Session 1

PENSION REFORM AND THE LABOUR MARKET

CONSUMPTION STRUCTURE, WELFARE GOODS AND RETIREMENT INCOME: LINKING THE AGEING PUZZLES

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While the empirical evidence tends to support some predictions of the life-cycle theory, a number of puzzles remain: an ageing-consumption, an ageing-saving, a saving-capitalisation and a saving-longevity puzzles have been put forward in the literature. This paper analyses the links between these puzzles and develops a model relating usual life-cycle variables, social transfers (public health care expenditures and the generosity of pension systems) to the level of savings. A reduced-form model using a panel of 18 OECD countries is tested, confirming the proposed explanations for the puzzles, together with other factors such as public deficits (Ricardian equivalence) and the population structure. We found that the relative generosity of welfare systems have a significant negative impact on household saving rate. It can also explain why the increase in longevity does not have had in general a positive impact on the household saving ratio.

1 Motivation

The life cycle model is the main framework used in economics to understand the relations between ageing, consumption and saving behaviour. While main predictions of the life cycle theory tend to be supported by empirical evidence, a number of puzzles remain. The literature has put forward four main types of puzzles: an ageing-consumption puzzle, an ageing-saving puzzle, a saving-capitalization puzzle and a saving-longevity puzzle.

The first puzzle concerns the tendency for consumption to decrease in old age. This stylised fact observed in all OECD countries, seems to contradict the idea that households save in order to maintain their consumption level after retirement. Second, significant levels of savings are observed at old age. Another puzzling fact is that countries with generous PAYG system and health care system (welfare goods) have the highest private saving rate. In contrast, in countries where pension funds are well developed, the private saving rate is much lower. Finally, an increase in longevity by increasing the duration of the retirement period could be expected to increase the saving ratio.[1] However, when empirically tested, the sign of longevity variables in traditional saving equations is often negative.

An extensive literature has put forward potential explanations for each of the puzzles, but, to our knowledge, there has been no attempt to bring all of them together in an integrated view. We argue in this paper that the four puzzles are interlinked. As discussed below, the interaction between consumption and provision of welfare goods and the level of retirement income can indeed explain a large part of these phenomena. In order to highlight the role of these determinants and their links, it is instrumental to compare household saving behaviour, health and retirement systems of two country groupings: those with PAYG systems and those with fully-funded systems.

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[1] This of course only holds when the age of retirement is fixed and not linked to longevity, which is still the case in most social security systems in OECD countries.

Other traditional determinants of savings have also to be brought into the picture, in particular the role of Ricardian compensation between private and public savings, as well as income.

The paper begins with a review of empirical facts on consumption, savings and pensions that generate the puzzles referred above. In order to guide our intuition concerning the relationships among the key variables, we develop in Section 3 a two-period life cycle model where we consider the optimal welfare consumption, welfare transfers, the generosity of pension systems and longevity. In Section 4, we get back to the facts and present some possible explanations of the ageing puzzles. In Section 5, we then present econometric panel estimates that combine both the relationships derived from the theoretical framework, other additional effects and controls often used in the empirical literature. A final section concludes.

2 The ageing puzzles: consumption, saving and longevity

The most useful framework to study the link between ageing, consumption and saving is the life cycle model (Modigliani and Brumberg, 1954; Friedman, 1957). In its simplest version, individuals live two periods. In the first period each person earns a wage from his or her labour supply and in the second period the person is retired. Individuals save from their wage income to provide for second period consumption with a constant rate of interest (*i.e.*, the rate of interest does not vary with the level of saving). The main result obtained from this framework is that the consumption is smoothed: the individuals will save in order to transfer purchasing power to the period of the retirement.

But some empirical facts on consumption, pension and saving do not fit well with the basic life-cycle model. The *first puzzle* concerns the link between ageing and consumption. A large body of literature has found that consumption falls significantly at retirement, a fact somewhat in contradiction with life-cycle consumption smoothing. This applies over a number of countries (e.g. US, UK and Italy), across different time periods and across different measures of spending. This stylized fact is displayed in Figure 1, relating levels of household consumption by age for the US and several European countries.

While household survey data suggest that total consumption displays a hump-shaped profile across age-groups,[2] this is not equivalent to say that the consumption profile is hump-shaped over the life cycle mainly due to the existence of cohort and time effects.[3] Nonetheless, they would suggest that the pure consumption-smoothing hypothesis is only partly supported by the micro data.[4]

Several explanations of this puzzle have been put forward. Allowing for uncertainty, Banks, Blundell and Tanner (1998) suggest that unanticipated shocks that occur around the time of retirement could explain the fall in spending within the context of the life-cycle model. Bernheim, Skinner and Weinberg (2001) suggested that workers do not adequately foresee the decline in income associated with the retirement. Hurd and Rohwedder (2003) argue that the drop in spending

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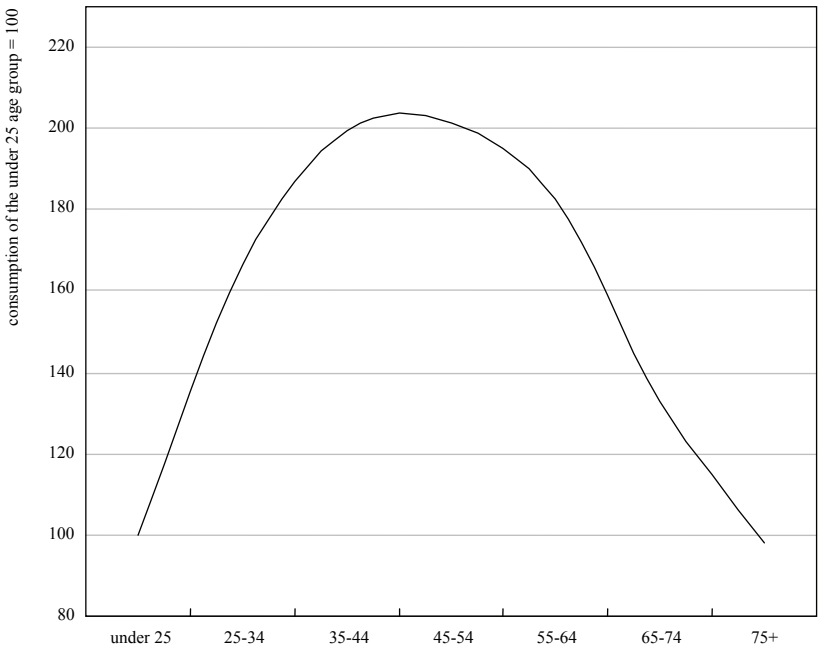
2 To be precise, the consumption profile is hump-shaped across households headed by individuals belonging to different age groups.

3 Due to the lack of data, it will be assumed that the snapshot picture of total consumption per household by age-groups approximates the life-time consumption profile of a cohort (*e.g. static* ageing as opposed to *dynamic* ageing). This approach takes an agnostic view on how a combination of various household characteristics in conjunction with institutional factors in each country affects the life-cycle consumption pattern. Fernandez-Villaverde and Krueger (2002) suggest that the bias induced by the use of age-groups instead of cohorts may not be very large for the estimation of the hump-shaped consumption profiles.

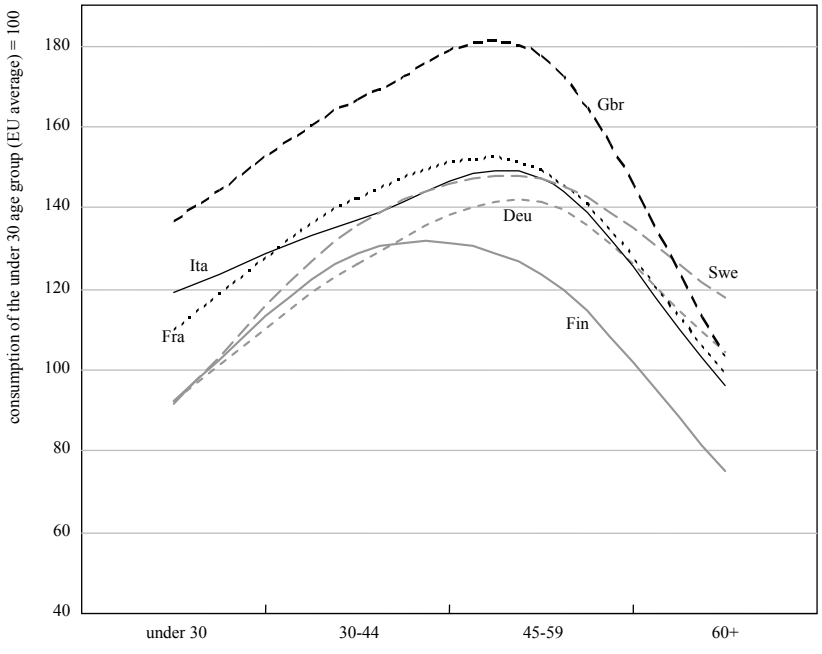
4 Attanasio (1999) provides an overview of competing theories of consumption behaviour over the life cycle. Note that when the age-income profile is more hump-shaped than consumption, the above observed age-consumption patterns are still compatible with some consumption smoothing over the life cycle.

