

Assessing the short-term impact of pension reforms on older workers' participation rates in the EU: a diff-in-diff approach

Alfonso Arpaia - Kamil Dybczak - Fabiana Pierini'

1. Introduction

The performance of the European labour markets improved significantly during the second half of the 1990s (AER 2003). After having reached a peak in 1994, the unemployment rate started gradually to decline while both the employment and the participation rates kept rising. From 1995 to 2006 the overall employment and participation rates raised respectively by about 6 and 4 percentage points, from 59.9 to 65.6 and from 67.2 to 71.4. With increases of more than 8 and 7 percentage points, respectively for the employment and the participation rates, the female and the older workers were the most dynamic components. Although these improvements reflect long-term changes in the socio-economic behaviour (e.g. a different aptitude toward female employment and participation), there seems to be broad agreement that they took place in response to the reforms implemented during the period (e.g. ECB, 2007).

The last decade witnessed important changes in European pension systems. Indeed up to 1995 only few countries implemented pension reforms. By 2006 almost every European country had enacted reforms of the pension system. This richness of reforms can be used to conduct a "policy experiment" of the effects of pension reforms.

This paper investigates the effect of pension reforms on the participation rates of specific age groups belonging to the 50-64 age class with a cross-country event-study approach. The idea is simple. Each policy intervention is considered as a discrete event that occurred at a specific time for each country. The event-study compares the value of one variable of interest after a certain

reform or legislation has taken place with its value before such institutional change has occurred. To control for other determinants not related to specific policy interventions, the findings of the before-after comparison are compared with the average for a control group made of those countries which did not implement a reform at least in one year covered by the sample period. With the event-study approach we will verify whether after pension reforms the participation rate rises.¹

The paper is organised as follows. Section 2 presents the main stylised facts. Section 3 briefly reviews the main theoretical explanations of the observed trends in participation, while section 4 discusses the effects of pension reforms on the average retirement age. Section 5 gives an overview of the reforms undertaken in the EU between 1997 and 2007. Section 6 presents the empirical finding of the effects of recently introduced pension reforms on the older workers' activity rates. Section 7 discusses the policy implications and possible follow up.

2. Stylised facts: main developments in older workers' participation rates

Life expectancy has significantly increased in developed countries, mainly thanks to improved living standards, working conditions and health care. In the early 1980s it was not rare to find European countries with a life expectancy at around 75 years. In 2006, the same average life expectancy was observed for few new Member States only (Table 4). Conversely, for the EU15 the average life expectancy hovered around 80 years.

Work has become less physically demanding, population much healthier and long-lived. Even so, as documented, among others, by Palmer (1999), Samwick (2002), and Boeri et al (2001), there has been a significant decline in the participation rate of elderly people, which reversed its negative trend only in recent years. The dramatic difference in the time pattern across men and women (Graph 1 and Graph 2) often gets unnoticed. For several countries, the activity rate of men aged between 55 and 64 appears often U shaped, with decline in participation at least until the mid 1990s. For the 50-54 age group, rates appear more stable and the decline relatively more limited. There are significant exceptions to this pattern – e.g. the participation rates of Belgian and Italian men aged 50-54, rapidly converging to the highest rates, and that of German and Finnish males between the 60 and 64 years. Despite country specific labour force histories, the

¹ DG ECFIN, European Commission. The views expressed are the authors' alone and do not necessarily correspond to those of the European Commission. A final version of this paper will appear as Economic Paper in DG ECFIN European Economy.

¹ The event-study method has been applied to study market response to changes in the law, both as a result of court decisions and legislative reforms.

broad trend of a shrinking labour supply of male aged 50+ remains. Thus, even though men live longer, they leave the labour market earlier.

Conversely, women, especially those aged less than 60, have a steadily rising participation, and it is not rare to find countries where female rates almost doubled in 10 years only. The change over time in the age profile of the participation rates confirms that the major modifications in the participation behaviour occurred in the case of women, at age below 59, and especially in their early 50s. Without these modifications, several countries would have had in 2007 activity rates hovering around the level of twenty years earlier. As a consequence of these differentiated patterns in the participation rates by sex, the average age at which people retire has changed only to a minor extent (Table 5).

A synthetic indicator of the outcome of the participation decision is provided by the age profile of the exit rate from the labour market. This rate is calculated as the conditional probability of an age cohort of not staying in the labour market at age h .² Graph 3 displays these rates for selected countries, respectively for two sub-periods: the mid 80s-early 1990s and the first half of 2000s. For all countries spikes can be observed at about the statutory retirement age and, for some, at the age of early retirement. For the earliest period, the male exit rates just below the age of 60 are in an interval between 10% and 15%; the exit rate reaches its maximum at the age of 60. Moreover, for some countries it comes immediately to one's eye the difference in the exit rates by sex, which mainly reflects different statutory retirement ages of men and women. Finally, compared to the first sub-period, there are significant changes in the age profile of the exit rates in the recent years. The probability of leaving the labour market at ages just below 60 falls for both sexes in several countries. Even so, at the age of 60 there is a significant increase in the probability of withdrawing from the labour market. Early exit from the labour market remains high in Belgium, Germany, France, Italy and the Netherlands.

The patterns briefly described are the outcome of complex individual participation decisions which are influenced by a variety of factors, including *social factors*, such as longer schooling or change in the role of women in households; *demographic factors*, including the decline of fertility rates and modifications of the age structure; *institutional factors*, such as changes in the financial incentives to retire early, in the eligibility conditions or in the availability of alternative early retirement paths. These paths were commonly used in the 70s and 80s as labour force policies to deal with industrial restructuring, high unemployment of older workers, low employment of

² In symbols if $PR(h,t)$ is the participation rate at time t of cohort h the exit rate is defined as $1-PR(h,t)/PR(h-1,t-1)$.

young workers, or as a labour cost saving strategies and consisted in practice in unconditional access to disability and unemployment benefits (Van Ours, 2007 for the Netherlands) or pre-retirement programmes (Brugiavini, 2001). Economic factors, such as the level of the unemployment rate, the average income by household, the share of part-time employment in total employment or the share of the services sector in the economy have also been invoked to explain the differences in the participation rates across countries and over time.

3. What explains the main trends

Many economists have tried to solve the puzzle of higher life expectancy, less physically demanding work and lower retirement ages. Two major factors have caused declining participation rates of older workers (Diamond, 2005).

First, due to positive trend in real earnings, both the fraction of lifetime spent working (i.e. the hours worked when working) and the years spent working has dropped for workers of all ages. Thus, the income effect deriving from higher real earnings prevailed on the substitution effect, implying more hours available for leisure. Higher real incomes allowed higher consumption and savings despite a decreasing working time. According to Bloom, Canning and Moore (2007), the very increase in real wages has been the main driving force for the long-term decline in the retirement age in industrialised countries over the last 150 years. The increase in the lifespan has also produced a wealth effect because of the influence of compound interest and wage growth, which reduce the proportion of life devoted to work.

Second, the rules establishing access to pension, public health and long-term care may have influenced the individual decision to retire. Many have noticed high exit rates at the first age at which one can retire and at the statutory retirement age (e.g. Coile and Gruber, 2000 or Samwick, 1998). Using a panel for 12 countries, Gruber and Wise (2002) demonstrate several disincentives for continued work for the elderly built in national social security schemes. As life expectancy increases it would be optimal to postpone retirement age. However, the existence of social security programs translate into higher savings and earlier labour market exits (e.g. Bloom, Canning, Mansfield and Moore, 2006 for a life-cycle model of the labour supply with endogenous retirement age and the social security arrangement). Similarly, in a model with stochastic ageing among three age classes and accumulation of human capital with two skill levels, Ljungqvist (2007) shows that the non-employment effect of taxation do not differ in complete and incomplete markets. Even so, aggregate outcomes conceal different individual behaviours. In a complete market, the consumption allocation is independent from the labour market position.

Conversely, in an incomplete market, one's wealth influences how work histories impinge upon current consumption and labour supply. Consequently, the non-employment outcomes depend on the influence of the tax and benefit system on the personal distribution of financial wealth. With complete markets, taxes and benefits are a powerful incitement to non-employment of low-skilled. In incomplete markets the well-off high-skilled choose non-employment through access to retirement savings.³ Consequently, the non-employment effects are attenuated if benefits are only paid to non-employed people that have not been high-skilled when working. More generally, individuals able to set aside enough funds are those that firstly retire, especially when they are allowed to use benefits to "top-off" their retirement wealth.

Early retirement schemes can be characterised by several adverse mainly long-term effects (Conde-Ruiz and Galasso, 2004). They can influence negatively the accumulation of human capital of less-skilled workers, lower economic growth, and increase the dependency ratio and the risks of financial imbalances when population ages. Using an overlapping generation model with heterogeneous agents extended by voting, Conde-Ruiz and Galasso demonstrate why alternative policies had not been realised even though they would have had less distortive impact upon the economy. Their analysis provides a political economy explanation of the early retirement schemes. These schemes were introduced in the 1960s and 1970s as a reaction to the large labour market shocks, which resulted in a mass of redundant middle-aged workers who were not entitled to pensions. Although early retirement is not the first best response to these shocks, a political equilibrium can be achieved with a support of an early retirement coalition of the extremes composed by both low-skilled and high-skilled workers. Following the shocks, low income workers who expect to retire early would gain from an early retirement pension. High income workers, who do not plan to retire, transfer part of the current tax burden on future generations.

4. Pension reforms and average retirement age

If expected income falls or life expectancy increases unexpectedly, a worker realises that his/her planning horizon is extended and previous plans concerning the rest of his/her life should be reassessed. Economic theory proposes three ways how to set up a new optimal plan. First, a worker could reduce consumption during pre-retirement age and accumulate savings for later stages of life. Second, a worker could reduce consumption spending during retirement age and deplete lifetime savings more slowly. Third, a worker could decide to work longer to reach the

³ With incomplete markets fiscal policy impacts employment outcomes via the optimal allocation of individual wealth. As tax rates increase, skilled people can put aside enough funds to finance early retirement. At successively high rates, the low skilled will start to save up for early retirement.

initial level of consumption. When there is only one earner in the family, the fall in his or her expected income during retirement may induce the second earner to enter into the labour market to keep unchanged the family consumption.⁴ The final impact on the participation rate depends on how these effects influence the retirement decision.

Within a life-cycle framework, the retirement decision is a function of the lifetime streams of earning, pensions and other sources of income (Mitchell and Fields 1981). Obviously rational agents chose their optimal consumption pattern jointly with the amount of work they wish to supply during their lifetime and the time at which they wish to stop working. In a standard competitive model with social security, taxes and benefits have distortionary effects on individual consumption, savings and optimal retirement age (e.g. Seshinski, 1977). Thus, compared to an economy with no benefits, any positive level of social security benefits implies in equilibrium lower consumption and lower retirement age. In the *option value* model (Stock and Wise, 1990), the work/retirement decision is associated to the option of *continued work keeping the option to retire at a later stage*. If the expected value of working is worth more than the expected value of retiring, the individual continues to work. If there are no expected gains from continued work, he would retire. In this framework, changes in the pension formula may alter significantly the retirement rates. Changes in the coverage rate and in the accrual of retirement wealth attributable to continued work, rather than the level of retirement wealth at a given point in time, are found to influence the average retirement age (Samwick, 1998).

Gruber and Wise (2002) documented the existence of enormous disincentives for continued work at old ages and their significant effect on the retirement decision. According to their simulations, a reform that delays benefit eligibility by three years would likely reduce the proportion of men from 56 to 65 out of the labour force between 23 to 36%.

Mitchell and Fields (1983) apply an ordered logit model to estimate the impact on the average retirement age of changes in the expected income. Not surprisingly they find a negative impact of a rise in social security streams on the average retirement age. The impact of a 10% increase in the social security benefits was estimated to reduce a retirement age by -0.07 years for all individuals without any restriction on age. In case of individuals at the age of 60 the effect is more pronounced when reducing the average retirement age by -0.19 years.

⁴The so-called "added worker" effect implies an increase in the participation rates when the expected income of the family deteriorates (Pissarides 2000).

Bottazzi, Jappelli and Padula (2006) estimate - separately for males and females - the impact of the Italian pension reform on the expected retirement age, omitting the transitional 1993-1997 period of the reform. While their regressions indicate that the patterns found for women are the same as for men, still the effect on women is somewhat larger. The estimated impact on the expected retirement age is about 0.7 years for both male and female private sector worker. In case of public employee and self employed the effect is even higher reaching values over 1 and 2 years respectively.

Some EU countries have switched from defined benefit to defined contribution pension systems or at least introduced one pension pillar based on this assumption. Such change may lead people to stay longer in the labour market and, therefore, is expected to increase the average retirement age. Friedberg and Webb (2005) support this hypothesis by estimating that employees with defined contribution plans usually retire one or two years later compared to employees with defined benefit plan. Furthermore, Diamond (2005) argues in favour of pension systems with low implicit tax on continued work after the age at which retirement benefits can first be claimed. Usually low implicit taxes are ensured with a defined contribution system.

Palmer (1999) proposes a notional defined contribution pay-as-you-go system. As usual in prevailing pay-as-you-go systems, working people contribute to the system providing resources for contemporary pensioners. However, differently from the DB system, the more people contribute to system the higher is their future pension. Finally, the rate of return is not affected by the developments of the financial markets, but by the overall performance of the economy. So, the system should stimulate people to postpone their exit from the labour market and, in passing, to its financial stability.

Bloom, Canning and Moore (2007) show that the optimal response to dealing with the solvency problems that arise in social security when life expectancy increases is to reduce contributions and increase benefit rates, maintaining solvency exclusively by increasing the retirement age. This response can maintain solvency because raising wages over time and compound interest on accumulated savings mean that longer working lives tend to create more than proportional wealth at retirement.

The retirement age has stabilised and recently partially reversed its declining trend. Again, several factors have to be taken into account. First, under the pressure of ageing and the medium- to long-term risks for the financial sustainability of social security systems, several member states have enacted reforms of the pension systems that have tightened the eligibility conditions for

pension benefits (e.g. minimum years of contributions, retirement age) and reduced their generosity. Second, some reforms have shifted part of the financial risks from state to employers and employees. Thus, longer life expectancy and less generous pension benefits may have induced workers to work longer to accumulate precautionary savings for their old age (i.e. they have made the income effect prevail over the substitution effect). The next section reviews more in depth the pension reforms enacted in the member states in the last decade.

5. Overview of early retirement and pension reforms undertaken in the EU over the 1997-2007 period⁵

Reaching low levels of unemployment and inactivity among older workers and promoting longer working lives are key factors to alleviate the negative impact of population ageing on employment and economic growth.⁶ As an incentive to undertake the reforms to improve the labour utilisation of older workers, a number of key targets on the employment of older workers were fixed in the framework of the Lisbon strategy. The 2001 Stockholm European Council stressed the importance of labour market reforms encouraging higher employment especially among women and elderly workers, and emphasised that pension reforms are needed to ensure both the long-term financial sustainability and a certain degree of intergenerational fairness. It set a target of 50% employment rate for people aged 55-64 to be reached by 2010. Next to this, the Barcelona European Council in 2002 called for the EU average labour market exit age to be risen by five years by 2010.⁷ In response to these pressing needs, all EU member states have reformed their old-age pension systems over the last ten years - so as to ultimately encourage older workers

⁵ This section briefly describes the main elements of the reform strategies adopted in the EU27 over the period 1997-2007. Information on pension reforms adopted in the EU27 in the years 2000 to 2007 is taken from the LABREF database (http://ec.europa.eu/economy_finance/db_indicators/db_indicators8638_en.htm). For reforms enacted during the Nineties in the EU15, we used the Fondazione Rodolfo De Benedetti database, available at: <http://www.frdb.org>. Concerning Bulgaria and Romania, for the time being LABREF only covers the years 2003 to 2007. Missing information was mainly obtained from Disney, R. (2003), "Public Pension Reforms in Europe: Policies, Prospects and Evaluation", a number of ILO and ISSA papers, as well as the Joint Reports on Social Protection and Social Inclusion, 2007 and 2008 editions, and the Synthesis report on adequate and sustainable pensions 2006, all available at: http://ec.europa.eu/employment_social/spsi/index_en.htm.

