes more clearly to establish patterns of adequacy and work incentives.

4.2.5. Overall review of the exercise

Replacement rates have proved to be a useful policy tool in interpreting the effects of reforms and labour market situations on an individual's pension. Given the new round of projection exercises by the ISG and AWG and the changed economic situation in Europe it is important to review the ISG theoretical replacement rate exercise and assumptions in light of changed economic and labour market climate.

Future work in theoretical replacement rates would probably be best served by first having a review of the current exercise with regards to content, assumption, methodology and implementation of the exercise.

ANNEX – PATTERNS FOR WAGE INCREASE IN THE VARIANT EARNINGS PROFILES

Age	Base case	Linear 80-120	Linear 100-200	Concave
25	100,0%	80,0%	100,0%	75,0%
26	100,0%	81,0%	102,6%	79,5%
27	100,0%	82,1%	105,1%	83,9%
28	100,0%	83,1%	107,7%	87,1%
29	100,0%	84,1%	110,3%	90,0%
30	100,0%	85,1%	112,8%	92,2%
31	100,0%	86,2%	115,4%	94,2%
32	100,0%	87,2%	117,9%	95,7%
33	100,0%	88,2%	120,5%	97,1%
34	100,0%	89,2%	123,1%	98,2%
35	100,0%	90,3%	125,6%	99,2%
36	100,0%	91,3%	128,2%	100,0%
37	100,0%	92,3%	130,8%	100,7%
38	100,0%	93,3%	133,3%	101,3%
39	100,0%	94,4%	135,9%	101,8%
40	100,0%	95,4%	138,5%	102,2%
41	100,0%	96,4%	141,0%	102,6%
42	100,0%	97,4%	143,6%	102,9%
43	100,0%	98,5%	146,2%	103,1%
44	100,0%	99,5%	148,7%	103,3%
45	100,0%	100,5%	151,3%	103,5%
46	100,0%	101,5%	153,8%	103,7%
47	100,0%	102,6%	156,4%	103,9%
48	100,0%	103,6%	159,0%	104,1%
49	100,0%	104,6%	161,5%	104,2%
50	100,0%	105,6%	164,1%	104,3%
51	100,0%	106,7%	166,7%	104,4%
52	100,0%	107,7%	169,2%	104,4%
53	100,0%	108,7%	171,8%	104,5%
54	100,0%	109,7%	174,4%	104,6%
55	100,0%	110,8%	176,9%	104,7%
56	100,0%	111,8%	179,5%	104,8%
57	100,0%	112,8%	182,1%	104,8%
58	100,0%	113,8%	184,6%	104,8%
59	100,0%	114,9%	187,2%	104,9%
60	100,0%	115,9%	189,7%	104,9%
61	100,0%	116,9%	192,3%	104,9%
62	100,0%	117,9%	194,9%	104,9%
63	100,0%	119,0%	197,4%	105,0%
64	100,0%	120,0%	200,0%	105,0%
Average	100,0%	100,0%	150,0%	100,0%