Figure 1

The Consumption-saving Puzzle
United States



European Countries



Source: Consumer Expenditure Survey, US, 2002; Household Budget Survey of Eurostat and Luxembourg Income Study.

can still be explained by an extended version of the life-cycle model, where certain work-related consumption expenditures stop at retirement and market-purchased goods and services are substituted by household home production. The latter could be the case of long-term care services, which often are provided informally within families. However, in a more recent paper, Hurd and Rohwedder (2006) argue, like others, that the reduction in consumption cannot be explained by the simple one-good life cycle model with forward-looking consumers. Many factors such as leisure or poor health could also explain the decline in spending. Along these lines, Smith (2007) argues that retirement is involuntary, largely reflecting ill health status and redundancy, and likely to be associated with a negative wealth shock.

The *second puzzle* is closely related to the previous one, although is not equivalent. With a certain stability of retirement incomes and a decline in consumption, positive saving at old ages can be observed (see Börsch-Supan *et al.*, 2000; Börsch-Supan and Winter, 2001). However, it is puzzling that

individuals cannot anticipate this fact and continue to save at old age, in particular in countries with generous welfare goods (high pension replacement rates and health care coverage).

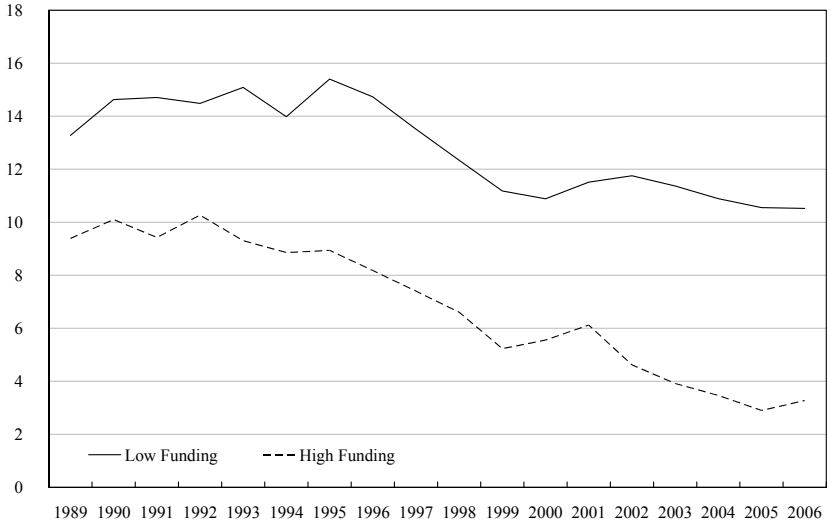
Bloom *et al.* (2003) and Sheshinski (2004) suggest that higher life expectancy may increase the need for additional precautionary savings, despite the effect of improved health care on the length of desired working life. Moore and Mitchell (1998) also conclude that Americans are not preparing adequately for retirement as a couple would need to save 20 per cent of annual earnings between 1992 and the time of retirement (at 62) to have a replacement rate of 61 per cent. A single woman would need to save around 32 per cent of her income to have a replacement ratio of 54 per cent at age of 62. They conclude, despite seemingly large accumulations of total retirement wealth, the majority of older households will not be able to maintain current levels of consumption into retirement without additional saving. Bernheim *et al.* (2001) argue their results are difficult to reconcile with the life-cycle model and that they are more likely to be the result of household behaviour not governed by rational, farsighted optimization. Khitatrakun and Scholz (2004) note that tax incentives, like IRAs and 401(k) are not needed and may lead to excess savings. Finally, a largely evoked, but not well documented, reason for saving at older ages is the existence of bequest motives.

The *third puzzle* arises from the fact that countries with fully funded systems have the lowest private saving rates. In principle, the introduction of a fully-funded pension system should induce a decline in the replacement rate of PAYG systems and, according to the life-cycle model, increase aggregate savings. Figure 2 shows that while saving rates have been decreasing steadily in all countries, the countries with PAYG systems have persistently displayed higher household saving rates and the gap has widened over time.

In a seminal paper, Feldstein (1974) highlighted a negative link between PAYG pension systems and household savings. But, subsequent empirical tests on the impact of pension systems on household saving have produced mixed results (e.g., Edwards, 1996; Callen-Thimann, 1997; Corsetti, Schmidt-Hebbel, 1995) and Murphy and Musalem, 2004). Confirming earlier Feldstein's results, Edwards (1996) found that the social security system has a negative impact on private saving using a sample of 32 countries (developed and developing countries). Baillu and Reisen (1997) also found a positive and statistically significant impact of pension funds on savings using a panel of 11 countries for the period 1982-93. In more recent study, Bosworth and Burtless (2004) did not find an econometrically significant impact on private

Figure 2

The Saving-capitalisation Puzzle
Average Household Saving Rate



Source: OECD ABD Database and authors' calculations.

saving for a set of 11 countries during the period 1971-2000. Murphy and Musalem (2004) considered 43 countries for the period 1960-2002 and found that mandatory contribution to funded pension systems increase national saving. It could be noted that it is quite difficult to compare these studies due to the heterogeneity of samples and estimation methods.

That the introduction of pension systems may decrease, increase or be neutral on savings has several potential explanations. Under defined benefits, if pension wealth can be seen as a substitute for private accumulation and therefore there could be a decrease of the household saving when a pension system is introduced. Moreover, pensions are usually paid in the form of annuities. Without pension annuities, the employee would be forced to accumulate more to finance their retirement period. Thus, by offering annuities, pension plans could reduce savings. Another explanation is related to earlier retirement decision, as individuals who retire earlier are forced to save more in order to finance a longer period of retirement. Imperfect capital markets can also prevent households from borrowing freely, thereby forcing them to save more than they otherwise would. In this case, insofar as mandatory private pension funds may increase financial deepening and reduce borrowing constraints they would decrease household savings.

The *fourth puzzle* is related to the impact to impact of longevity. Bloom *et al.* (2003) argued that higher life expectancy should lead to an increase of precautionary savings, but empirical work has often suggested an opposite sign. This could be seen as a sort of "saving-longevity puzzle". More recently, Bloom *et al.* (2006) have also shown that in the absence of strong saving retirement incentives, such as in PAYG systems, an increase in longevity does not induce higher savings.

3 Ageing consumption, saving and longevity: theory

To guide our investigation of the ageing puzzles, we now develop a simple life-cycle model. Following Bohn (1999) and Chakraborty (2004), we consider a two period overlapping generation's model with a survival probability.[5] This provides a tractable framework to think about the different determinants of savings at the individual level. Our aim is to consider the institutional settings of the welfare system during retirement and how they impact saving behaviour. Therefore, we specify a model combining Pay-as-you-go (PAYG), funded pension retirement incomes and welfare transfers (*e.g.* public health insurance). Each agent lives two periods and optimises her/his consumption and saving over the life-cycle. In the first period, each agent splits her disposable wages w_i into consumption (C_i) and saving (S_i):

$$C_i + S_i = (1-\alpha).w_i \tag{1}$$

where α is the rate of social contributions. In the second period, we assume that only a welfare good consumption (e.g. Health) is considered H_i.[6] As we are mainly interested in the demand-side drivers of household savings, we assume here that income growth and the interest rate are pre-determined.

To finance consumption in the second period, the agent receives a PAYG pension with a replacement rate β, the accumulated saving accrued by the return on capital r and a given amount of welfare transfers T. Note that the amount of savings accumulated for the second period has to be scaled down by the survival probability p_i, given that when it increases you have to spread your

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[5] See also Drouhin (2002). In another context, Jorgensen and Jensen (2008) also incorporate the survival probability a stochastic OLG model with endogenous labour supply.