⁶ The Commission-EPC report on the long-term economic and budgetary impact of ageing populations has been released in 2006. A new demographic projections exercise for the period 2005-2060 is currently under way and its results will be made available during the first quarter of 2009. For more information: http://ec.europa.eu/economy_finance/epc/epc_sustainability_ageing_en.htm or http://ec.europa.eu/economy_finance/analysis_structural_reforms/ageing_welfare4160_en.htm

⁷ All Council Conclusions are available from the website of the Council of the EU, at: <http://www.consilium.europa.eu>. To notice, that the current average employment rate within this age group is around 41, while the average labour market exit age is currently 61 years. It should also be noted that the member states will have to go beyond these targets if public finances sustainability is to be maintained in the long-run.

to stay longer in the labour market. A large part of these reforms were packages comprising a number of different measures (Table 6 and Table 7).

In this paper we adopt the widely accepted distinction between parametric and systemic reforms. Parametric reforms are those which involve adjustments to the parameters of the defined benefit (DB) and pay-as-you-go (PAYG) public pension systems (or points systems) without changing their basic nature. Systemic reforms are those moving away from the PAYG DB-type public pension system and adopting a DC-type personalised accounts system, thus linking more strictly pension contributions to pension benefits.⁸

Several Member States have enacted parametric reforms mainly focusing on the eligibility conditions to old-age benefits, contribution rates, or benefits formula, without basically modifying the underlying philosophy of the concerned pension system. Only in few cases, pension reforms involved radical changes in the old-age insurance system (so-called "systemic reforms"), notably leading to the conversion of pre-existing DB first pillars into notional defined contribution (NDC) public pension schemes (e.g. PL, SE), or to the introduction of statutory funded pension schemes (e.g. HU, EE, LV, SK).

Other measures included changes in the taxation of contributions and benefits, or in the pension coverage, as well as the setting-up and development of mandatory and/or voluntary second- and third-tier pension schemes. Reducing the generosity and availability of early retirement pensions was also a key component of all these reform strategies. Bonuses in case of postponement of retirement were introduced in terms of higher pension benefits for extending working lives.

The EU15, and especially countries of the euro area, were the most active in the field of pensions over last years, due to the strong pressure stemming from ageing populations and persisting low participation rates of older workers. In some countries, enacted measures were rather incremental in nature, and tended to refine or build upon existing strategies - dating in some cases from the early Nineties (e.g. Italy). Reforms generally involved the establishment of stronger actuarial links between benefits and contributions - mainly through longer contribution periods required for a

⁸ The distinction between parametric and systemic reforms is largely used by the international academic community, notably the IMF and the OECD (see for instance "Pensions at glance", OECD, June 2007). The key parameters of DB pension schemes can be grouped into: income measures (ceiling or other restrictions on pensionable earnings; number of past salaries included in the calculation of the pension; revalorization mechanism for past salaries); eligibility conditions (statutory retirement age, minimum retirement age (for early retirement), minimum vesting period, contribution rate); benefit formula: (accrual rate; "reduction factors" for retirement prior or after the statutory retirement age; maximum replacement rates and/or pensions; minimum replacement rates and/or pensions; indexation mechanism for pensions). The main difference between DB and DC pension schemes lies in

full pension - and increased incentives for workers to retire later, notably by means of actuarial reductions for early pensions and increases in pension rights for deferred retirement.

With few exceptions (e.g. Slovakia), no major reforms were on the contrary more recently passed in recently-acceded Member States, as the measures introduced in the 1990s had already involved substantial reshufflings of their old-age pension systems, (for instance, Poland, Estonia, Latvia, Lithuania and Slovenia). In some cases, recent reforms in the EU10 have increased the generosity of the system, for instance by introducing new early retirement schemes where they did not exist any more (e.g. in Lithuania, where the an early retirement scheme abolished in 1995 was re-introduced in 2004 for the long-term unemployed, the Czech Republic, where a new programme to facilitate the early-retirement of older workers in the steel industry was introduced in 2000) or by reinforcing them (e.g. in Hungary), to help absorb the shocks of ongoing employment restructuring and economic change.

Parametric reforms, mainly involving changes in the eligibility conditions...

The majority of pension reforms adopted in last ten years were parametric reforms mainly aiming at introducing closer actuarial links between contributions and benefits (notably by extending the period over which earnings are taken into account for benefit calculation), and stricter conditions for eligibility to first pillar defined-benefit pension schemes (notably through higher retirement ages). The reference contribution period and wages used for the calculation of old-age pensions were both extended in Finland, in 2003. In this country, the annual pension accrual rates were also modified to discourage early exits from the labour market and to financially reward long working careers. In addition, greater flexibility was given to older workers to decide their retirement age (abolition of the general retirement age at 65) while it was also decided that starting from 2009 pension levels will begin to reflect changes in average life expectancy. In Austria, with the pension reform passed in 2003, the retirement age was raised to 65 for men (60 for women) starting from 2017, the assessment period for pension calculation gradually extended from 15 to 40 years and the accrual rate gradually reduced. One year later, the 2004 reform redesigned the calculation of pension benefits leading to a much stronger link between contributions and benefits, including a bonus/malus system for deferred/early retirement, and introduced a uniform pension law for all professions, there including civil servants. Finally, the reform of the public old age pension scheme introduced in Portugal in 2000 increased the

the sharing of risks for longevity between the current generation and future ones (i.e. the shift to DC structure in systematic reforms implies greater risks for individuals).

contribution period for a full pension for the private sector to 40 years. In 2005, it was extended to employees in the public sector. The benefit formula was again significantly changed in 2007.

... and notably in the retirement age

More in general, almost all countries adopted increases in the statutory retirement age, as key measures to keep people longer on the labour market. The majority of member states took a smooth transitory path towards higher retirement ages, sometimes with very long phasing-in periods (Table 8). The age of eligibility to a state pension was progressively increased from 65 to 67 in Denmark, Germany (2007 reform - with a very long phasing-in period, between 2012 and 2035) and Sweden. In the UK, the earliest age to take a pension was raised from 50 to 55 in 2004 and a default retirement age was fixed at 65 in 2005, with unjustified retirement ages of below 65 years being prohibited. The retirement age was also progressively increased in the Czech Republic (2003) up to 63 years for men and childless women (women get one-year bonus per child varying between 59 and 62 years), in Hungary (1997) up to 62, but also in Slovenia (1999) and Romania (2000). In Cyprus, the retirement age for civil servants was increased from 60 to 63, the same as in the private sector (where retirement ages range between 63 and 65). In Portugal it was raised from 60 to 65. The age at which women can receive a first pillar pension was equalised with men's age in most countries. The statutory retirement age was abolished and flexible retirement ages introduced in Finland and Spain.

Systemic reforms

Few countries made a complete overhaul of their first pillar public pension system, so as to strengthen the actuarial principles in their statutory pension systems in such a way that individual pension payments are explicitly linked to individual contributions paid to the programme. This is notably the case of Poland, where the general reform of the old-age pension system launched in 1999 replaced the pre-existing defined-benefit PAYG pension scheme with a three pillar system including a notional defined-contribution (NDC) first pillar linking contributions to future pensions, a second pillar that capitalises individual contributions and is mandatory for the younger generations, and a voluntary third pillar based on company plans or other savings vehicles.⁹ Similar reforms were passed also in Sweden (1999), Latvia (1996) and Italy (1993, with very long implementation schedule). Alongside, some member states (HU, SE, PL, LV, EE, LT and SK) switched part of the public defined-benefit pension system into funded defined-

contribution schemes, where the pension depends on contributions and interest earned on them. These major changes in the pension systems were meant to help maintain the sustainability of public finances mainly by transferring part of the demographic risk from the state to individuals and by giving strong incentives for working longer.

Boosting second and third pillar pension provision

Somehow similarly, the pension reform passed in Germany in 2001 established state-supported second and third-pillar voluntary funded pension saving schemes, supplementing a gradual reduction of first-pillar pension levels through the modification of pension adjustments. In France, the 2003 pension reform paved the way for the development of third pillar pension funds, based on employees' own savings, and for the convergence of private and public pension schemes. A new government-run supplementary individual retirement account system was introduced in Portugal in 2006. Support measures to supplementary pension schemes, mainly in the form of tax incentives, were introduced/increased in those countries where second and/or third pillar pensions had been only recently set up, while contribution rates were adjusted in the direction of private and occupational schemes (e.g. HU, DE, NL) so as to promote the development of privately-managed, fully-funded occupational pensions. Similarly, the automatic transfer of the end-of-service allowance to occupational pension funds was decided in Italy in 2004.

Introducing life expectancy adjustment factors

To take better account of future demographic trends in the calculation of pension benefits, a significant number of countries introduced a demographic adjustment factor in their first pillar pension formula, linking pensions to changes in average life expectancy. This is a common feature of all countries having introduced systemic reforms, where pensions will in future automatically adjust to changes in life expectancy, but similar adjustment mechanisms have also been built into systems which have not undergone systemic reforms. This is, for instance, the case of the 'sustainability factor' introduced in Germany in 2004, which reflects not only demographic, but also labour market trends (i.e. changes in the ratio between contribution payers and pension recipients). DK, FR, AT, FI, LV, LT and - more recently - PT (2007) introduced similar provisions. In France, the 2003 pension reform provided for an increase in the

⁹ Following the shift of the public pension pillar from defined benefit to notional defined-contribution accounts, the pension benefits depend on contributions made, but the notional interest rate is set by government and the schemes remain pay-as-you go financed.

contribution period by one-quarter every year to take account of the expected increase in life expectancy.

Discouraging early retirement...

Early retirement benefits, which vary by country and usually by professional group depending on the nature of work, can be a key reason for early labour market exit. They are often used as an instrument of employment policy, to artificially lower the unemployment rate of elderly workers. To discourage early exits from the labour force, member states have either abolished early retirement schemes or substantially reduced the access to and the generosity of any benefits received before normal retirement age (Table 8). In some, early retirement schemes were dramatically cut or completely abolished. For example as part of the 1999 pension reform, in Poland the "pre-retirement allowance" was discontinued in 2001, while the eligibility conditions for obtaining "pre-retirement benefits" were made more stringent in 2004.¹⁰ A comprehensive reform of the pre-retirement pension system was approved in France in 2003¹¹. In Finland (2003-2004), the qualifying age for early old age pension was raised to 62 and the individual early retirement, available to people with reduced working capacity aged 60 to 64, was phased-out. Similarly, the unemployment pension (allowing early retirement for older long-term unemployed) will be abolished by 2009¹². Some early retirement schemes were suspended and abrogated in Portugal in 2005¹³ and the conditions for accessing early retirement tightened in Czech Republic and Spain (2006). Germany, Hungary, Slovakia (2006) and Portugal (2007) cut early retirement benefits, raised the minimum contributory period to be eligible for an old-age pension and implemented several measures to limit and eliminate those schemes open to unemployed. In Latvia, the possibility to early retire will be eliminated as of July 2008. The early retirement age was gradually raised in Austria in 2003, and the possibilities for early retirement phased out by 2017. In Germany (2004), the minimum entry age for early retirement on account of

¹⁰ Both schemes had been introduced in 1994 to accompany employment restructuring in the waning branches and outdated sectors of national economy.

¹¹ The 2003 reform, which was embedded in the pension package known as the 'Raffarin Act', included limiting fiscal incentives for pre-retirement schemes to physically demanding jobs and restructuring firms in financial distress; eliminating progressive early retirement; increasing the cost of company early-retirement schemes, placing restrictions on state-financed early retirement. Even so, employers may still require employees who have the right to a full pension to retire between the ages of 60 and 65 if the worker is covered by an early retirement scheme put in place before the reform came into force or if an extended sector-level collective agreement, providing for compensatory measures for such retirement, was reached before 1 January 2008. A number of sectors have taken advantage of this option for maintaining retirement before the age of 65.

¹² If people become unemployed at the age of 57, they will be entitled to the income-related daily unemployment allowance until the age of 65 if they have worked for five years during the previous 15. Those born before 1950 will be entitled to a daily unemployment allowance from the age of 55 until the age of 60; thereafter, early retirement and then full retirement will be still possible.

unemployment was increased from 60 to 63. The earliest age at which a private or occupational pension can be taken was also raised in those countries where this has an impact on the effective labour market exit age (e.g. UK, IRL). In Sweden (2000), the possibility was introduced for early retired people to return to work. All tax facilities for early retirement schemes were abolished in the Netherlands.

... and rewarding deferred retirement

The possibility to work beyond the official retirement age was expanded in most countries, and rewarded for instance with higher accrual factors – e.g. CZ, EE, LU, DE, EL, HU, PT, SI - or through the introduction of supplements for deferred public old-age pension (e.g. DK). Partial retirement was introduced in Germany (2001) and the UK (2004) and gradual retirement in France (2006). In this country, a new form of fixed-term contract for job seekers aged 57 or more was introduced in 2006, while the so-called 'Deladande Contribution' - a tax to be paid by companies dismissing employees aged 50 years and over - was gradually phased-out to improve the employability of older workers¹⁴. Incentive schemes for workers who decide to remain in the labour market after the official retirement age were decided in Italy, France, Spain and the UK.

Some efforts were also made to promote flexible working arrangements, to facilitate and encourage remaining at work after the age of 60. For example, Germany, Finland and France introduced part-time work practice before the standard retirement age. In Sweden, individuals can continue working, taking a part-time pension and accrue additional unlimited pension rights. Gradual retirement was introduced in Luxembourg for those employees who agree to switch from full-time to part-time work.

¹³ Previously, workers in Portugal could qualify for early retirement benefits either at age 55 with 30 years of contributions or at age 58 if they were unemployed.

¹⁴ The Deladande Contribution was introduced in 1987 to compensate for the removal of the administrative authorisation of redundancy but in practice obstructed the recruitment of people aged 50 years and older and transferred possible redundancies to employees who were soon to reach 50 years of age. The contribution will be phased out completely in 2010.

6. An empirical evaluation of the effect of pension reforms on the older workers' participation rates in the short-term

For the revised Jobs Strategy, the OECD has conducted an extensive research on the impact of policies and institutions on employment and unemployment in the OECD countries.¹⁵ With the cross-country/time series techniques, this work has explored the impact of structural policies and labour market institutions on the unemployment and employment rates, the latter disaggregated by main age groups. It is shown that high implicit taxes on continued work deter older workers from remaining in the labour market, while high statutory retirement ages have the opposite effect.¹⁶ The characteristics of the old age-age public pension systems (e.g. standard retirement age and accrual rates) and other forms of income support (early retirement schemes) are found as the main determinants of the differences across countries and over time in the 55-64 participation rates (Blondall and Scarpetta, 1998; Duval, 2003).

In this section we verify the impact of pension reforms on the participation rates of specific groups of older workers with a difference-in-difference approach. This approach requires the identification of a specific policy intervention against which one should compare the difference in outcomes before and after intervention for a treatment and a control group. A source of spatial and temporal policy variation in the reforms carried out is necessary to estimate this effect.

We exploit the information available from LABREF and other sources (e.g. FRDB, MISSOC etc) to identify a chronology of reforms. LABREF provides information on reforms enacted in various years by the 27 Member States¹⁷. Reforms are classified in three categories. First, fundamental reforms are those systemic reforms that imply a change from defined benefits to notional defined contribution first pillar pension schemes or that transfer public pension savings partly to private funded schemes. To this category belong also parametric reforms that entail a change in the eligibility conditions (e.g. statutory retirement age, years of contributions). These

¹⁵ Bassanini, A. and R. Duval (2006), "Employment Patterns in OECD Countries: Reassessing the Role of Policies and Institutions", *OECD Economics Department Working Papers*, No. 486, OECD Publishing

¹⁶ A 10 percentage points cut in the implicit tax and a one-year increase in the standard retirement age are estimated to raise the employment rate of older workers by 1 and 0.6 percentage points, respectively.

¹⁷ LABREF is an inventory of labour market reforms jointly managed by DG ECFIN and the Economic Policy Committee. It is conceived as a tool to provide comprehensive description of qualitative features of the reform process, including the design of enacted reforms, their scope and durability. To date, the database covers the years 2000-2006 for the EU27. Information for the year 2007 will be made available to the public in April 2008. The database can be freely accessed at: http://europa.eu.int/comm/economy_finance/indicators/labref_en.htm. For a description of LABREF see *European Economy Research Letter* Vol. 1, issue 3 November 2007. As regards pension reforms LABREF provides information distinguishing policy measures in the area of Disability benefits, Early retirement schemes, Contributions, Coverage, Eligibility conditions, Level and tax treatment of pension reforms. For the years 2000-2006, the chronology of pension reforms is taken from LABREF. For the previous years the information draws on different sources (e.g. EIRO, MISSOC, NATLEX).

reforms are usually gradually phased in and imply longer implementation lags. Second, all other measures that do not modify financing or eligibility conditions are deemed as non fundamental, namely those modifying the tax regime of contributions and pension benefits, indexation rules, or introducing second and/or third pension pillar gradually and on a voluntary basis. The third group gathers all measures that imply phasing-out of early retirement schemes.