[6] This assumption does not entail a loss of generality in the model, as we could have introduced a composite consumption good in the form $\delta.C + (1-\delta).H$, with the weight δ changing from period 1 to period 2.

consumption over a longer retirement period.[7] By definition, the income from the PAYG system and the welfare transfers are not affected by changes in the longevity (at least at the individual level):

$$H_i = \beta.w_i + \frac{(1+r)}{p_i} \cdot S_i + T_i \tag{2}$$

Note that we did not introduce a pure time-preference parameter, as usual in perfect foresight models. Under uncertainty, the survival probability captures the effect of the discounting parameter (see Chakraborty, 2004).[8] To simplify, we omitted the index corresponding to the time period. Solving for S_i in (2) and replacing into (1), we obtain the inter-temporal budget constraint:

$$C_i + \frac{p_i}{1+r} \cdot H_i = (1-\alpha) \cdot w_i + \frac{p_i}{1+r} \cdot T + \frac{p_i}{1+r} \cdot (\beta \cdot w_i) \tag{3}$$

Maximising the utility of each agent under the budget constraint (3), we obtain:

$$\begin{aligned} &Max\, E\left[u(C_i, H_i)\right] = u(C_i) + p_i \cdot u(H_i) \\ &s.t. \quad C_i + \frac{p_i}{1+r} \cdot H_i \le (1-\alpha) \cdot w_i + \frac{p_i}{1+r} \cdot T + \frac{p_i}{1+r} \cdot (\beta \cdot w_i) \end{aligned} \tag{4}$$

First-order conditions imply that:

$$\begin{aligned} u'(C_i) &= \lambda_i \\ u'(H_i) &= \lambda_i /(1+r) \end{aligned} \tag{5}$$

where λ_i is the Lagrange multiplier associated with the budget constraint. Using these conditions we obtain the usual consumption smoothing rule:

$$\frac{u'(C_i)}{u'(H_i)} = (1+r) \tag{6}$$

As in Bohn (1999) and Chakraborty (2004), we assume thereafter that the $u(C) = \text{Log}(C)$ and idem for H.[9] We get then a simple relation between C_i and H_i:

$$H_i = (1+r) \cdot C_i \tag{7}$$

Now replacing (7) into the budget constraint:

$$C_i + p_i \cdot C_i = (1-\alpha) \cdot w_i + \frac{p_i}{1+r} \cdot T + \frac{p_i}{1+r} \cdot (\beta \cdot w_i) \tag{8}$$

The optimal level of consumption in each period can be derived:

$$\begin{aligned} C_i &= \frac{1}{1+p_i} \cdot \left[(1-\alpha) \cdot w_i + \frac{p_i}{1+r} \cdot T + \frac{p_i}{1+r} \cdot (\beta \cdot w_i) \right] \\ H_i &= \frac{1}{1+p_i} \cdot \left[(1+r) \cdot (1-\alpha) \cdot w_i + p_i \cdot T + p_i \cdot \beta \cdot w_i \right] \end{aligned} \tag{9}$$

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[7] Using a survival probability is identical to modelling the length of life in the retirement period. Note that this probability gives an indication of the life expectancy. By normalising the duration of one period to one, life expectancy is by definition $(1+p)$. For example, if period 1 is equal to 60 years and total life expectancy is 84, the survival probability in this context is (24/60)=0.4.

[8] See Bohn (2001) and Jensen and Jørgensen (2008) for an alternative specification.

[9] A log utility implies homothetic preferences. Nonetheless, the main results of the model used in this paper derive from the existence of the conditional life expectancy and from the intertemporal budget constraint.

By using the expression for the optimal consumption above and equation (1), we derive the optimal saving rate over net income in the first period:

$$s = \frac{S_i}{(1-\alpha)\cdot w_i} = \frac{p_i}{1+p_i}\cdot\left[1-\frac{\beta + T_i / w_i}{(1+r)\cdot(1-\alpha)}\right] \tag{10}$$

The derivative the optimal saving ratio *s vis-à-vis* the survival probability has interesting properties, when interacted with key parameters characterising the generosity of the welfare system.

$$\frac{\partial s}{\partial p_i} = \left[\frac{1}{1+p_i}\right]^2 \cdot \left[1-\frac{\beta + T_i / w_i}{(1+r)\cdot(1-\alpha)}\right] \geq 0 \quad if \quad \beta \leq (1+r)\cdot(1-\alpha) - T_i / w_i \tag{11}$$

For reasonably small values of β, an increase of the survival probability increases the saving ratio. This is the expected intuitive result, *i.e.* when an individual experiences a higher longevity he/she has to save more in order to ensure an adequate consumption level in the second period. Assume that the interest rate is equal to 3 per cent, the contribution rate is 20 per cent and the welfare transfers are equivalent to 10 per cent of the wage income. From (11), the threshold for the replacement rate is around 72 per cent. For larger values of this parameter, an increase in the survival probability induces a decrease in the saving ratio. The intuition is as follows. Assume that α, r and T are equal to zero, and $\beta > 1$. This implies a negative saving ratio (equation 10). Then an increase of the survival probability would generate an expected income above the initial consumption level. Consumption smoothing would then require a higher consumption and lower saving.[10] To some extent, variation in the welfare transfers ratio (T_i/w_i) also induces a change in the sign of $\partial s / \partial p_i$, but only for very large values of β.

Under the current prevailing replacement rates in most OECD countries, our model could therefore provide an explanation for a possible negative effect of longevity on savings. The "longevity puzzle" would be only *a priori* in contradiction with life-cycle theory.

The derivatives of the saving ratio (s) vis-à-vis the other key parameters in the model are defined in a non-ambiguous way, as follows:

$$\partial s / \partial \beta \leq 0 \; ; \quad \partial s / \partial T_i \leq 0 \; ; \quad \partial s / \partial \alpha_i \leq 0 \; ; \quad \partial s / \partial r \geq 0 \; ; \quad \partial s / \partial w_i \geq 0 \tag{12}$$

The saving rate is expected to be a decreasing function of the replacement ratio, welfare transfers to older people and the rate of social contributions (α). In other words, the systems providing large transfers and generous retirement income (typically PAYG) are expected to have *ceteris paribus* lower individual saving rates. Conversely, the saving ratio depends positively from income and the interest rate.

Assuming that all individuals are identical in each period, one can derive an aggregate saving by taking the weighted average of savings of the two segments of the population. Given that savings in the second period are by definition zero, the aggregate saving ratio is simply the product of the individual saving rate by the share of the active people on total population (or one minus the share of old people):

$$\frac{S}{Y} = \left\{(1-\alpha)\cdot\frac{p_i}{1+p_i}\cdot\left[1-\frac{\beta + T_i / w}{(1+r)\cdot(1-\alpha)}\right]\right\}\cdot\left[1-\frac{Old\ \ population}{Total\ population}\right] \tag{13}$$

where S and Y are aggregate saving and gross household income. As suggested by life-cycle theory,

[10] In the case where there is no perfect consumption smoothing, an increase of the replacement income could actually induce excess savings in the second period.

the aggregate saving ratio is expected to be negatively related to the share of old people in the population.

4 Back to the empirical evidence

There are a number of additional empirical facts that combined with the insights from the theoretical model may help to understand the ageing puzzles.

The first fact relates to consumption structure and how it evolves with age. Household survey data allow an assessment of the age-group specific composition of consumption expenditure by broad categories of goods and services. Figure 3 shows the relative level of consumption for main items and age group for the US. Most expenditure items display a hump-shaped profile. The consumption level per capita increases steadily with age, peaks at middle-age then decreases. Only health consumption increases with age. The same profiles can be observed for other countries (cfr. Oliveira Martins *et al.*, 2005).

While health care is one the few consumption items increasing with age,[11] it is also heavily subsidised. The shares of publicly provided health services to household income increased steadily countries (e.g. France, Sweden, UK and USA, see Figure 4). The ratios varying from 5-7 per cent of household income in UK and US to 10-15 per cent in France and Sweden.

At the same time, average replacement rates increased in most countries (Figure 5).[12] For example, in France, Italy and Portugal they reached above 80 per cent. In US, starting from a lower basis they reached close to 55 per cent in the early 2000s. In Sweden they have declined following pension reform to around 55 per cent. By 2003, average replacement rates in PAYG systems are around 58 per cent compared with 44 per cent in fully-funded systems. As many PAYG systems are currently unsustainable, this should induce a decline in replacement rates over time.

How the interrelations among these basic facts can explain the puzzles? The changing structure of consumption with age, together with a large subsidy for welfare goods and increasing replacement rates could provide an explanation for both the ageing-consumption and ageing-saving puzzles. If old-age consumers shift their consumption structure towards goods that are heavily subsidised and receive substantial retirement income, this could both induce a decline of observed consumption expenditures and a surplus of saving at older ages. This hypothesis will be tested in the next section.

To investigate how the saving rates are related to the introduction of fully-funded systems, we ran a simple regression of household saving[13] rates (SAV_{it}) on the rate of capitalisation (CAP_{it}, defined as the ratio of pension fund assets on GDP) for a set of 25 OECD countries for the period 1993-2005. We use both an OLS pooled regression and a fixed-effect model. To avoid a potential endogeneity problem, the capitalisation variable is lagged by one period. Results are as follows:

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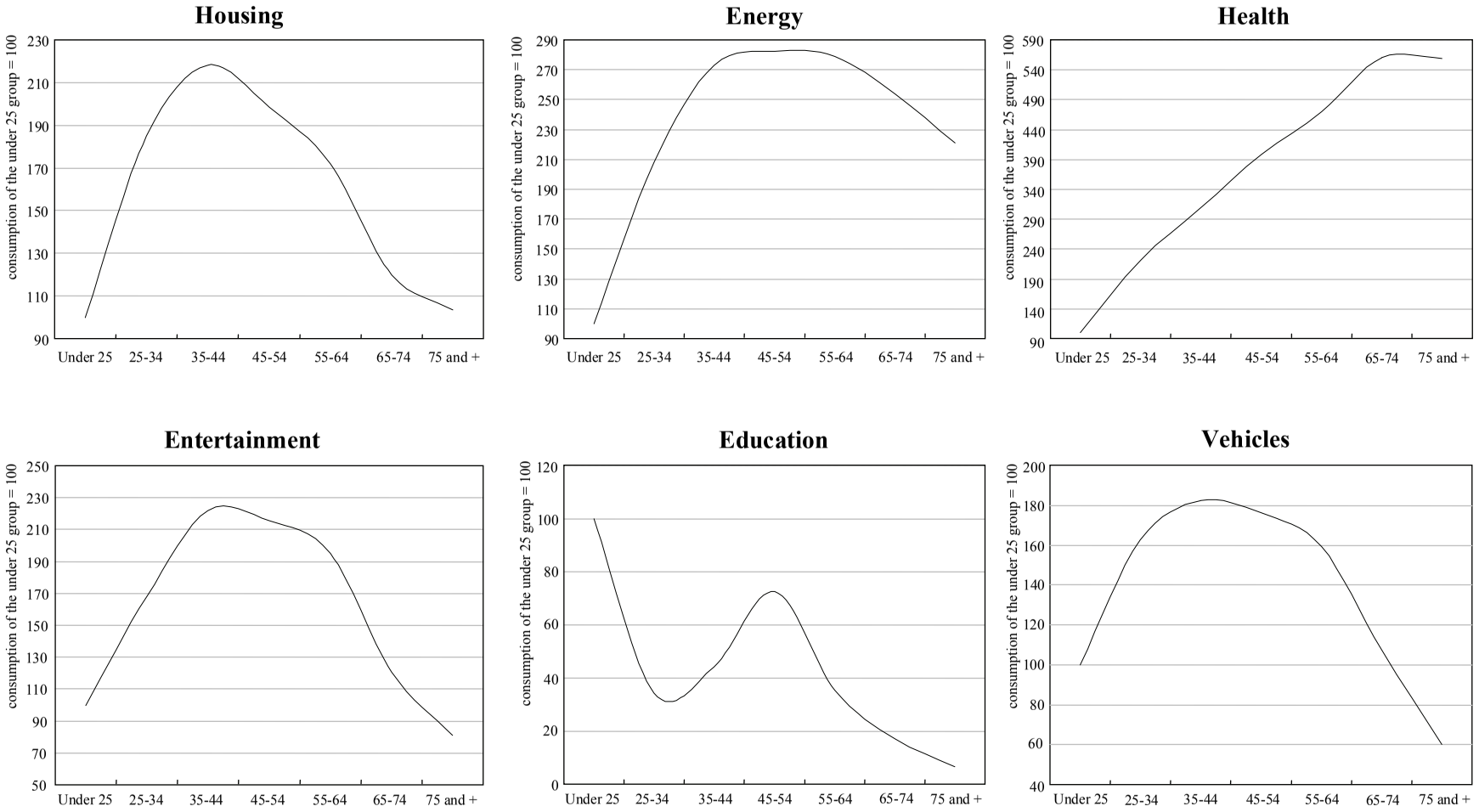
[11] Note that age by itself is not a major driver of health care expenditures, but other factors such as the proximity to death, the effects of income and technological progress. In contrast, the expenditures of long-term care are mainly determined by the age profile (see Oliveira Martins and de la Maisonneuve, 2007, for a discussion).

[12] Average replacement rates are defined here as the ratio between average pension benefits to gross average wages. They were computed using the data OECD Pension and ADB databases.

[13] Household saving is defined here as household disposable income less consumption. Household income consists primarily of the compensation of employees, self-employment income, and transfers. Property and other income – essentially dividends and interest – are evaluated in the light of business income and debt interest flows. The sum of these elements is adjusted for direct taxes and transfers paid to give household disposable income. Note that SNA93/ESA95 has changed the concept of disposable income for households (compared with SNA68/ESA79) so as to include private pension benefits and subtract private pension contributions.

Figure 3

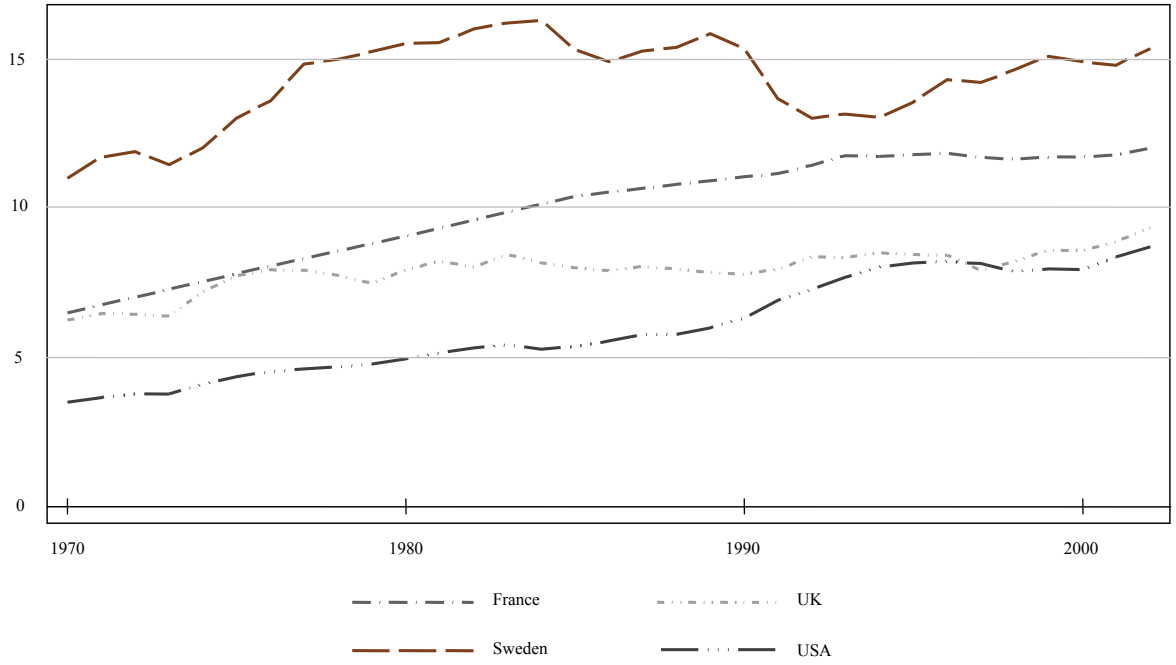
Relationship between Age and Consumption by Expenditure Items in the US



NB: Consumption levels per capita in each age group are normalised at 100 to the under 25 years age group.
Source: Consumer Expenditure Survey, US (2002).