Graph 4 displays the cumulated number of fundamental, non-fundamental pension and early retirement reforms for the period 1990-2006. Three things emerge from this chart. First, an increasing number of countries introduced reforms that changed the philosophy of the pension system (fundamental reforms). As of 2006 nearly every European country, especially of the EMU (Table 6), had reformed its pension system. Second, starting from 2000, non-fundamental reforms are more frequent than fundamental or early retirement reforms. Third, early retirement reforms were rare in the 1990s but became more frequent in the early 2000s.

Thus, there is a rich variation in policy choice over time and across countries that can be used to estimate the effect on the participation rates of policy interventions. Each measure is considered as a discrete event occurred at a specific point time for each country. The value of a variable of interest after certain legislation has taken place is compared to its value before such a change has occurred. To control for other factors unrelated to specific policy intervention, the before-after comparison is evaluated against the average of a control group. In the period under consideration almost all countries undertook a pension reform. The quasi-natural experiment framework requires that pension reforms are a source of exogenous variation with respect to shocks to the participation rates. We assume that the main reason for governments to undertake a pension reform is not to offset different pattern of participation rates and retirement age by different age groups, but to achieve financial sustainability of social security.

Our sample covers 27 countries over the 1990-2006 period.¹⁸ To define our treatment group we identify as reform year the year in which a reform is enacted. When reforms of the same type are enacted in two consecutive periods we treat them as a one reform year. Thus, the average participation rate is taken representative of the participation rate at the time of the reform. Similarly, if there are at most two years between two years of reforms we treat them as a one reform year as well. Our control group is made out of the remaining periods. Within both groups we compute the average change in the participation rate. Finally, the average change in the participation rate of the treatment group is compared with average participation rate for the control group. If a reform is successful, the

¹⁸ Since data on participation rates from European LFS Statistics are not available for all years for all countries the panel is unbalanced.

difference between the participation rates of the target and control groups should be statistically different from zero.

If a reform is successful, the participation rate of our target group should significantly change after the reform. One way to detect this is to compare the change in the participation rate 1, 2 and 3 years after a pension reform has been implemented with the change in the participation rate in all periods but those that followed a reform. Formally, the change in the participation rate can be modelled as follows:

$\Delta PR_{i,t} = \alpha I_{i,t} + v_{i,t}$ where $I_{i,t}$ is an indicator taking the value of 1 if country i enacts a reform in period t and zero otherwise. A similar expression holds for a country j which never did a reform in any year t : i.e. $I_{j,t} = 0$ for all $j \neq i$ or for $j = i$. The average change of the participation rate in reforming years relative to change of the participation rate in years of non reform can be written as follows

$$\frac{\sum_t \sum_i \Delta PR_{i,t}}{IT} - \frac{\sum_s \sum_j \Delta PR_{j,s}}{JS} = \alpha$$

The reform in country i is successful if α is statistically different

from zero. We evaluate the effect of pension reforms comparing the average change in the participation rate after a pension reform with the average change of the participation rate over the sample period excluding those years where a reform occurred.¹⁹

For each target group, the first two columns of Table 1 to Table 3, report the average change in the participation rate over the two sample periods, while the third display the test statistics to assess whether their difference²⁰ is systematic or simply the outcome of pure chance. The test supports the hypothesis of a statistically significant increase of the participation rate of the 50-54 and 60-64 age groups in response to early retirement reforms. Conversely, no significant effect is detected for the fundamental reforms while those measures that we have dubbed as non fundamental appear to have influenced positively the participation rate of the 55-59 age group only.

Table 1 - Average annual change of the participation rate after EARLY RETIREMENT reforms' years and years where no reforms occur			
	No reforms' years	Reforms' years	z-test: same mean changes
Participation rate 50-54	0.5	0.9	1.9
Participation rate 55-59	0.7	0.9	0.6
Participation rate 60-64	0.3	0.9	2.4
Source: Authors calculations on LABREF database; the difference between the participation rates of the no-reforms and reforms years is statistically different from zero at 5% of confidence when the value of the z-test is above 2			
<i>Source: Commission services.</i>			

¹⁹ In contrast, we do not look at the effect on the participation rate of changes in one specific element of the system (i.e. contributions, eligibility conditions, retirement age, indexation formula, and the like). We leave this for future work.

²⁰ Since it may take some time for a pension reform to have visible effects on the participation rate, we calculated the average change in the participation rate over a period of 6 years following a pension reform.

Table 2 - Average annual change of the participation rate after FUNDAMENTAL reforms' years and years where no reforms occur

	No reforms' years	Reforms' years	z-test: same mean changes
Participation rate 50-54	0.8	0.5	-1.4
Participation rate 55-59	0.7	0.9	0.4
Participation rate 60-64	0.3	0.6	1.1

Source: Authors calculations on LABREF database; the difference between the participation rates of the no-reforms and reforms years is statistically different from zero at 5% of confidence when the value of the z-test is above 2

Source: Commission services.

Table 3 - Average annual change of the participation rate after NON-FUNDAMENTAL reforms' years and years where no reforms occur

	No reforms' years	Reforms' years	z-test: same mean changes
Participation rate 50-54	0.6	0.5	-0.4
Participation rate 55-59	0.4	1.1	2.1
Participation rate 60-64	0.2	0.5	1.2

Source: Authors calculations on LABREF database; the difference between the participation rates of the no-reforms and reforms years is statistically different from zero at 5% of confidence when the value of the z-test is above 2

Source: Commission services.

Graph 5 shows the time pattern of the participation rate around the reform event for three types of pension reforms and three age groups of elderly workers. We consider only those reforms that are followed at least by one year; hence, measures taken in 2006 are excluded from the sample. Next, in order to select the reform years we treat the two consecutive periods of reform as a one reform year. The same rule applies for years once there are at most two years between two years of reforms. Consequently, the participation rate in the selected years is calculated as a simple average of the participation rates in these years. The figure plots for the different age-groups the average change in the participation rate compared with the year in which the reform occurred. Hence, each point of the chart gives the cumulated change up to and since the enactment of the reform. Before the pension reform, all groups have participation rates lower than or as big as the rate observed at the time of reform. After the reform, the participation rate increases and after 3 years is on average 5 percentage points higher than at the time the pension reform is enacted. A successful reform should imply a change in the slope of the line in the years following the reform.

The first column of [Graph 5](#) shows the time evolution of the participation rate for early retirement reforms.²¹ For different age-groups, the graphs plot the cumulated change before and after the enactment of the reform. The following points are visible. First, the increase in the overall participation rate is mainly due to the female component. Second, after early retirement reforms, the participation rate of female aged 55-59 slightly accelerates, while the male profile is more muted. Third, the changes in the participation rates of the oldest group barely differ by gender. Thus, 3 years after an early retirement reform, the activity rates of the 50-54 and 55-59 age groups increase on average by about 2.0 percentage points. A similar comparison for the fundamental reforms suggests a positive impact on the female participation, especially of women aged between 55 and 59.

These findings are suggestive of a positive impact of early retirement reforms on the participation rate of specific groups of older workers. The different response for the male and female rates is consistent with differences in the elasticity of the labour supply to the implicit tax rates and in the length of working careers and years of contribution to social security. Thus, the tightening of eligibility conditions to early retirement would induce women to postpone retirement.

Of course, participation rates also change in response to the business cycle. In line with the cyclical ups and downs, people out of the labour force may be induced to start searching actively for a job when they perceive that their employment chances have improved. Similarly, unemployed people may stop searching for a job when their employment prospects weaken and leave the labour force (the so-called discouraged worker effect). Thus, controlling for the state of the economy is necessary to identify the effects of pension reforms on the participation rate.

Short-term changes in the participation following a pension reform, as the one considered in this paper, tell nothing about the lags needed for a reform to fully influence the retirement decision and the participation rate. Pension reforms, especially fundamental, are gradually phased-in and their impact may become visible only after some years, when an increasing number of cohorts born over successive years start to be under the new regime. Therefore, the expected gains of pension reforms cannot always be perceived immediately and their short-run effect is uncertain. Moreover, due to the gradual phase in, it is unlikely that the oldest generations would change their retirement behaviour because of the reform. In general, when a reform is announced, agents may respond with “imperfect” foresight when two dimensions of uncertainty namely timing and

²¹ We consider only those reforms that are followed at least by one year; hence, measures taken in 2006 are excluded from the sample. In addition, when one reform is followed within four years by another reform of the same type, we consider in the calculation only the three years preceding and following the first reform.

measures adopted to reform the system, prevail (Butler 1999). In contrast, to achieve an optimal allocation of consumption and leisure over their non-working lifetime, those aged between 50 and 54 may revise their behaviour sooner in reaction to the expected effects of future reforms. Finally, early retirement and non-fundamental reforms may have shorter implementation lags, and their effects can be more visible in the short-term. However, delay between announcement and enactment creates in general the possibility for agents to reassess how the reform will affect their incentive to retire prior to the effective implementation of the new regime (Santoro, 2006).²² Thus, the effects of the reforms in the short term are highly uncertain and depend on how different cohorts react to current or perspective changes in the rules of the social security system. For example, for those relatively far from the statutory retirement age, any change in their participation rate due to the reform would be induced by an announcement effect.

Finally, the participation behaviour is influenced by changes in the socio-economic aptitudes towards work of the elderly, not necessarily related to governments' interventions. The fact that participation rates can be influenced by other factors invites shifting to multivariate analysis.

Econometric Methodology

To capture the effect of reforms we estimate a reduced form regression for the participation rate comparing the participation rate in countries enacting a pension reform in a given year with the participation rate in countries that did not enact a pension reform.

$$PR_{ist} = \alpha_s + \mu_t + \beta SEX_{is} + \gamma ER_{st} + \delta FUN_{st} + \delta NONFUN_{st} + \varepsilon_{it}$$

where PR_{ist} is the participation rate for the age group $i=50-54, 55-59, 60-64$ in country s at time t ; α_s and μ_t are fixed effects for countries and years respectively, SEX_{is} is a dummy equal to 1 for women and 0 otherwise; ER_{st} , FUN_{st} and $NONFUN_{st}$ are dummy variables taking the value 1 if a reform occurs in country s at time t and zero otherwise. γ , δ and η is the mean difference between countries that undertook a reform and those that didn't.

A reform of any type has an impact on the participation rate if γ , δ and η are statistically different from zero. The reference group in the equation is men. Thus α_s represents the average (over time) activity rate of male in country s . Since a reform may imply different effects on the implicit tax rate and pension wealth of groups with different working histories, we expect a response that

²² Santoro finds unintended announcements effect of the Italian pension reform of September 1992. Santoro, M., M., (2006), "Early announcements of a public pension reform in Italy" CBO WP-1

differs across age groups and gender types. The interaction between SEX and the reforms dummies would capture this differential effect. Including interaction of this sort is also convenient when treated and control group are very similar and/or the treatment and the control group differ along other dimension of the data, in our case sex; it may also remove trends along these dimensions (Meyer, 1995). To account for lagged effect of enacted reforms we introduced the reform dummies up to 3 lags (i.e. 3 years). Formally, we estimate the following relationship

$$PR_{ist} = \alpha_s + \mu_t + \beta SEX_{is} + \gamma(L)ER_{st} + \delta(L)FUN_{st} + \delta(L)NONFUN_{st} + \\ SEX_{is} [\phi(L)ER_{st} + \varphi(L)FUN_{st} + \theta(L)NONFUN_{st}] + \varepsilon_{it}$$

where $\gamma(L); \delta(L); \phi(L); \varphi(L); \theta(L); \eta(L)$ are all polynomials of degree 3 in the lag operator L.

The use of fixed effects allows controlling for unobserved heterogeneity possibly correlated with the policy dummies. This happens when the participation rates and the decision to undertake reforms of any type are correlated. Under these circumstances the fixed effect estimator is consistent and unbiased. In addition to a country specific unobserved component, there can be a common latent factor which influences both the participation rate and the reform dummy. This happens when exogenous trends in participation rates (e.g. increase in level of education or female participation) make a reform of the pension system more likely (for example, because there is stronger support for reforming the pension system when the participation rate is low rather than high). In this case the fixed effect estimator is inconsistent and inefficient (Coakley, Fuertes and Smith, 2004). Conversely, the two-way fixed effects provide consistent and efficient estimates. In our case, the inclusion of period dummies would absorb all the values of the coefficients of the reform dummy making them not significant. To avoid this we account for unobserved common factors with a time trend, which is equivalent to controlling for period effects when the coefficient of the trend variable is the same across countries. The introduction of lagged of the reform dummies control for possible correlation between these and the country specific effects. Finally, to control for the presence of common shocks hitting men and women in each country we correct standard errors using a robust covariance estimator according to the formula developed by Liang and Feger (1986)²³ across groups. We estimate the equation controlling for fixed effects (table 4) and for fixed and time dummies (table 5)²⁴.

²³ This is implemented in Stata with the cluster command. The clustering adjusts for correlations between the error terms over subgroups. In practice there are less independent observations standard errors should go up. If the error terms are not independent in a subgroup of observations (such as for the different time periods for a specific individual in a panel, or e.g. for observations that are spatially close) clustering avoids that common group errors generate too low standard errors (Moulton, 1990)

Results

Before commenting the results, a note of caution is needed for the relatively limited number of observations and reforms events. Moreover, it is worth reminding that our analysis focuses on the very short term as many reforms (especially fundamentals) tend to be gradually phased in.

The results highlight a different response of the participation rate by gender and country groups. For the EU27 as a whole, the 50-54 male participation rate is barely affected by pension reform of any sort. When the sample is limited to the EMU countries, it cannot be excluded that early retirement reforms have negative effects on the participation rates of males belonging to this age group. Conversely, the male participation rate increases after non-fundamental reforms. In the case of women with the same age, early retirement reforms are associated with higher participation rates. On the contrary, the effect of non fundamental reforms is negative. Finally, for the group of non-EMU countries, we found that non-fundamental reforms have a short-term negative effect only on the male participation rate, while the female component is affected positively. Conversely, no statistical significant impact is found for reforms tightening early retirement provisions.

In the case of the 55-59 age group, our results suggest that in response to pension reforms the participation rate has changed only for the EMU sub-sample. As commented for the younger group, also in the case of this group the male participation rate falls while the female increases after early retirement reforms. Compared to the 50-54 age group, the different response by gender is observed also in case of fundamental reforms for those approaching the retirement age. On the other hand, the coefficient capturing the effect of non-fundamental reforms turns out to be statistically insignificant.

Finally, early retirement reforms have the already mentioned effect on the female and male participation rates of the 60-64 age group. However, opposite to what found for those aged between 50 and 54, non fundamental reforms reduce male participation but increase the female one.

²⁴ Controlling for period fixed effects would imply that the estimated coefficients would capture all the effects of our reform dummies which are slowly time varying. Preliminary evidence based on ANOVA F-test suggests that for early retirement and non fundamental reforms there is more similarity in the number of reforms across time averages than across countries averages. The opposite occurs for the number of fundamental reforms with an average which is more similar across time than countries. This implies that the former types of reforms are enacted in a specific cluster of countries uniformly over time. Conversely the latter are enacted in specific years in a large set of member states

In our view, these findings reflect the different length of working life of men and women. A full pension is usually granted to anyone who has been working for a certain number of years. If someone does not reach the statutory number of working years, his or her pension is consequently reduced. When men enter the labour market, they tend to have more stable career path than women and to work continuously until retirement age (e.g. Hall, 1982). By the official retirement age, males have worked a sufficient numbers of years to get a full pension. Thus, following the announcement of a reform that makes less generous the pension system, men just below the retirement age may find more convenient to anticipate the exit decision, not to miss a generous pension. Conversely, women have more career interruptions than men, especially because of maternity leave and for family reasons, and the number of worked years at the age of retirement is smaller. This difference between men and women may explain why the female participation rate rises in reaction to fundamental and, especially, early retirement reforms. Compared to men, women have to reach a reasonable pension or accumulate a sufficient amount of precautionary savings before being able to retire with (not too large) drop in consumption. The effects are stronger in the EMU than in the non-EMU countries.