Figure 4

Ratio of Public Health Expenditures to Household Income
(percent)



Source: OECD Health and ADB databases.

$$Sav_{it} = 9.23 - 0.47 \cdot Cap_{i,t-1} + \varepsilon_{it}$$
$$student - t \quad (-4.72) \qquad N = 193$$

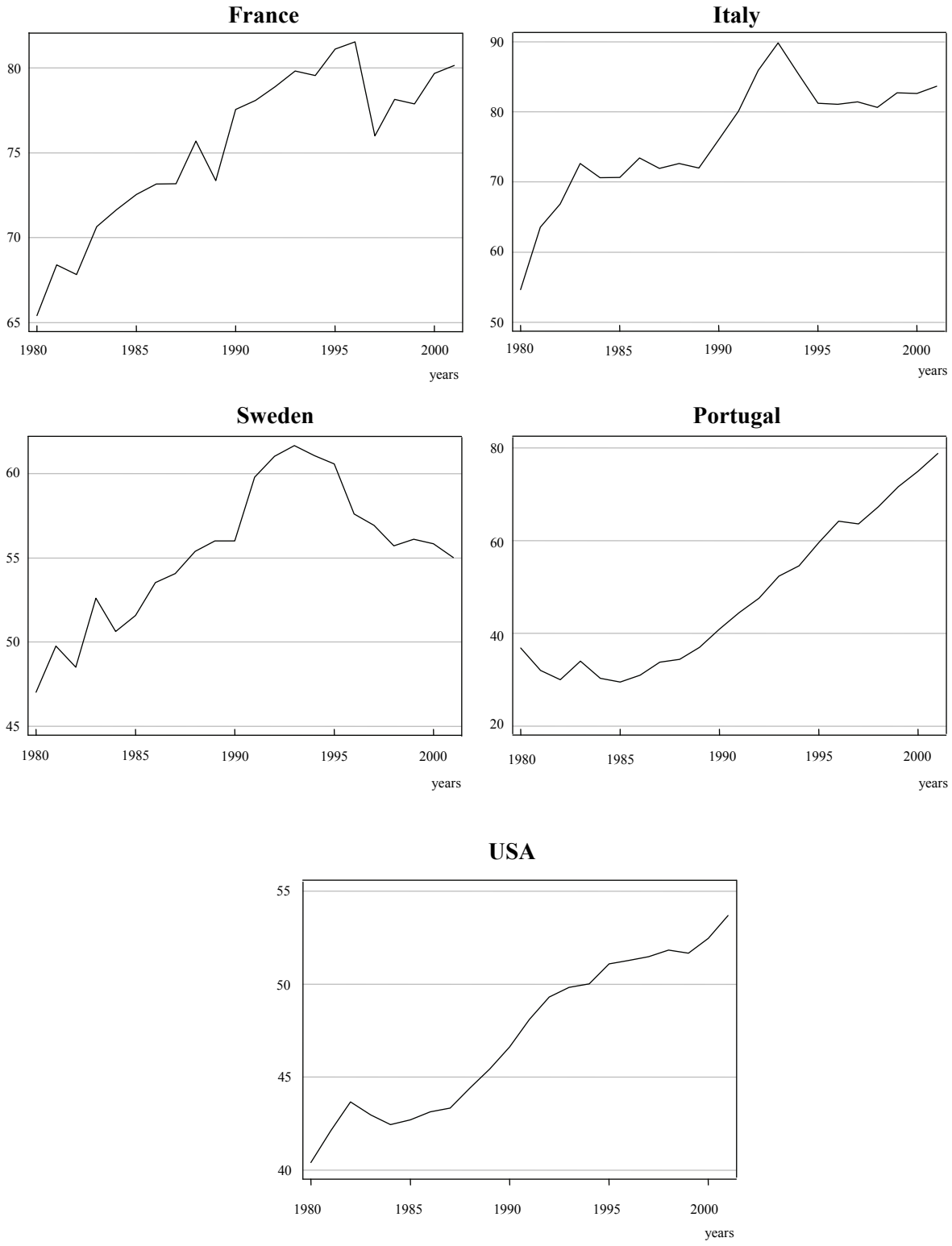
$$Sav_{it} = 11.4 - 0.12 \cdot Cap_{i,t-1} + Country\_Fixed\_effects + \varepsilon_{it}$$
$$student - t \quad (-4.40) \qquad N = 193$$

Capitalisation appears negatively correlated to saving rates. As our theoretical model suggests that PAYG systems should display lower not higher saving rates (see Figure 2), this is a saving-capitalisation puzzle. A possible explanation could be related to compensation between private and public savings or Ricardian equivalence (Barro, 1974). When government budgets are running on debt or public pension systems are not sustainable, households anticipate a required increase in future taxes and/or lower transfers and adjust their current level of savings accordingly. To check this point, we split our sample in two groups of countries: those offering a large coverage by PAYG and those having large fully-funded systems. The latter group include Australia, Canada, Denmark, Ireland, Netherlands, Switzerland, the UK and the US. All these countries have private pension assets close or above 100 per cent of GDP.

In both groups, the countries with the largest budget deficits also display the largest saving rates (Figure 6). The relationship is particularly strong for the countries dominated by PAYG systems.