The results for non-fundamental reforms are more uncertain, especially for the 50-54 age group. The positive effect of non-fundamental reforms for men is not surprising. These reforms usually adjust upwards the contribution rates, implying a lower net wage. If the substitution effect prevails, an individual prefers to work more. There is an additional motive for working more, which is related to the increasing life expectancy. Because of a longer life span an individual needs to work more in order to accumulate sufficient amount of wealth. As the real wage drops, he/she needs to work more to reach an intended level of consumption during the retirement age.

7. Conclusion and policy implication

This paper investigates the short-term effects of pension reforms on the participation rates of specific age groups belonging to the 50-64 age class with a cross-country event-study approach. Variation across countries and time in pension reforms enacted in the member states provides the information needed to examine the effects of these reforms.

The descriptive and preliminary econometric analysis conducted on a sample of 27 EU countries suggests a different short-term impact of pension reforms on the participation rate of men and women. Reforms tightening the access to early retirement have a short-term positive effect on the female participation rate, but reduce somewhat male participation. In contrast, reforms that change the way of financing pensions or the eligibility conditions (fundamental reforms), usually

with long phasing-in periods, may have unintended short-run effect on the male participation rate, especially of EMU countries. Finally, the effect of reforms modifying the tax regime of contributions and pension benefits, and/or indexation rules (reforms we have dubbed as "non-fundamental") may have positively affected the male participation rate of EMU countries aged 50-54. But this effect turns out to be negative for the 60-64 age group. In contrast, the opposite is found for the female participation rate. The results are less clear for the non-EMU, possibly because of the relatively short period allowed by the LFS statistics.

Our findings point at the importance of designing pension reforms and strategies to reform social security that reduce the risks of undesired effects on the decision to remain into the labour market. There is plenty of evidence that workers' information about pension rules and uncertainties about long transition periods may influence in the short-term the retirement decision in a way which is not consistent with the intended effects of the reform. While transitory periods may be needed to gain the political support for the reforms, long and reiterated discussions on how to reform the social security system may add uncertainty and, if allowed by the rule in force, lead to anticipate the retirement decision even in cases where reforms involve future and not current older workers. Well-informed individuals are far more responsive to pension incentives, while ill-informed individuals seem to respond systematically to their misperceptions of pension incentives (Chan and Huff Stevens, 2008).

To buttress these results, we plan to extend the empirical analysis in four directions. First, in the regression, we control for the determinants of participation unrelated to reforms with country fixed effects, period dummies or a common trend. The evidence found needs to be corroborated by enlarging the set of controls to observable variables, such as self-employed, age of entry into the labour market, per capita income, share of employee working in the public sector. Second, to get an indication of the short-term effect of pension reforms on the retirement decision our result should be validated by similar finding for probability of withdrawing from the labour market. Third, to better study labour force dynamics in response to pension reforms we need to combine the cross-country policy variation with individual information on the labour market status. To use individual data from older workers' self-reported satisfaction to investigate the effect of pension reforms on their retirement decisions.

References

- Bloom D., Canning D., Mansfield R., Moore M. (2006): "Demographic Change, Social Security, and Savings", National Bureau of Economic Research, Working Paper, No. 12621
- Bloom D., Canning D., Moore M. (2007): "A Theory of Retirement", National Bureau of Economic Research, Working Paper, No. 13630
- Boeri, T. A. Brugiavini and C. Maignan (2001) Early retirement: reasons and consequences. in T. Boeri, A. Boersch-Supan, A. Brugiavini, R. Disney, A. Kapteyn and F. Peracchi (eds), *Pensions, More Information, Less Ideology: Assessing the Long-term Sustainability of European Pension Systems* (Kluwer Academic)
- Brugiavini A. (2001) "Early retirement in Europe", *European Review*, Vol. 9, No. 4
- Chan, S. and A. Huff Stevens (2008), "What you don't know can't help you: pension knowledge and retirement decision-making", *The Review of Economics and Statistics*, May, 90(2) pp. 253-266.
- Coakley, J., Fuertes, A. Smith, R. (2004), "Unobserved Heterogeneity in Panel Time Series Models", *Birbeck Working Papers in Economics and Finance* 0403.
- Colie C., Gruber J. (2000): "Social Security Incentives to Retirement", National Bureau of Economic Research, Working Paper, No.7651
- Commission Staff Working Document (2008): "Joint Report on Social Protection and Social Inclusion", Supporting Document
- Diamond P. (2005): "Pension for an Aging Population", National Bureau of Economic Research, Working Paper, No.11877
- Friedberg L., (2007) "The Recent Trend Towards Later Retirement", Center for Retirement Research at Boston College, *An Issue in Brief*, series 9
- Guber J., Wise D. (2002): "Social Security Programs and Retirement around the World: Micro Estimation", National Bureau of Economic Research, Working Paper, No.9407
- Hall, R. E., (1982) "The Importance of Lifetime Jobs in the U.S. Economy", *American Economic Review*, 72(3), 716-724.
- Mitchell O., Fields G. (1981): "The Effects of Pensions and Earnings on Retirement: a Review Essay", National Bureau of Economic Research, Working Paper, No. 772
- Palmer E. (1999): "Exit from the Labor Force for Older Workers in Sweden: Can the NDC Pension System Help?", *The Geneva Papers on Risk and Insurance*, Vol. 24, No. 4
- Samwick A. (1998): "New Evidence on Pensions, Social Security, and the Timing of Retirement", National Bureau of Economic Research, Working Paper, No. 6534
- Seshinski E. (1977): "A Model of Social Security and Retirement Decisions", National Bureau of Economic Research, Working Paper, No.187

- Stock J., Wise D. (1988): "Pensions, the option Value of Work, and Retirement", National Bureau of Economic Research, Working Paper, No.2686

Table 4 - Life expectancy at birth

	Belgium	Bulgaria	Czech	Denmark	Germany	Estonia	Ireland	Greece	Spain	France	Italy
1980	73.3	71.1	70.4	74.7 ¹	73.1	70.6 ²	73.3 ³	75.3	75.4	:	75.6
1990	76.2	71.2	71.5	74.9	75.4	69.9	74.8	77.1	77	77	77.2
2006	79.5	72.7	76.8	78.4	79.9	73.1	79.7	79.5	:	81	81 ⁵

¹ 1986; ² 1989; ³ 1985; ⁴ 1985;

	Cyprus	Latvia	Lith.	Luxem.	Hungary	Malta	Netherl.	Austria	Poland	Portugal	Romania
1980	:	:	70.5	74.7 ⁵	69.1	70.4	76.5 ⁷	72.7	:	71.5	69.2
1990	:	:	71.5	75.7	69.4	77 ⁶	77.1	75.8	:	74.1	69.9
2006	80.6	70.9	71.1	79.4	73.5	79.5	80	80.1	75.3	78.9	72.6

⁵ 1986; ⁶ 1994; ⁷ 1985

	Slovenia	Slovakia	Finland	Sweden	UK
1980	:	70.4	74.5 ⁸	75.8	:
1990	73.9	71.1	75.1	77.6	:
2006	78.3	74.4	79.6	81	:

⁸ 1985

Source: Eurostat.

Table 5 - Average exit age

	1984-1990	1991-1999	2000-2006
BE	58.5	59.6	60.2
DK	65.6	64.6	65.8
DE ¹	61.5	60.8	62.7
GR	62.7	63.4	63.2
ES	63.2	62.3	63.3
FR	59.6	59.3	59.8
IE	63.9	64.7	66.3
IT	60.7	59.8	61.1
LU	62.3	58.9	60.8
NL	60.3	60.7	63.2
AT ²		58.3	61.4
PT	65.1	66.2	64.5
FI ²		62.5	62.9
SE ²		65.4	65.7
UK		62.3	64.3
CY			67.9
CZ ³		59.4	61.2
EE ³		65.8	67.6
HU ⁴		58.1	61.1
LT ⁵		65.2	63.8
LV ⁵		61.4	67.1
MT			60.1
PL ³		59.6	58.7
SK ⁵		57.4	59.1
SI ⁴		61.1	62.7
BG			63.5
RO ⁶		61.5	62.5

Source: Commission services.¹ 1985-1989; ² 1996-1999; ³ 1998; ⁴ 1997-1998; ⁵ 1999; ⁶ 1998-1999

Table 6 – Number of pension reforms by a type of a reform and by a country group

	Fundamental	Non Fundamental	Early
EU27	56	87	37
EMU	36	55	26
Non EMU	20	32	11

Source: FRDB, Labref

Source: Commission services.¹ 1985-1989; ² 1996-1999; ³ 1998; ⁴ 1997-1998; ⁵ 1999; ⁶ 1998-1999

Table 7 – Pension reforms' characteristics

COUNTRY	MODIFYING THE PARAMETERS OF EXISTING DB SCHEMES	INTRODUCING NDC STATUTORY SCHEMES	INTRODUCING A FUNDED TIER IN THE STATUTORY PENSION SCHEME	REFORMING EARLY RETIREMENT	DEVELOPING PRIVATE OCCUPATIONAL OR PERSONAL PENSION PROVISION	OTHER (E.G. TAXATION, CONTRIBUTIONS, PENSION COVERAGE, INDIVIDUALISATION OF PENSION RIGHTS)
BE				x		x
DK	x			x		x
DE	x			x	x	x
GR						x
ES				x	x	x
FR	x			x	x	
IE				x		
IT		x		x	x	x
LU						
NL						x
AT	x			x		x
PT	x			x	x	
FI	x			x		
SE	x	x	x	x		
UK	x			x		x
BG	x					x
CY	x					
CZ	x			x		x
EE			x			
HU	x		x	x		x
LT	x		x			
LV		x	x	x		
MT						x
PL		x	x	x		
RO	x					x
SI	x					
SK	x		x	x		x

Source: Commission services.¹ 1985-1989; ² 1996-1999; ³ 1998; ⁴ 1997-1998; ⁵ 1999; ⁶ 1998-1999

Table 8 –

Countries	Standard retirement age		Earliest age to access old-age pension	
	Current	New established by reform and not yet fully implemented	Phasing-in period	
BE	Men: 65 Women: 64	Women: 65	2009	60 (with minimum 35 years career)
DK	Social Pension: 65 (67 for those who had reached the age of 60 on 1.7.1999) Supplementary pension (ATP): 67	1) Increase of the eligible age for pensions from 65 to 67 2) Increase of the eligible age for the voluntary early retirement scheme from 60 to 62	1) 2024-2027 2) 2019-2022	Supplementary pension (ATP): Persons who reach the age of 60 after 1st July 1999 can retire between 65 and 67
DE	65	67, starting with those born in 1947. For all those born after 1964, the standard retirement age of 67 years shall apply. It will still be possible to retire at the age of 65 years without pension reduction if minimum 45 years of compulsory contributions from employment and care and from child-raising periods up to the age of 10 of the child.	2012 to 2029	The age limit of 60 years ²⁵ will be increased in monthly intervals as of 2006. From December 2008 the earliest possible age at which a pension can be claimed will be 63 Under certain circumstances, people will be able to retire after 2029 from the age of 63 but will then have to face a permanent cut in the pension of 0.3% per month of earlier retirement. Long-term unemployed will be obliged to take this early retirement option. The retirement age for disabled people will increase accordingly from the age of 63 to 65 years. <i>Persons insured before 1.1.1993:</i> <u>Full pension:</u> no age condition if 37 insurance years; from between 55 and 62 years for men (57 for women) depending on number of insurance years or working days eventually plus other conditions (e.g. mothers with a minor child, arduous and unhealthy work) <u>Reduced pension:</u> From 65 years (men and women) if 3,500 insurance days (transitory regulation until 31.12.2008), • from 53 to 60 years for men (55 years for women) depending on number of insurance years or working days plus other if relevant other conditions (e.g. arduous or unhealthy conditions, mothers with a minor or disabled child)
GR	<i>Persons insured before 1.1.1993:</i> Men: 65 Women: 60 <i>Persons insured since 1.1.1993:</i> Men: 65 Women: 65			<i>Persons insured since 1.1.1993:</i> <u>Full pension:</u> no age condition if 37 insurance years or 11,100 days; from 60 years for men and women if arduous or unhealthy work if 15 years of insurance or 4,500 working days; from 55 years for mothers with a minor or disabled child if 20 years of insurance or 6,000 working days <u>Reduced pension:</u> From between 55 and 60 years (men and women) if 35-15 insurance years or 10,500-4,500 days insured

²⁵ 63 (or 60 for severely handicapped persons) after 35 years of pension insurance periods; 60 for women born before 1952 after at least 15 years of insurance, if compulsory contributions were paid for more than ten years since the age of 40; 60 for persons born before 1952 after at least 15 years of insurance if they were compulsorily insured for at least 8 in the last 10 years, are unemployed at the commencement of the pension and were unemployed for 52 weeks after completion of the age of 58.5 years or have worked part-time for elder workers for 24 calendar months.

	Standard retirement age			Earliest age to access old-age pension
	Current	New established by reform and not yet fully implemented	Phasing-in period	
ES	65			60 for those insured according to the system abolished on 1/1/1967); 61 for employees with more than 6 years of service in the company and more than 30 years of contributions. The age of 65 can be reduced for certain groups whose professional activity is arduous, toxic, dangerous or unhealthy
FR	General scheme for employees: 60. Complementary schemes for employees (<i>ARRCO</i>) and management staff (<i>AGIRC</i>): 65, with possibility to obtain the pension at the age of 60 if the basic pension was accorded at a full rate. State Pension (Transition): 65 years. State Pension (Contributory): 66 years.			56 for those that started their professional activity at the age of 14 depending on the duration of insurance and contributions 55 for the insured with severe disability who fulfils the minimum periods of insurance and contribution 55 for the complementary schemes for employees (<i>ARRCO</i>) and management staff (<i>AGIRC</i>)
IE				No early pension
IT	Persons insured before 1.1.1996: Men: 65 ; Women: 60 Persons with a disability of at least 80% and blind people: Men: 60; Women: 55. Persons insured since 1.1.1996: Flexible retirement age between 57 and 65 years.			As of 2008, 60 years of age with no less than 35 years of contributions in the case of employees, and 61 for the self-employed; the age limit is to rise by one year from 2010 and by an additional year from 2014, thus reaching 62 and 63 years for the employees and the self-employed, respectively. A further postponement of pension payments is envisaged with respect to the moment in which the requirements are met, there including workers under the contribution-based system. For the period 2008-2015, the possibility to receive a "seniority pension" under the requirements of previous legislation (at least 35 years of contributions and a minimum age of 57 for the employees and 58 for the self-employed) is provided only to women who choose a pension treatment calculated according to the contribution-based method. Early retirement possible up to 5 years before normal retiring age for employees of companies in economic difficulties (<i>pre-pensionamento</i>) Special conditions for employees with early start of working life; employees exposed to arduous work; persons benefiting from specific measures to return to the labour market because of a shut-down or reorganisation of the enterprise; and manual workers
LU	65			Between 57 and 60 on condition that 480 months of effective insurance or assimilated periods can be proved
NL	65			62 for both men and women 60 years for heavy workers provided that they have worked heavily at least 10 years during the preceding 20 years, and have a total of 45 insurance years
AT	Men: 65 Women: 60	Progressive increase of retirement age to 65 for women Elimination of early retirement by 2017	Between 2024 and 2033	Gradual increase of these age limits between 2004 and 2014 (gradual abolition of these types of early pension) plus life coefficient for persons having completed the age of 50 on 1/1/2005 and younger persons Two more types of early pension for those having an extremely long insurance career or particularly hard working conditions

	Standard retirement age			Earliest age to access old-age pension
	Current	New established by reform and not yet fully implemented	Phasing-in period	
PT	65			Unemployed: 62 if they were aged 57 at the beginning of their unemployment and have completed the qualifying period; 57 for those who have contributed 22 calendar years and are aged 52 or more when unemployed (with reduced pension); 55 in case of heavy or unhealthy work
FI	National pension: 65 Statutory earnings-related pension: between 63 to 68 Lower individual retirement ages in the public sector			62 Statutory earnings-related pension: permanent reduction in the early old-age pension by 0.6% for each month that the pension is taken early National pension: is similarly permanent reduction by 0.4%
SE	Flexible retirement age from 61 to 67			No early pension
UK	State Pension: Men: 65; Women: 60 <i>First Pillar</i> : Men: 63 plus 100 points; Women: 59 plus 93 points If a person has insufficient points the right to a pension shall be acquired after 15 years of insurance and 65 years of age for men and women	Women: 65	2010 to 2020	No early State Pension
BG	<i>Second Pillar</i> : 5 years before completion of pensionable age provided the amount saved in pensioner's individual account is sufficient to provide a benefit equal to the minimum pension	The age and number of points for women are increased each calendar year by 6 months and 1 point until they reach 60 years and 94 points	2009	1) 47-52 for women and 52-57 for men plus minimum insurance period in the frame of the general statutory scheme with universal coverage. This regime is in force until 2009 2) Teachers pension fund 3) Supplementary compulsory pension insurance under the second pillar for early retirement of persons working under hard labour conditions
CY	65 for men and women; 63 for miners			63 for men and women, provided that the insured person satisfies the relevant contribution conditions and was entitled to invalidity pension immediately before reaching the age of 63 58 for miners with at least 5 years of employment in a mine (1 month early for every period of 5 months of mining work)
CZ	Men: 61 years and 8 months. Women: no children 60 years, 1 child 59 years, 2 children 58 years, 3 or 4 children 57 years, 5 or more children 56 years	The retirement age shall be increased by 2 months for men and 4 months for women each year until it reaches 63 years for men and women without children and 59 – 62 years for women with children		The pension is reduced by 0.9% for every 90 day period before normal retirement age. This reduction is permanent and continues after the recipient reaches normal retirement age

	Standard retirement age		Phasing-in period	Earliest age to access old-age pension
	Current	New established by reform and not yet fully implemented		
EE	Men: 63 Women: 60	Women: 63	2016	<p><u>Early Retirement Pension</u>: available up to 3 years before legal retirement age</p> <p><u>Old-age Pension Under Favourable Conditions</u>: a) 5 years before standard pension age (after at least 15 years of contributions) for: raising a child with a disability for at least 8 years; raising 5 or more children for at least 8 years; those involved in the clean-up of the Chernobyl nuclear power station; those who have been unlawfully imprisoned or in exile for at least 5 years; b) 3 years before standard pension age for raising 4 children for at least 8 years; c) 1 year earlier for raising 3 children for at least for 8 years; c) 5 or 10 years before the legal retirement age (and 15 to 25 years of contribution) for workers in occupations that are considered hard or hazardous</p> <p><u>Superannuated Pension</u>: Early retirement available for certain professional groups (e.g. pilots, mariners) whose professional abilities have declined before the normal retirement age, provided they have 15-25 years of pensionable service depending on the profession</p> <p><u>2nd pillar</u>: No early pension before retirement age</p> <p><u>1st pillar</u>: Early Retirement Pension to those involved in jobs allowing exemption by age (i.e. work involving increased physical load or hazardous to health): 2 years before normal retirement age for those who have worked in such activities for at least 10 years (men) or 8 years (women); pensionable age is further reduced by 1 year for every additional period of 5 years (men) or 4 years (women).</p> <p><u>Advanced Pension</u>: from the age of 60 for men and 5 years before the retirement age for women with long service period</p> <p>5 years maximum before retirement age, provided that beneficiaries have an insurance period of 30 years and have been are registered as unemployed for at least 12 months</p> <p>2 years before the standard retirement age men and women with an insurance period of not less than 30 years (preretirement pension - until 1st July, 2008)</p>
HU	1st and 2 nd pillar: 62			
LT	Men: 62.5 Women: 60			
LV	Men: 62 Women: 61 years by 1 July 2007	Women: gradually increasing by 6 months every year until it reaches 62		
MT	For persons born before 1/1/1952: Men: 61; Women: 60 (women given the option to retire at 61) For persons born between 1952 and 1955: 62 For persons born between 1956 and 1958: 63 For persons born between 1959 and 1961: 64 For persons born on or after 1/1/1962: 65			<p><i>For persons born before 1st January 1952</i>: No early pension.</p> <p><i>For persons born between 1952 to 1961</i>: 61 if 35 years of paid/credited weekly social security contributions</p> <p><i>For persons born on or after 1st January 1962</i>: 61 if 40 years of paid/credited weekly social security contributions</p> <p>In all cases, those opting for early pension cannot be employed until 65 of age</p>

PL	Men: 65 Women: 60			55 for women with a 30-year qualifying period; 5 years early pension for a) totally incapacitated persons if they fulfil the qualifying period requirements; b) persons working in unhealthy conditions or performing a specific type of work (e.g. journalist, rail workers) 10 years early pension for miners, persons working with lead, cadmium or asbestos, steel workers, pilots, etc. 15 years early pension for wind instrument musicians Persons born since 1.1.1949: No provisions
RO	Men: 63 in 1 st quarter of 2007 Women: 58 in 1 st quarter of 2007	Men: 65 Woman: 60	2014	1) <u>Old-Age Pension with Reduced Standard Retirement Age</u> : assortment of standard retirement age reductions for a) persons who contributed under special or difficult working conditions, b) persons who had a handicap prior to obtaining the insured person status, c) persons persecuted for political reasons, d) women with multiple births, e) other categories, defined by legislation. 2) <u>Early Retirement Pension</u> : maximum 5 years before standard retirement age to insured persons exceeding the full contribution period by minimum 10 years 3) <u>Partial Early Retirement Pension</u> : maximum 5 years before standard retirement age to insured persons exceeding the full contribution period by maximum 10 years
SI	Men: 63 in 2009 Women: 61 in 2008 (following gradual increase)			No special early pension. Possibility of exceptions (no malus) in the case of retirement at the age of 58 provided that a person has completed 40 (men) or 38 (women) years of service
SK	Old-Age Pension: 62	This level of retirement age will be reached in 2014 for all population groups	2014	<i>1st Pillar</i> : No age limit. Early pension possible if minimum duration of membership (10 years) and minimum amount of benefit reached. <i>2nd Pillar</i> : No age limit. Early pension is possible if the early pension of the 1 st pillar is received and minimum amount of benefit reached
<p>Source: MISSOC Comparative Tables on Social Protection in the 27 Member States of the European Union, in the European Economic Area and in Switzerland, Situation as of 1 January 2007, available at: http://ec.europa.eu/employment_social/spsi/missoc_tables_en.htm#table2007; LABREF 2000-2007.</p>				

Table 9 – Effect of different pension reforms on the participation rate of the 50-54 age group

	EU27		EMU		NON EMU				
	coef.	t-stat	coef.	t-stat	coef.	t-stat			
Fundamental	0.31	0.21	0.43	0.27	1.18	1.14			
Fundamental (-1)	0.01	0.00	-0.16	-0.10	0.58	0.56			
Fundamental (-2)	-0.77	-0.44	-0.15	-0.07	-1.93	-2.32	**		
Fundamental (-3)	-0.75	-0.44	0.36	0.20	-2.92	-2.78	**		
Non Fundamental	1.36	0.78	4.69	2.13	1.69	1.52			
Non Fundamental (-1)	1.34	0.79	4.83	2.56	1.48	1.34			
Non Fundamental (-2)	0.80	0.47	3.19	1.40	0.66	0.69			
Non Fundamental (-3)	-0.53	-0.31	0.54	0.23	0.19	0.16			
Early Retirement	-0.82	-0.45	-2.42	-1.25	0.11	0.10			
Early Retirement (-1)	-0.71	-0.45	-1.82	-0.80	0.08	0.14			
Early Retirement (-2)	-2.24	-1.21	-4.41	-1.78	-0.32	-0.34	*		
Early Retirement (-3)	-2.77	-1.45	-6.08	-2.21	0.34	0.33	**		
	-		-		-				
Women	36.28	-7.37	***	42.86	-8.11	***	14.14	-5.09	***
Women Fundamental	0.58	0.25		-0.29	-0.11		0.92	0.58	
Women Fundamental (-1)	1.30	0.52		1.23	0.48		1.00	0.57	
Women Fundamental (-2)	3.39	1.23		4.25	1.25		2.50	4.36	***
Women Fundamental (-3)	3.02	1.08		2.78	0.95		4.49	4.49	***
Women Non Fundamental	-1.62	-0.55		-3.51	-1.11		-0.61	-0.39	
Women Non Fundamental (-1)	-2.08	-0.77		-5.28	-2.19	**	-0.55	-0.37	
Women Non Fundamental (-2)	-0.76	-0.27		-2.14	-0.80		0.29	0.21	
Women Non Fundamental (-3)	0.21	0.08		0.65	0.20		0.92	0.46	
Women Early Retirement	4.57	1.58		9.68	2.81	**	0.22	0.10	
Women Early Retirement (-1)	5.10	1.88	*	10.26	2.94	**	0.06	0.05	
Women Early Retirement (-2)	6.45	2.35	**	12.17	3.79	***	1.26	0.84	
Women Early Retirement (-3)	6.63	2.28	**	13.27	4.13	***	0.27	0.13	
Constant	86.38	39.85	***	86.06	28.31	***	87.35	90.27	***
No of obs	601			358			243		
No of groups	27			15			12		
No of periods	17			17			17		
R2	0.51			0.73			0.30		
Gender Specific Time Dummy	YES			YES			YES		
Country fixed effects	YES			YES			YES		

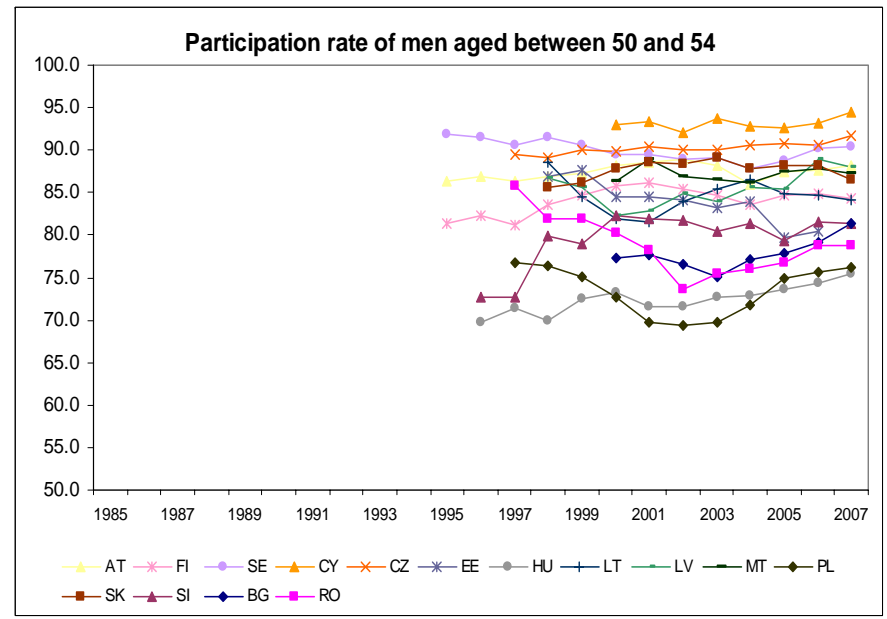
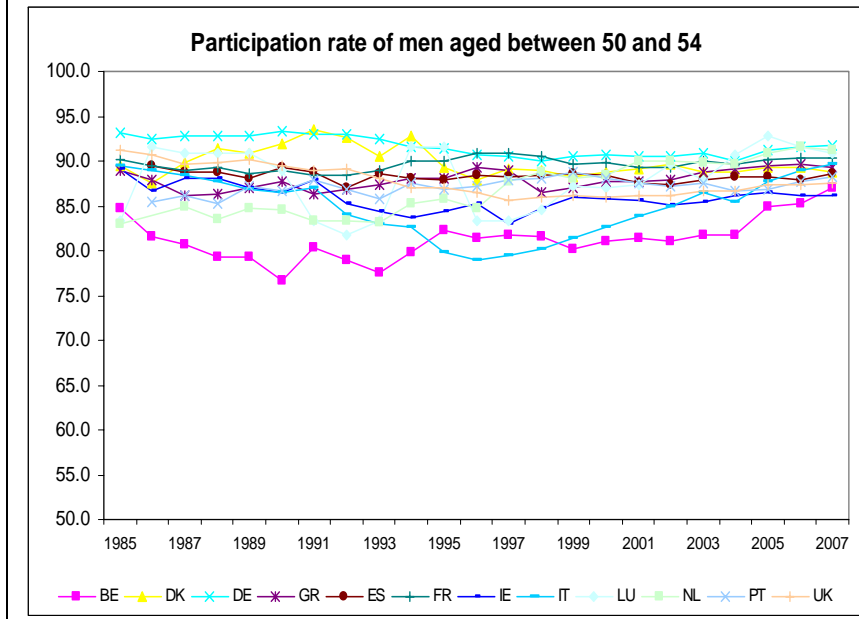
Table 10 – Effect of different pension reforms on the participation rates of the 55-59 age group

	EU27		EMU		NON EMU				
	coef.	t-stat	coef.	t-stat	coef.	t-stat			
Fundamental	-0.21	-0.17	-1.60	-1.54	1.55	1.01			
Fundamental (-1)	-0.76	-0.60	-2.36	-2.31	**	2.30	1.06		
Fundamental (-2)	-1.03	-0.84	-2.68	-2.84	**	-0.32	-0.18		
Fundamental (-3)	-1.39	-0.94	-2.78	-1.64		-1.48	-0.57		
Non Fundamental	-0.34	-0.28	-1.04	-0.73		0.99	0.90		
Non Fundamental (-1)	-0.64	-0.58	0.42	0.50		0.24	0.19		
Non Fundamental (-2)	-1.61	-1.46	-0.32	-0.31		-1.87	-1.52		
Non Fundamental (-3)	-1.30	-1.09	-1.91	-1.32		-0.44	-0.36		
Early Retirement	-0.18	-0.12	-3.27	-3.21	***	2.64	1.06		
Early Retirement (-1)	-1.55	-1.39	-4.47	-3.69	***	-0.53	-0.27		
Early Retirement (-2)	-0.83	-0.75	-2.14	-1.55		1.38	0.94		
Early Retirement (-3)	-1.09	-0.71	-2.16	-1.31		1.33	0.65		
Women	-37.15	-10.44	***	-41.31	-12.05	***	-20.97	-12.51	***
Women Fundamental	0.38	0.19		1.59	0.88		-0.38	-0.16	
Women Fundamental (-1)	2.08	1.04		2.97	1.83	*	0.39	0.12	
Women Fundamental (-2)	2.70	1.38		5.31	3.42	***	0.38	0.14	
Women Fundamental (-3)	3.50	1.50		4.50	2.10	*	3.46	0.98	
Women Non Fundamental	-0.38	-0.19		0.36	0.16		-0.28	-0.16	
Women Non Fundamental (-1)	0.72	0.36		-1.44	-0.83		1.91	0.91	
Women Non Fundamental (-2)	2.07	0.95		0.03	0.02		4.03	1.45	
Women Non Fundamental (-3)	1.06	0.47		1.42	0.63		1.54	0.48	
Women Early Retirement	0.67	0.26		6.21	3.44	***	-4.00	-0.72	
Women Early Retirement (-1)	2.35	1.29		7.32	3.75	***	0.57	0.16	
Women Early Retirement (-2)	1.52	0.79		4.10	2.43	**	-0.46	-0.17	
Women Early Retirement (-3)	0.33	0.12		2.42	1.20		-3.33	-0.90	
Constant	70.25	31.28	***	68.77	32.15	***	67.86	35.48	***
No of obs	601			351			250		
No of groups	27			15			12		
No of periods	17			17			17		
R2	0.50			0.59			0.35		
Time Dummy Gender Specific	YES			YES			YES		
Country fixed effects	YES			YES			YES		