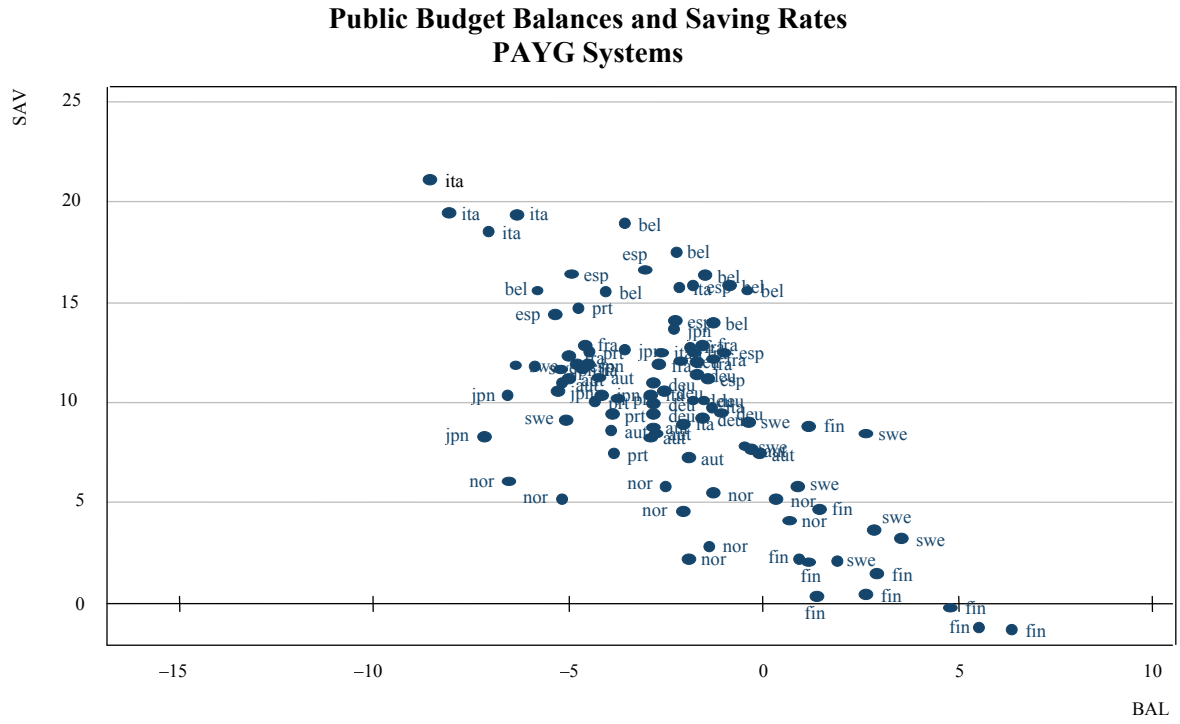
Figure 5

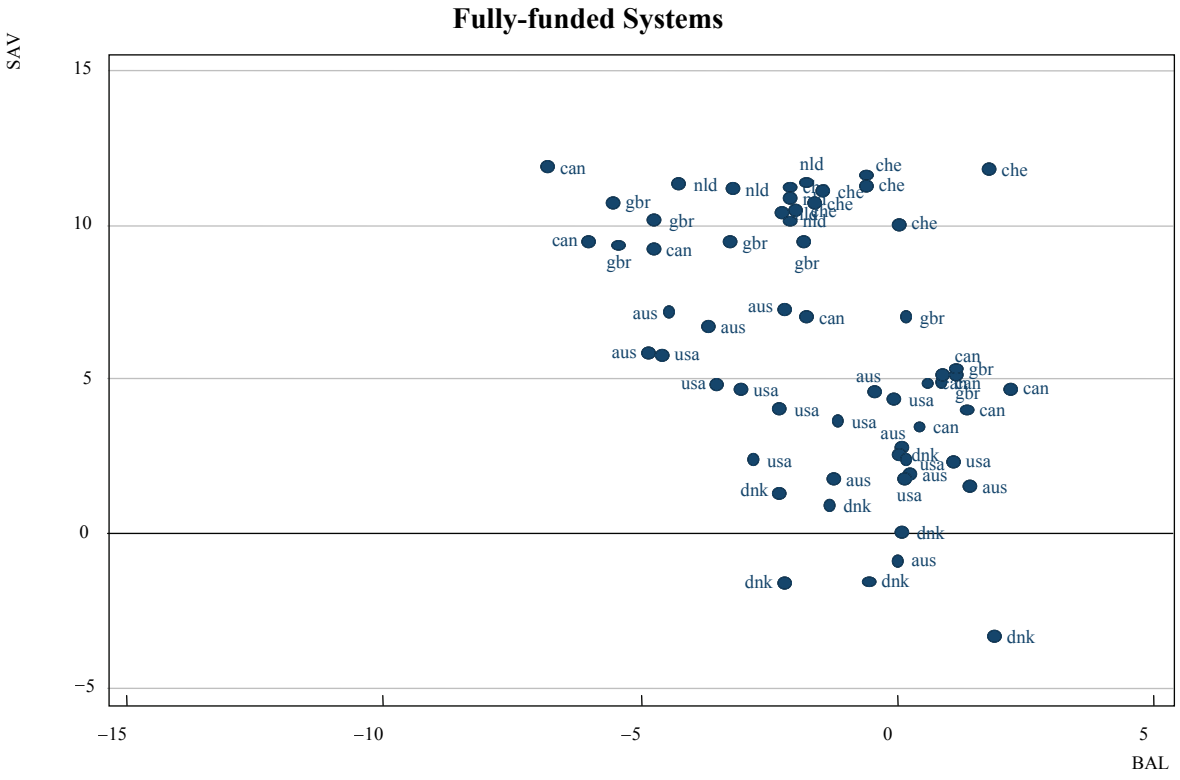
Average Replacement Rates in OECD Countries
(percent)



Source: OECD ADB data base and authors' calculations.

Figure 6





Legend: SAV: household saving rates (in percent of Household income); BAL: Public budget balance (in percent of GDP).
Source: OECD National Accounts and ABD database.

Now, if we run the same regressions for the sub-set of OECD countries with fully-funded systems we obtain the following results:

$$Sav_{it} = 0.06 + 0.84 \cdot Cap_{i,t-1} + \varepsilon_{it}$$
$$student - t \quad (5.45) \qquad N = 65$$

$$Sav_{it} = 12.9 - 0.12 \cdot Cap_{i,t-1} + Country\_Fixed\_effects + \varepsilon_{it}$$
$$student - t \quad (-4.55) \qquad N = 65$$

The OLS pooled regression model shows a positive impact between capitalisation and saving ratios. However, the introduction of fixed-effects changes the sign of the capitalisation coefficient. In other words, within countries, the increase in capitalisation is concomitant with a decrease in saving rates. A possible way to reconcile this result with our model would be to take into account the widespread increase of replacement rates, noted above. Despite the introduction of fully-funded systems, the latter could still induce a decline in savings.

5 Revisiting the ageing puzzles: empirical tests

Drawing from the above results, we are now in a position to test a reduced-from model embodying both the long-term determinants of the saving rates suggested by the theoretical model, as well as other determinants. The specification accounts for a variety of saving determinants identified in the literature (*e.g.* Edwards, 1996; Loayza, Schmidt-Hebbel and Serven, 2000; Musalem 2004). The list is as follows:

(i) *Short-term and macroeconomic determinants*:

- Public budget balance (in percent GDP)
- GDP per capita growth
- Long term real interest rate

(ii) *Social security and welfare systems determinants*:

- Ratio of Public health expenditures on Household income[14] (proxy for the provision of welfare goods)
- Average replacement rate (in public and private pension systems)[15]

(iii) *Structure of the population:*

- Shares of prime (25-59) and old-age (60+) population
- Ratio of life expectancy at 60 to life expectancy at birth[16]

To test for the hypothesis discussed above, we also introduced interaction terms. The first term is the product of public health spending ratio with the replacement rate. This captures the combined effect of the subsidization of health goods and pension income. By creating an excess income at older ages, it is expected to have a positive sign on total household savings. The second

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[14] Note that the ratio to household income is a better measure of the amount of transfers than GDP, as the latter by definition does not include the PAYG income.

[15] We used this variable because it the only available for a large sample of countries and years. A better proxy could eventually be the replacement rate of the retiring cohort in each year.

[16] As noted above, in the context of our two-period life-cycle model, the survival probability can be defined as the ratio of the numbers of years in retirement (period 2) to the numbers of years in period 1 (taken at 60 years). It is then straightforward to see that the term $p_i/(1+p_i)$ in equation (13) is equal to ratio of life expectancy at 60 divided by the life expectancy at birth.

term is the product of the replacement rate by the share of the old population. While a high replacement rate may discourage saving for the active population, it may also contribute to generate excess income after retirement.

The empirical test covers 18 OECD countries[17] and the period 1970-2003. Annex 1 provides descriptive statistics on the different variables used in the regressions. The estimates were carried out using country fixed-effects. A time trend captures an eventual spurious correlation among saving rates and explanatory variables (alternative specifications are also provided in Annex). We also present separate regressions for the sub-set countries with mainly PAYG and fully-funded systems.[18]

Most estimated coefficients are significant and have the expected sign (Table 1). The level of the public budget balance has a negative impact on savings, *i.e.* budget deficits tend to increase the saving rates. Among others, this result is compatible with the Ricardian equivalence, although the size of the estimated coefficient is below one indicating that there is no full compensation between public and private savings.[19] This helps explaining the saving-capitalisation puzzle, as suggested above.

The real interest rates impact positively saving rates, though the former not being significant in PAYG countries. The coefficient of GDP per capita growth is negative. But this control has often an ambiguous sign in saving equations. In line with the life-cycle model, an increase in the share of old-age population (60-99 years) has a strong negative impact on the saving rate for the total sample and for the PAYG systems. The share of prime-age population (25-59 years) is only significant for PAYG countries.

More importantly, in accordance to our theoretical framework, the generosity of pension systems and subsidisation of health goods impact negatively on saving rates. Both the Public health expenditure ratio and the average replacement rate have negative and significant coefficients for the overall sample. The magnitude of the effects for the health transfers is large. An increase of one percentage point of public health spending ratio to household income induces on average a decrease of 1.7 percentage points in the household saving rate (ranging from 0.5 to 2.5 percentage points in the sample).[20] In contrast, the combined effect of the replacement rate is rather small.

The estimates also show that larger health transfers combined with pension income has a positive impact on the saving ratio. This helps explaining the ageing-saving puzzle. The interaction between replacement rates and the share of old-age population has also a positive impact on savings. This result is compatible with the fact that old-aged households could display excess income when there is no perfect consumption smoothing (see footnote 10).

Finally, the sign of the life expectancy ratio is negative but not significant. This is compatible with equation (11) above, showing that the impact of survival probability on savings is not monotonic. The time-trend is also not significant. In annex additional specifications were also carried out, basically confirming the results from the base specification.

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17 Unfortunately, not all variables were available to all OECD countries thus the sample had to be restrained to Australia, Austria, Belgium, Canada, Denmark, Germany, Finland, France, Italy, Japan, Netherlands, Norway, Poland, Portugal, Spain, Sweden, UK and the US.

18 PAYG systems: Austria, Belgium, Germany, Finland, France, Italy, Japan, Norway, Portugal, Spain and Sweden; Fully-funded systems: Australia, Canada, Denmark, Netherlands, Switzerland, UK and the US.

19 This is line with other empirical results in the literature (e.g., Serres and Pelgrin, 2003; de Mello, Kongsrud and Price, 2004).