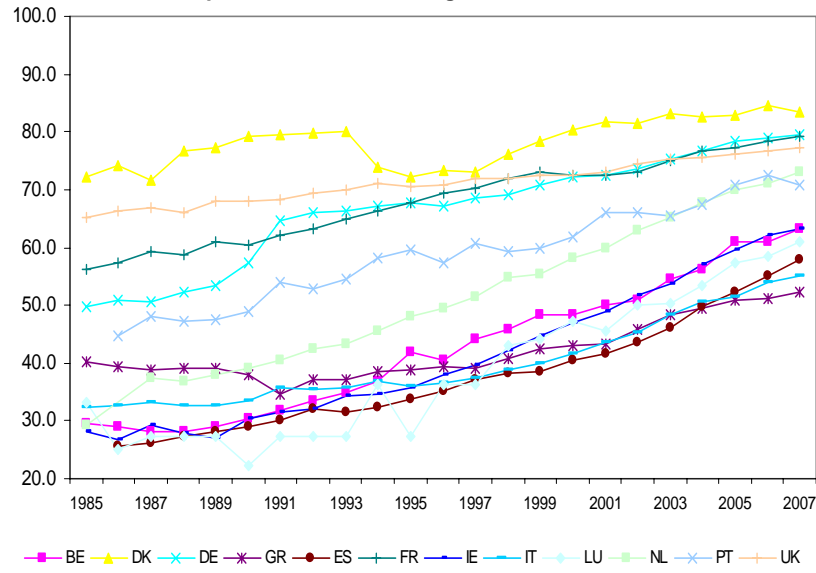
Table 11 – Effect of different pension reforms on the participation rates of the 60-64 age group

	60 – 64								
	EU27		EMU		NON EMU				
	coef.	t-stat	coef.	t-stat	coef.	t-stat			
Fundamental	0.84	1.07	0.41	0.51	2.66	1.27			
Fundamental (-1)	0.80	0.83	0.46	0.49	2.45	0.87			
Fundamental (-2)	-0.79	-0.67	-1.59	-1.04	0.29	0.14			
Fundamental (-3)	0.08	0.08	-0.52	-0.48	-0.05	-0.02			
Non Fundamental	-0.41	-0.34	-0.62	-0.37	-0.01	-0.01			
Non Fundamental (-1)	0.09	0.08	1.55	1.33	-0.18	-0.11			
Non Fundamental (-2)	-1.25	-1.27	-0.97	-1.19	-1.00	-0.60			
Non Fundamental (-3)	-2.25	-2.02	**	-3.09	-2.09	*	-1.50	-0.97	
Early Retirement	-2.71	-2.73	***	-4.73	-3.70	***	-0.99	-0.78	
Early Retirement (-1)	-2.32	-2.45	**	-4.44	-3.12	***	0.49	0.51	
Early Retirement (-2)	-2.02	-2.11	**	-3.35	-1.82	*	-0.75	-0.51	
Early Retirement (-3)	-2.47	-1.84	*	-5.19	-5.25	***	1.37	0.65	
Women	-22.70	-7.47	***	-24.38	-5.93	***	-24.12	-15.00	***
Women Fundamental	-0.35	-0.38		0.80	0.63		-3.92	-2.41	**
Women Fundamental (-1)	-0.05	-0.05		0.28	0.21		-1.80	-0.66	
Women Fundamental (-2)	2.36	1.87	*	3.98	2.05	*	-0.74	-0.38	
Women Fundamental (-3)	1.59	1.28		2.67	1.68		0.79	0.29	
Women Non Fundamental	-0.27	-0.17		1.46	0.60		-2.35	-1.56	
Women Non Fundamental (-1)	-1.11	-0.85		-1.95	-1.09		-1.22	-0.81	
Women Non Fundamental (-2)	0.99	0.78		1.08	0.68		0.34	0.22	
Women Non Fundamental (-3)	2.11	1.44		3.37	1.91	*	1.82	0.92	
Women Early Retirement	3.11	2.22	**	6.40	3.99	***	0.75	0.28	
Women Early Retirement (-1)	2.98	2.09	**	6.87	3.40	***	-1.90	-1.32	
Women Early Retirement (-2)	2.82	2.16	**	5.52	2.52	**	1.62	0.92	
Women Early Retirement (-3)	2.47	1.50		6.31	3.84	***	-2.92	-1.46	
Constant	36.22	24.21	***	34.41	17.50	***	39.81	20.99	***
No of obs	595			345			250		
No of groups	27			15			12		
No of periods	17			17			17		
R2	0.34			0.47			0.23		
Time Dummy	YES			YES			YES		
Country fixed effects	YES			YES			YES		

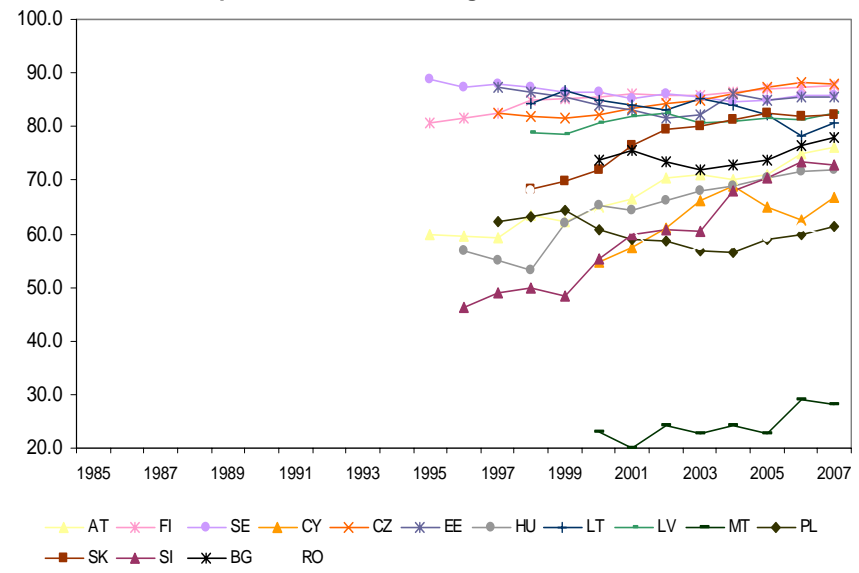
Graph 1 – Participation rates for different age groups



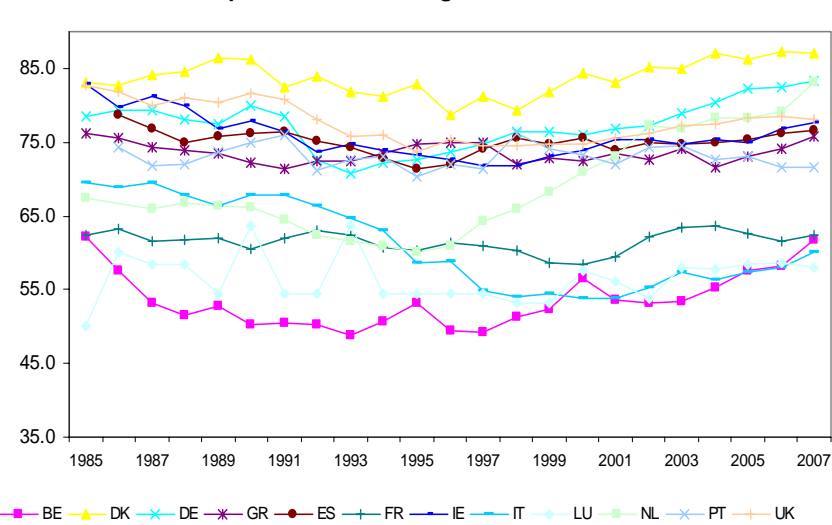
Participation rate of women aged between 50 and 54



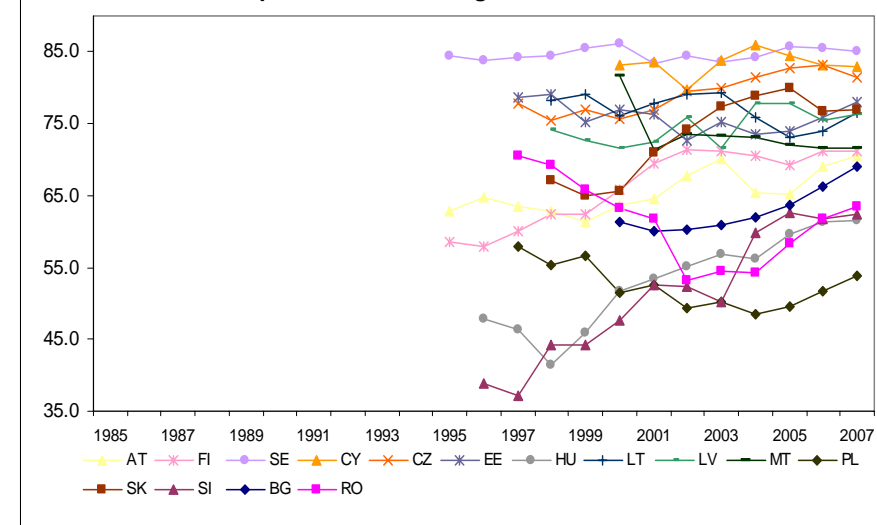
Participation rate of women aged between 50 and 54



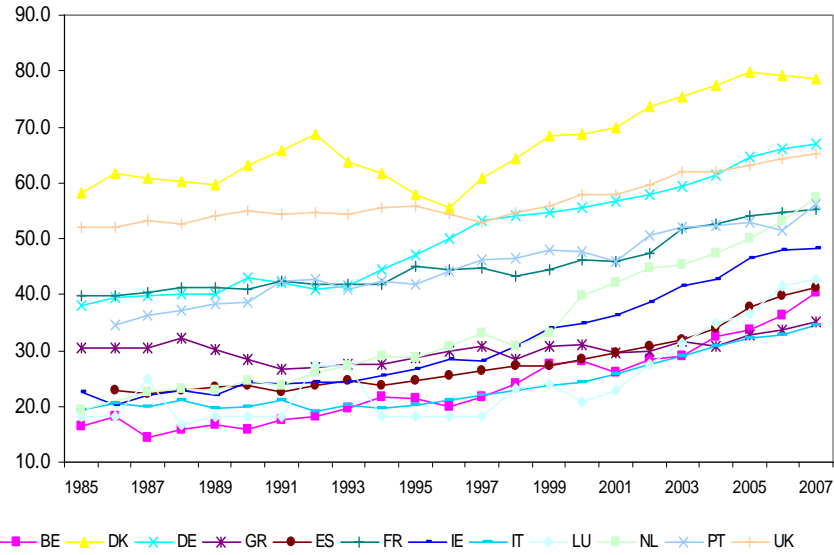
Participation rate of men aged between 55 and 59



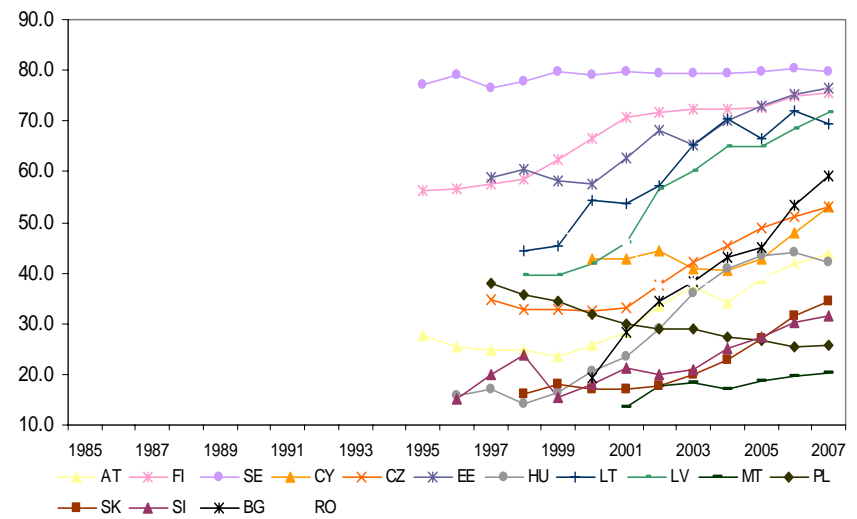
Participation rate of men aged between 55 and 59



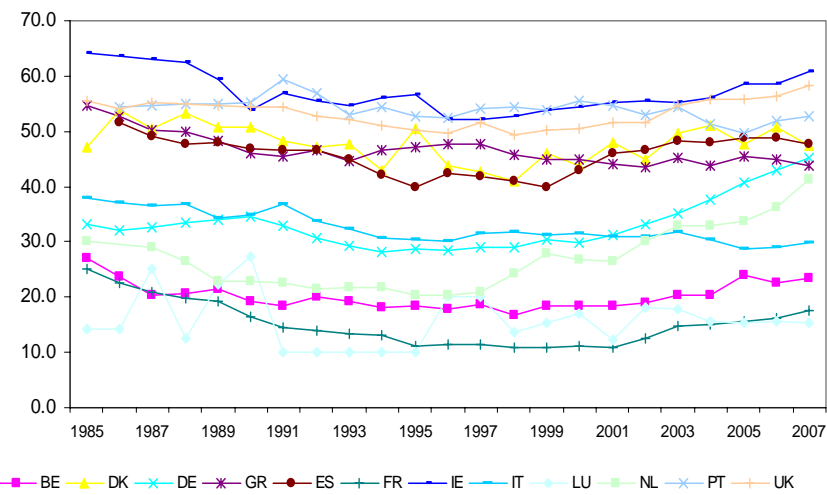
Participation rate of women aged between 55 and 59



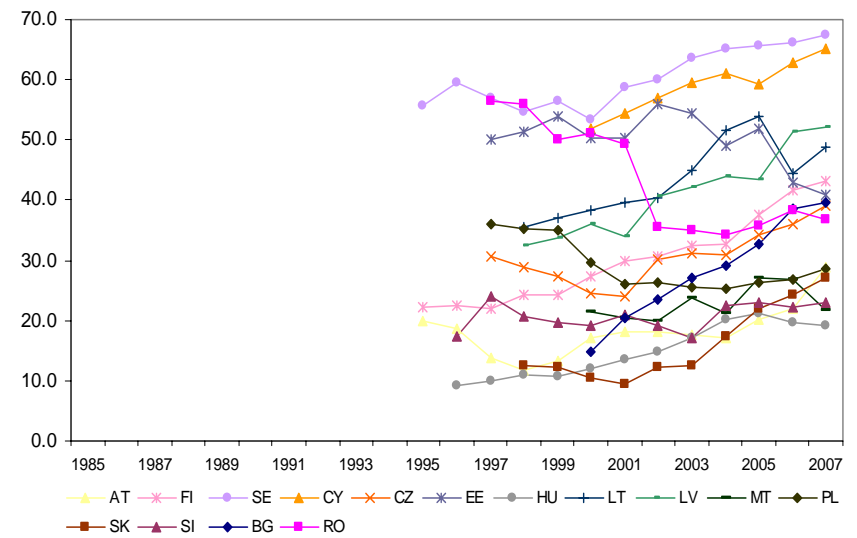
Participation rate of women aged between 55 and 59



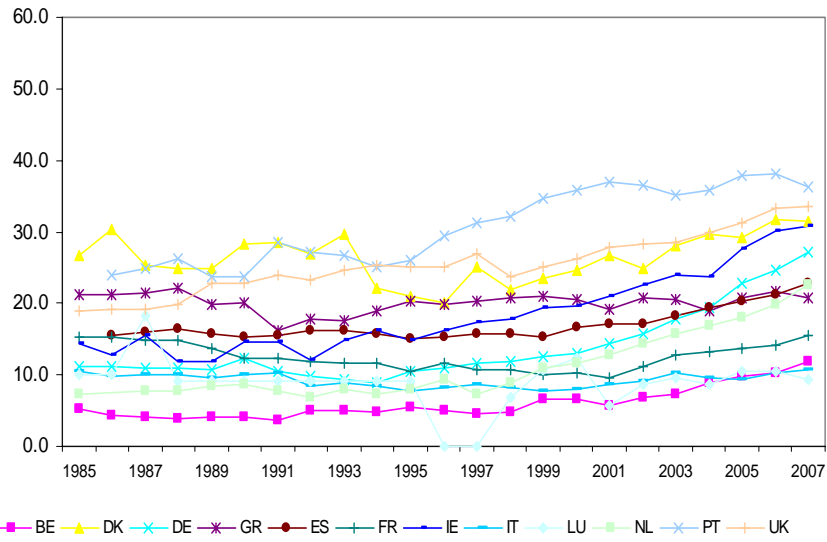
Participation rate of men aged between 60 and 64