20 See column 1 of Table 1 and Annex 1 (the total effect is calculated as –3.56+0.034x52.6).

Table 1

Econometric Estimates of Household Saving Rate*

	Total	**PAYG systems**	**Fully-Funded Systems**
	(1)	**(2)**	**(3)**
Public budget balance	**–0.477*****	**–0.444*****	**–0.443*****
	(–6.814)	**(–5.977)**	**(–3.261)**
Real interest rate	**0.183****	0.0818	0.299**
	(2.356)	(1.016)	(2.073)
GDP per capita growth	**–0.426*****	**–0.544*****	**–0.343*****
	(–5.628)	**(–6.789)**	**(–2.778)**
Share of pop 25-59	0.165	**0.693****	0.676
	(0.607)	**(2.168)**	(0.962)
Share of pop 60-99	**–2.031*****	**–1.734*****	–1.681
	(–3.509)	**(–2.790)**	(–1.605)
Public health exp. ratio	**–3.277*****	–0.864	**–3.822*****
	(–5.622)	(–1.026)	**(–2.921)**
Public health exp. ratio*replacement rate	**0.0250****	–0.0170	0.0294
	(2.158)	(–1.202)	(0.854)
Replacement rate	**–0.588*****	–0.0761	–0.268
	(–3.726)	(–0.477)	(–0.540)
Replacement rate*Pop 60-99	**0.0282*****	**0.0190***	0.00668
	(2.878)	**(1.917)**	(0.231)
Ratio Life exp. 60/Life exp. birth	–31.72	–61.47	–10.03
	(–0.420)	(–0.605)	(–0.0739)
Time trend	0.113	0.180	–0.1000
	(0.863)	(1.135)	(–0.344)
Constant	**65.56****	23.78	37.51
	(2.468)	(0.647)	(0.771)
Number of observations	245	134	111
Number of countries	18	11	7
R-squared (within)	0.647	0.719	0.716
F-Test	36.0	26.0	21.36
p-value	0.0	0.0	0.0

* Defined as household saving on household income. All models include country Fixed-effects (not reported). *T*-statistics are in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The Hausman specification test of the fixed-effects vs. the random-effect model is also provided (*p*-values in parenthesis indicate the fixed-effect cannot be rejected at 95 per cent confidence level).
PAYG systems: Austria, Belgium, Germany, Finland, France, Italy, Japan, Norway, Portugal, Spain and Sweden; Fully-funded systems: Australia, Canada, Denmark, Netherlands, Switzerland, UK and the US.

6 Concluding remarks

Some empirical facts on consumption, pension and saving do not fit well with theory. Four types of puzzles have emerged: an ageing-consumption, an ageing-saving, a saving-capitalisation and a saving-longevity puzzle. While most studies in the literature have analysed these puzzles separately, the originality of this paper is to integrate these four puzzles together. We developed a life-cycle theoretical model. Inspired from this model and a number of other determinants of savings analysed in the literature, we then estimated a reduced-form econometric model.

Our empirical results show that the four puzzles are linked together. The changing structure of consumption with age, together with a large subsidy for welfare goods and increasing replacement rates provides an explanation for both the ageing-consumption and ageing-saving puzzles. If old-age consumers shift their consumption structure towards goods that are heavily subsidised and receive increased retirement income, this induces a decline of consumption and a surplus of saving at older ages. Accordingly, higher replacement rates and larger public provision of health care contribute negatively to the savings rate. Furthermore, the level of the public budget balance has a negative impact on savings. This explains the observed saving-capitalisation puzzle. Finally, in line with standard life-cycle effects, we also showed that an increase in the share of the old-age population has a strong negative impact on the saving rate.

Finally, concerning the longevity-saving puzzle, our estimates did not provide significant results. Nonetheless, our theoretical model can explain why with large replacement rates an increase of the survival probability may induce a negative effect on savings.

ANNEX 1

Table 2

Descriptive Statistics of the Variables used in the Econometric Estimates

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Household saving ratio	612	10.08	6.26	–12.82	30.23
Public budget balance	529	–2.78	3.45	–16.38	7.84
Real interest rate	599	3.05	3.64	–17.82	14.25
GDP per capita growth	675	2.18	2.37	–9.16	10.70
Share of pop 25-59	507	46.08	2.89	37.44	51.79
Share of pop 60-99	522	16.76	3.10	10.53	24.85
Public health exp. ratio	535	9.39	2.68	3.13	16.22
Public health exp. ratio*replacement rate	329	526.20	181.14	194.71	961.48
Replacement rate	392	52.61	13.78	28.78	89.87
Replacement rate*Pop 60-99	355	929.74	347.44	369.78	2007.54
Ratio Life exp. 60/Life exp. birth	681	0.26	0.01	0.23	0.30

ANNEX 2
SENSITIVITY ANALYSIS WITH ALTERNATIVE ECONOMETRIC ESTIMATES

In order to test the sensitivity of the results to alternative specifications, we also carried out estimates using the random-effect model (Table 3) and the dynamic panel estimator using the Arellano-Bond (1991) method (Table 4). Note that, according to the Hausman test, the random-effect model is not accepted against the fixed-effect model (our preferred specification).

In general, the signs of estimated coefficients are robust. The long-term real interest rate, the GDP per capita growth and public budget balance keep the same signs and roughly the same magnitudes. The share of old-age (60+) population also remains negative, while the effect of the share of prime-age populations is positive. The health expenditure ratio (the proxy for the provision of welfare goods) is robustly negative, as well as the replacement rate. The interaction terms are also robust as they display the same signs as in the base specification. The coefficient on the relative life expectancy only appears negative in the case of the random-effect panel and for funded systems.

Table 3

Econometric Estimates of Household Saving Rate, Random-effect Model*

	Total	PAYG Systems	Fully-funded Systems
	(1)	(2)	(3)
Public budget balance	**–0.482*****	**–0.506*****	**–0.322****
	(–6.775)	**(–4.432)**	**(–2.147)**
Real interest rate	**0.149***	0.194	0.227
	(1.907)	(1.573)	(1.403)
GDP per capita growth	**–0.415*****	**–0.435*****	**–0.479*****
	(–5.390)	**(–3.229)**	**(–3.126)**
Share of pop 25-59	**0.524****	**0.774*****	**2.918*****
	(2.192)	**(5.551)**	**(9.375)**
Share of pop 60-99	**–1.234****	–0.343	0.163
	(–2.402)	(–0.898)	(0.155)
Public health exp. ratio	**–3.539*****	**–2.468*****	**–4.160*****
	(–6.349)	**(–3.653)**	**(–3.373)**
Public health exp. ratio*replacement rate	**0.0343*****	**0.0268****	**0.0616****
	(3.109)	**(2.158)**	(2.165)
Replacement rate	**–0.524*****	**–0.612*****	–0.148
	(–3.364)	**(–2.752)**	(–0.412)
Replacement rate*Pop 60-99	**0.0179****	**0.0148****	–0.0211
	(2.018)	**(1.977)**	(–0.870)
Ratio Life exp. 60/Life exp. birth	–60.07	36.98	**–368.2*****
	(–0.897)	(0.856)	**(–4.196)**
Time trend	0.00446	–0.0650	**–0.645*****
	(0.0386)	(–0.745)	**(–6.086)**
Constant	**49.28****	–0.785	16.61
	(2.066)	(–0.0372)	(0.675)
Number of observations	245	134	111
Number of countries	18	11	7
R-squared (within)	..	..	..
Wald-test	377.3	402.8	307.9
Hausman-test (p-value)	37.23	99.64	..
	(0.0)	(0.0)	..

* Defined as household saving on household income. *T*-statistics are in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The Hausman specification test of the fixed-effects vs. the random-effect model is also provided (*p*-values in parenthesis indicate the fixed-effect cannot be rejected at 95 per cent confidence level).

PAYG systems: Austria, Belgium, Germany, Finland, France, Italy, Japan, Norway, Portugal, Spain and Sweden; Fully-funded systems: Australia, Canada, Denmark, Netherlands, Switzerland, UK and the US.

Table 4

Econometric Estimates of Household Saving Rate, Dynamic Panel Estimates*

	Total	PAYG Systems	Fully-funded Systems
	(1)	(2)	(3)
Lagged dependent variable	**0.435*****	**0.354*****	**0.388*****
	(10.57)	**(5.898)**	**(6.127)**
Public budget balance	**–0.232*****	**–0.284*****	**–0.211***
	(–4.181)	**(–4.551)**	**(–1.901)**
Real interest rate	**0.153****	**0.197*****	0.145
	(2.491)	**(2.824)**	(1.331)
GDP per capita growth	**–0.395*****	**–0.491*****	**–0.335*****
	(–7.373)	**(–7.815)**	**(–3.688)**
Share of pop 25-59	0.102	0.213	0.451
	(0.476)	(0.789)	(0.762)
Share of pop 60-99	**–0.958***	**–2.143*****	0.251
	(–1.858)	**(–3.388)**	(0.255)
Public health exp. ratio	**–2.351*****	–0.239	**–2.043***
	(–5.027)	(–0.280)	**(–1.931)**
Public health exp. ratio*replacement rate	**0.0197****	–0.0170	–0.000989
	(2.149)	(–1.202)	(–0.0364)
Replacement rate	**–0.356****	–0.267	0.297
	(–2.348)	(–1.355)	(0.721)
Replacement rate*Pop 60-99	0.0133	**0.0297*****	–0.0105
	(1.514)	**(2.787)**	(–0.430)
Ratio Life exp. 60/Life exp. birth	30.40	–88.72	–23.37
	(0.548)	(–1.056)	(–0.232)
Time trend	0.0403	**0.287****	–0.0794
	(0.428)	**(2.164)**	(–0.342)
Constant	26.57	48.67	0.891
	(1.342)	(1.549)	(0.0221)
Number of observations	215	116	99
Number of countries	18	11	7

* Defined as household saving on household income. Regressions were carried out using the dynamic Arellano-Bond estimator. *T*-statistics are in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
PAYG systems: Austria, Belgium, Germany, Finland, France, Italy, Japan, Norway, Portugal, Spain and Sweden; Fully-funded systems: Australia, Canada, Denmark, Netherlands, Switzerland, UK and the US.