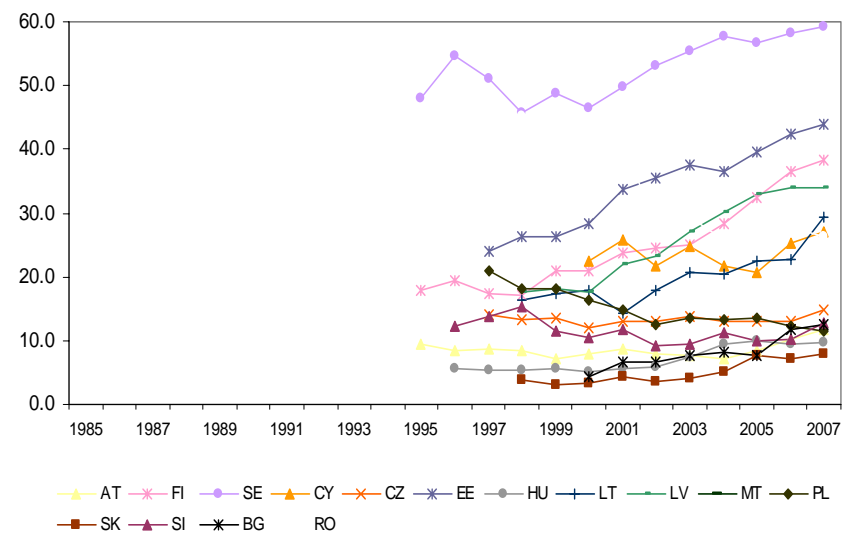
Participation rate of men aged between 60 and 64



Participation rate of women aged between 60 and 64

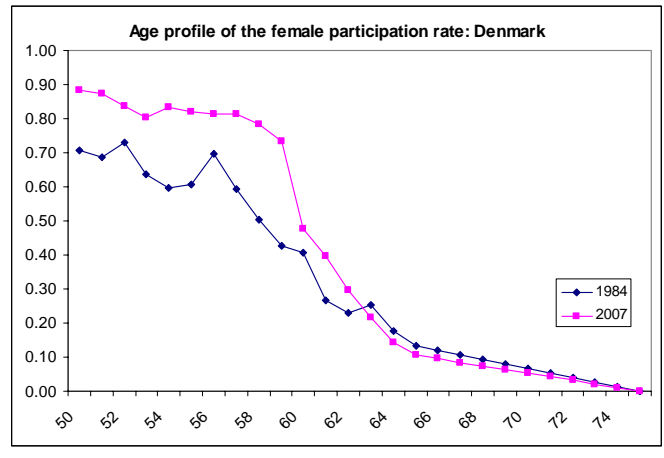
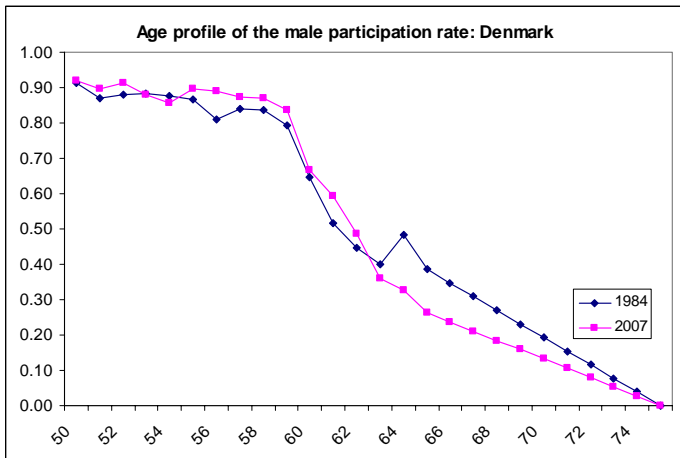
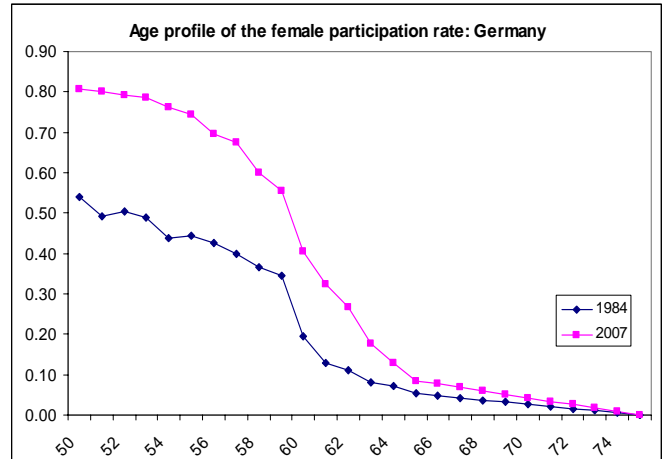
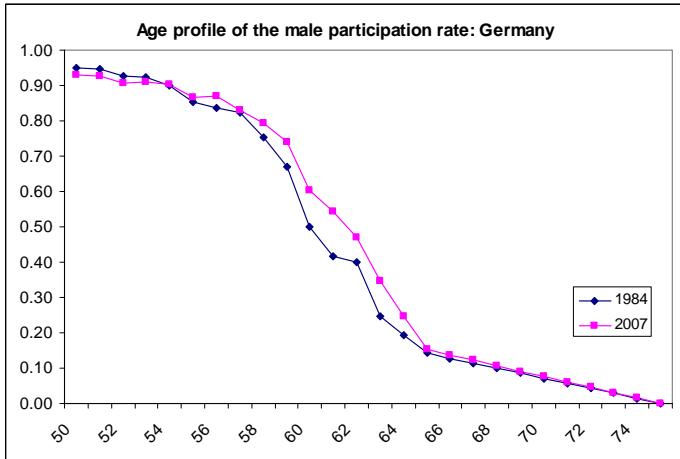
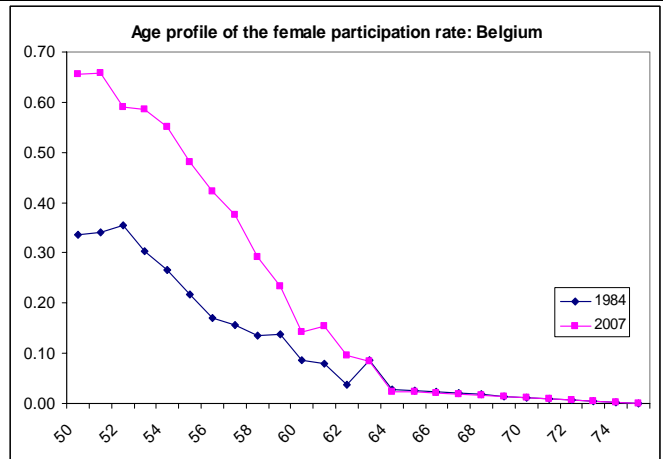
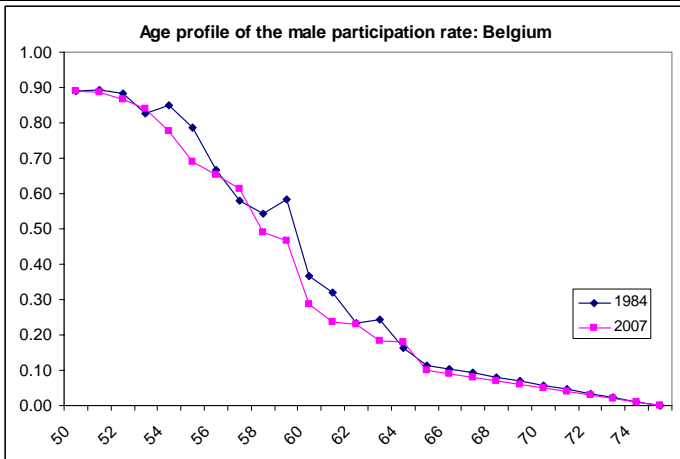


Participation rate of women aged between 60 and 64



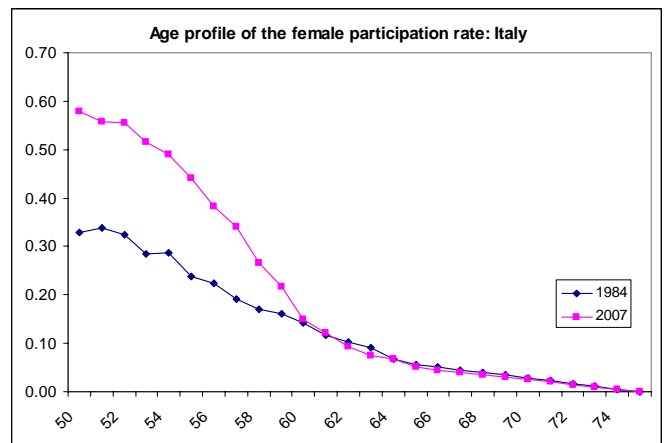
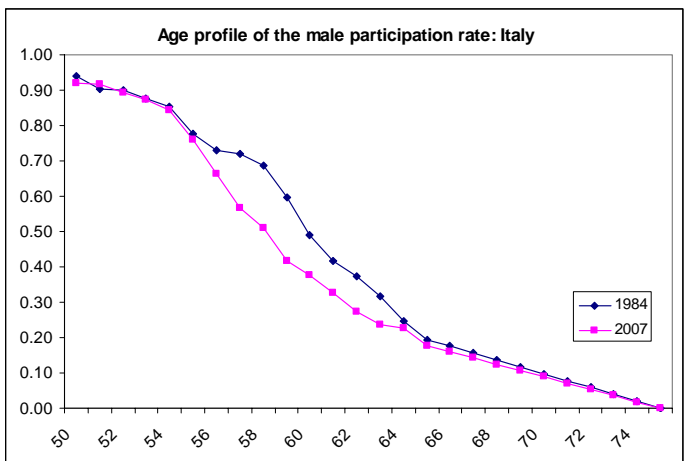
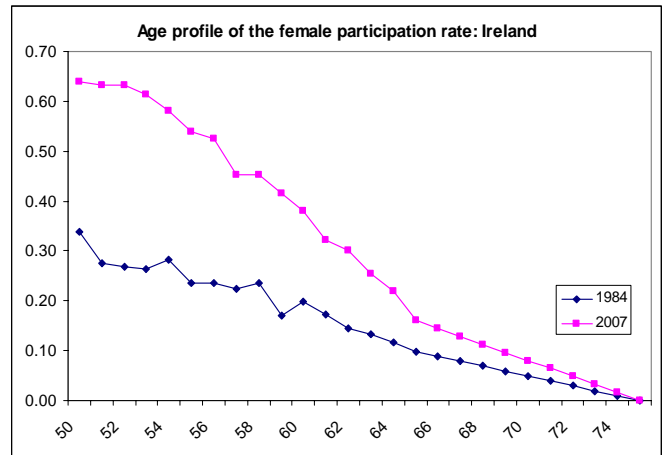
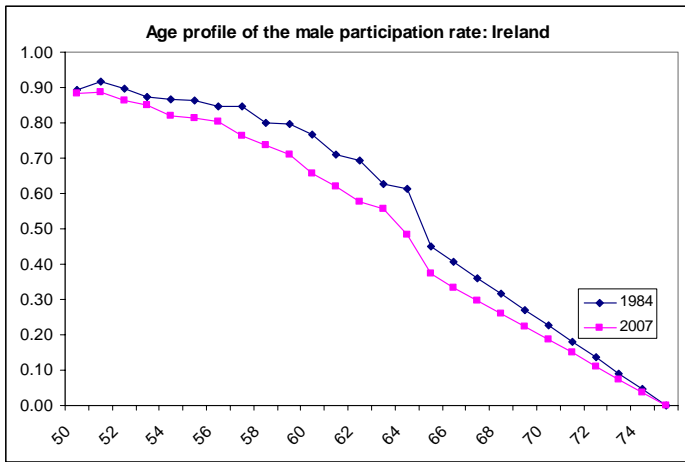
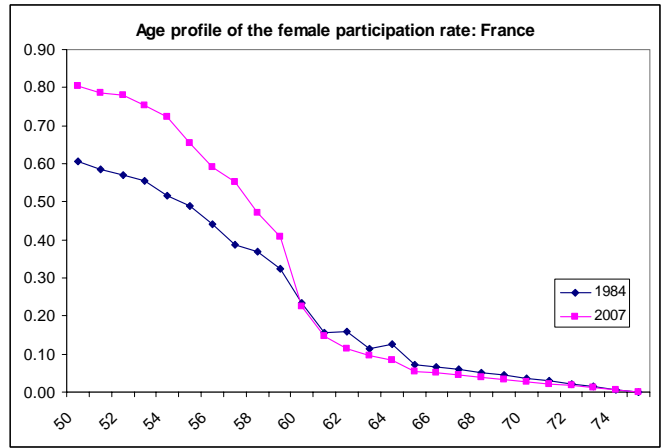
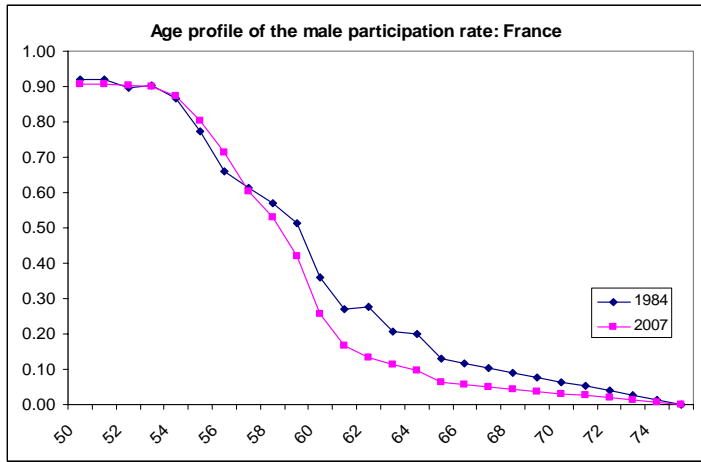
Source: Commission services

Graph 2 – Male and Female age profiles for selected countries



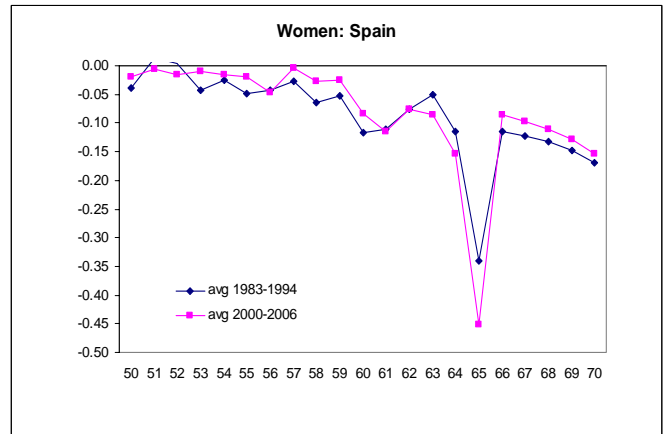
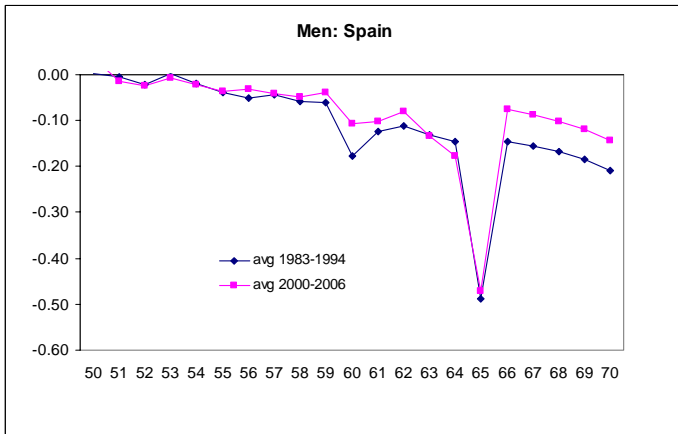
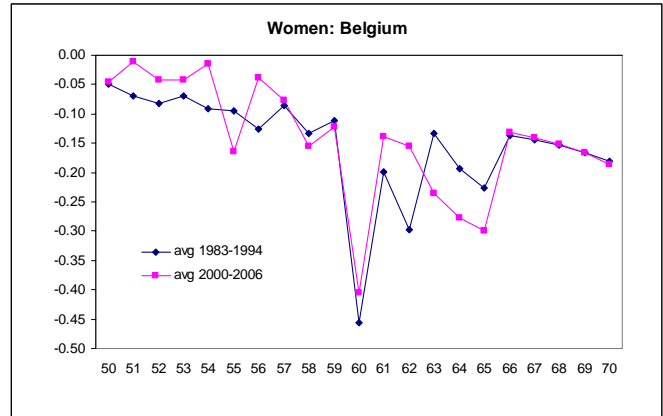
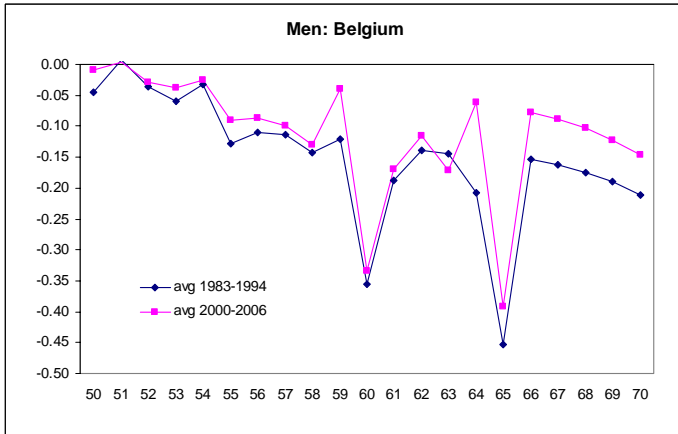
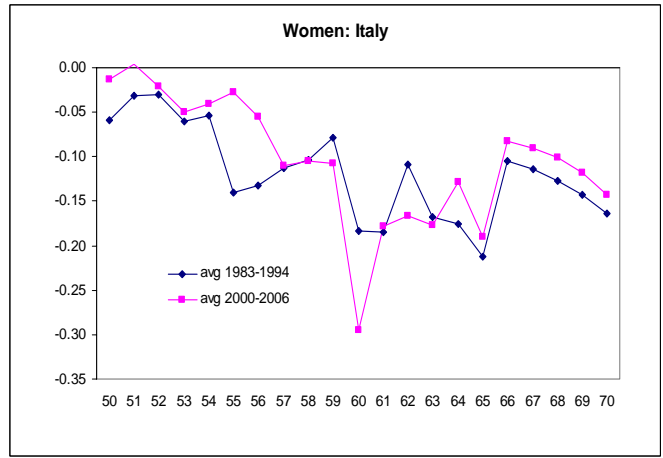
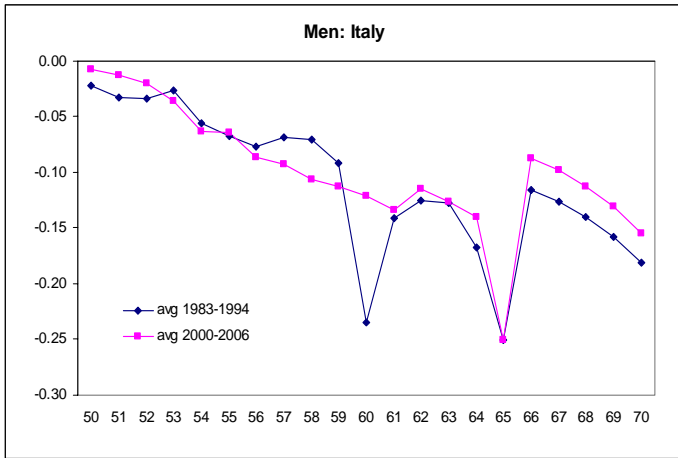
Source: LFS

Male and Female age profiles in selected countries



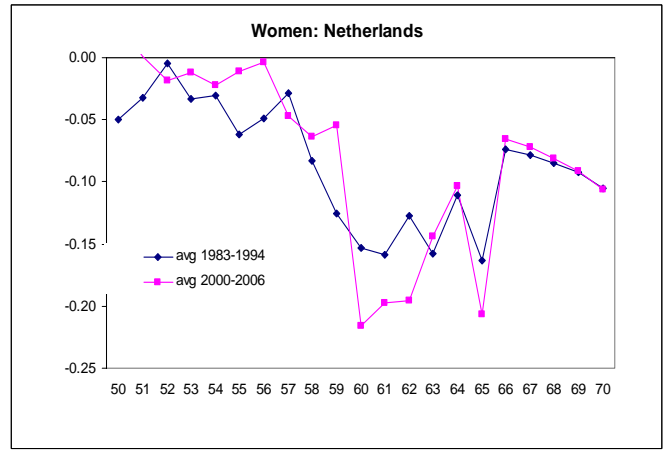
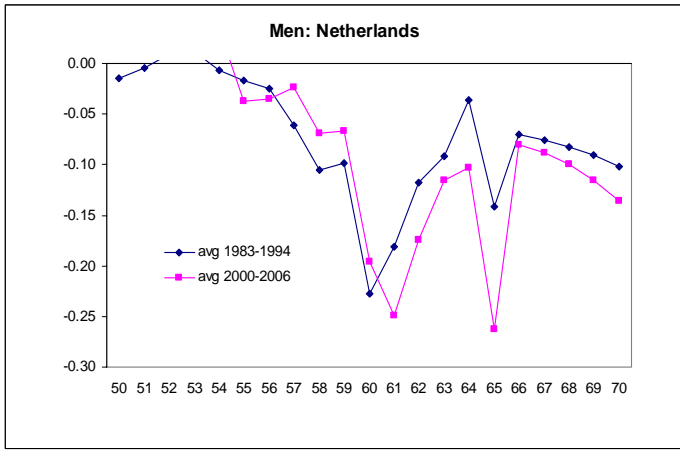
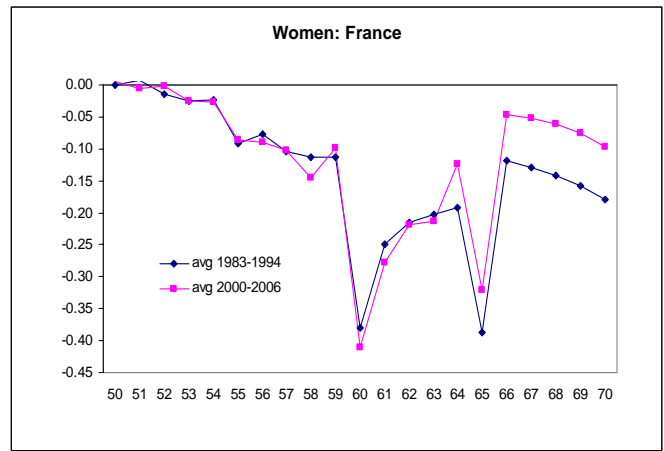
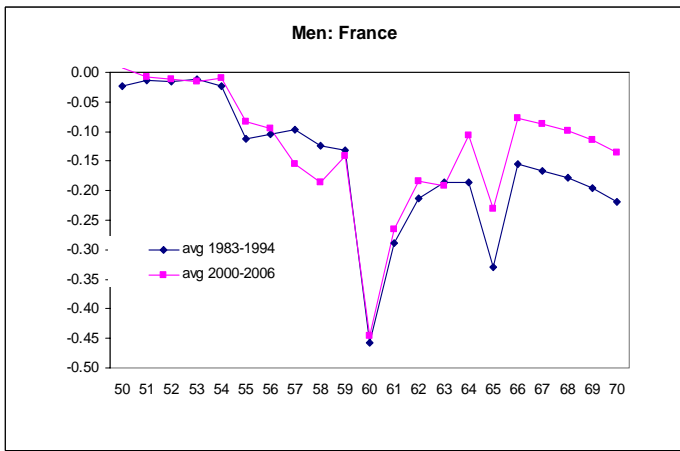
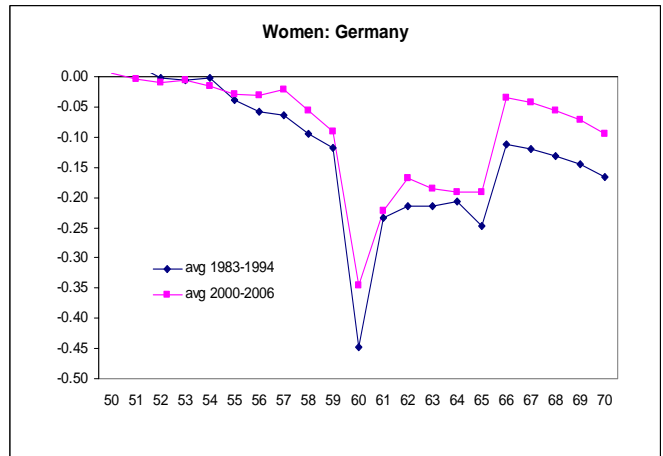
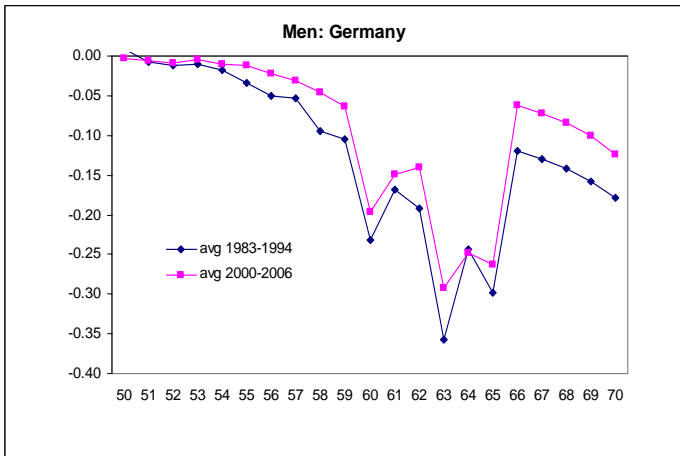
Source: LFS

Graph 3 – Probabilities of exiting in selected countries



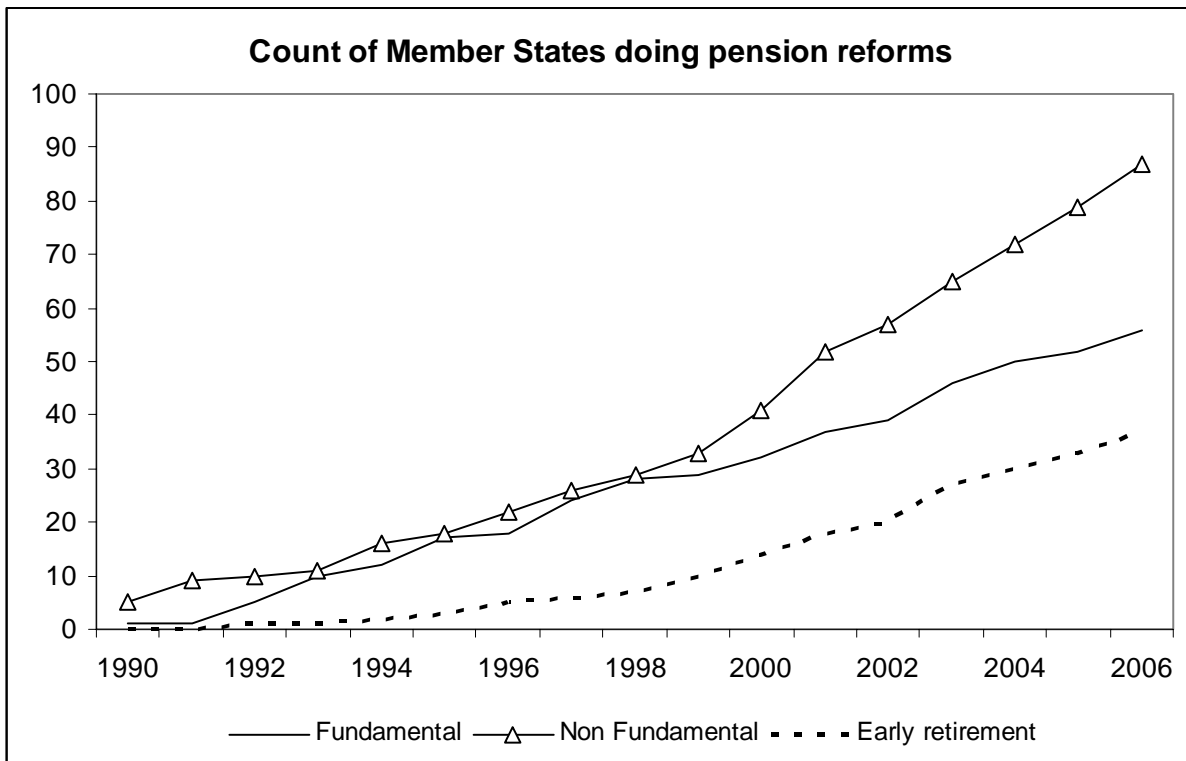
Source: LFS

Probability of exiting in selected countries



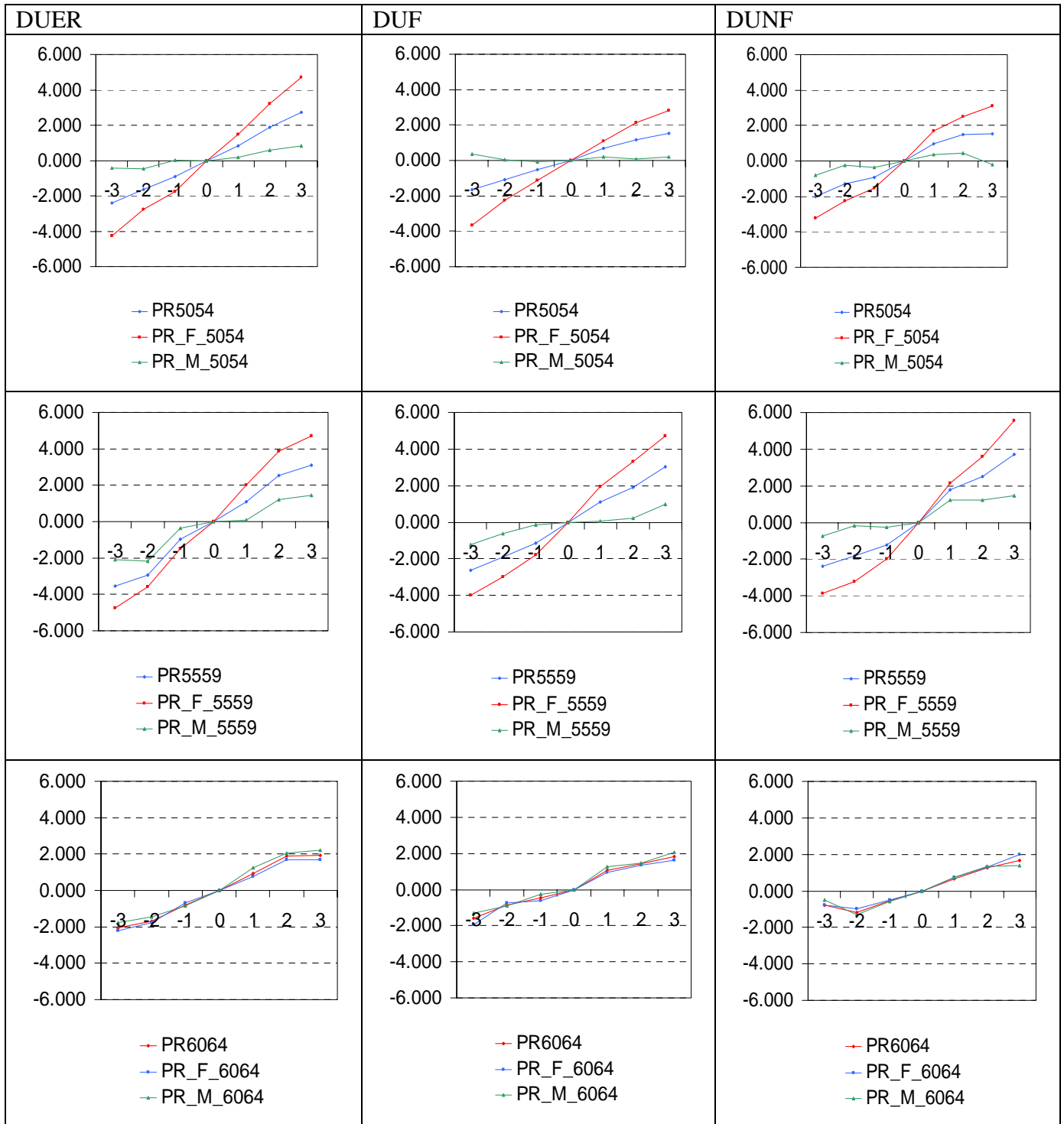
Source: LFS

Graph 4 – Count of Member States doing pension reforms



Source: Commission services, based on FRDB Social reforms data base and LABREF;

Graph 5 - Participation rate before and after reforms of early retirement: EMU countries



Source: Commission services.