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PUBLIC PENSIONS AND THE LABOUR MARKET IN NEW ZEALAND

Paul Rodway[*]

From 1977, New Zealand has had one of the simplest public pension systems in the world, a basic, universal pension – concentrating on the prevention of poverty in old age, with some success. The present set-up implies that without means tests, recipients can continue working, receiving a practically universal payment from their 65th birthday, and with only limited options for taking the pension before age 65.

This paper samples work done at the New Zealand Treasury about the drivers of the decision to cease being active in the labour market. Hurnard (2005) analysed how changes in the eligibility age for New Zealand Superannuation (NZS) twice in the past 30 or so years have influenced older people's decisions to participate actively in the labour market. Enright and Scobie (2009) have recently used survey data to quantify the separate effects of NZS, other income, health status, education, marital status, wealth, and so on, on the decision to participate for older workers, or to reduce the hours of working.

While labour participation of older workers has risen since the gradual lift in the eligibility age from 60 to 65 between 1992 and 2001, there still is a 50 per cent fall-off in participation between people aged 60-64 and 65-69 year olds. So New Zealand Superannuation, despite having no explicit financial disincentives, is still for many older than 65 a barrier to continued participation in the labour market. The coming acceleration of population ageing means that demand for older workers is likely to grow and that any barriers, real or imagined, should be removed.

1 Introduction

This paper reviews recent work done in the New Zealand Treasury on potential drivers of older people's decisions to reduce the hours spent working or to withdraw completely from the paid workforce. It shows that the country relies almost on a universal public scheme where the objective is poverty prevention, rather than publicly supported income replacement.

Population ageing is likely to increase the number of people 65 and older over the next 40-plus years and produce little growth in the population between 15 and 64. This structural change will challenge New Zealand's long-term economic growth prospects and our ability to maintain a stable public debt path. A way of meeting part of this challenge might be for older people to work longer (either by extending their paid working lives or working for more hours or both) and public policy may have a role in facilitating such a change.

The paper is structured as follows. Section 2 describes the pension system in operation in New Zealand since 1977, while Section 3 shows how older people have participated in the labour market in New Zealand and compares this with participation in other OECD countries.

Section 4 then updates work done by Hurnard (2005) analysing how employment and retirement patterns among older people have responded to changes in public pension policy, especially to the age of eligibility for the universal pension (now called New Zealand

[*] New Zealand Treasury.

Superannuation, NZS). The modelling indicates that eligibility for NZS is accompanied by a fall in participation of at least 24 percentage points.

While the aggregate modelling says something about the effects of NZS on participation of older people, sorting out the relative effects of many potential drivers requires analysis of detailed survey results. Since Hurnard's paper was published, work on two surveys has given us some insights into this issue.

Then Section 5 picks up some of the results of Enright and Scobie (2009, forthcoming) about the factors associated with people aged 55-70 continuing in the labour force on a full- or part-time basis, rather than retiring. This study uses the first wave of a new longitudinal survey of health, work and retirement conducted by Massey University in 2006. Relative to being married to a non-working spouse, being separated, a widow/er or married with a working spouse tends to raise the probability of remaining in the labour force, while receiving NZS (or a benefit) lowers the working probability (by 16 percentage points). Levels of significance of these factors are briefly compared with results using Statistics New Zealand's Survey of Family, Income and Employment (2002-05) restricting the sample to 55 and older.

Finally, Section 6 draws some conclusions from these studies about the policy implications for labour participation by older New Zealanders.

2 Public pensions in New Zealand

A small country, as far from Europe as it is possible to be, New Zealand has conducted many social experiments, including introducing a public pension system in 1898. Since then, in this area, we have tried targeting, universality, different levels of generosity, dual public pensions, and changes in the eligibility age of our public pension system. The regime introduced in 1977 set up the broad outlines of the present NZS.

Pension systems have two main goals: first, to prevent destitution in old age by redistributing income to poor pensioners (social protection) and secondly to help workers maintain their living standards in retirement (earnings replacement). NZS follows the New Zealand (and Anglo countries') tradition of coming down firmly on the side of social protection.

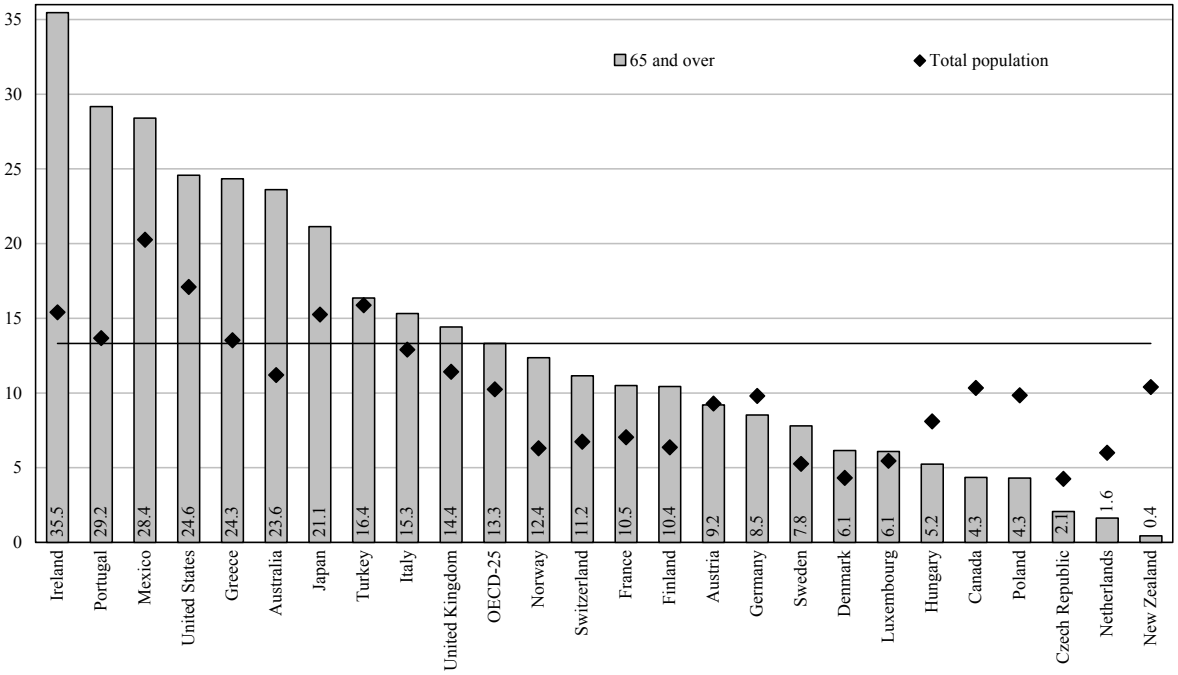
International and national reports rate New Zealand's universal flat-rate public pension scheme highly in achieving the objective of the prevention of poverty in old age. For many, NZS is a major source of retirement income. Figure 1 shows that the poverty rates for New Zealanders aged 65 and over compare very favourably with other OECD countries (also see OECD, 2009).

Positive Ageing Indicators (a report released by the Ministry of Social Development, 2007) says older people in New Zealand generally have adequate incomes that provide them with a reasonable standard of living. This assessment varies with population subgroups and is not so positive for older Māori and single people, especially single women. The adequacy of NZS payments is reflected in the low levels of poverty and hardship among the older population. The report says this conclusion also depends on the high levels of mortgage-free home ownership in the current cohort of older people. It is important, the report notes, that future generations of older people enter retirement as home-owners – either mortgage-free or with small mortgages – as mortgage-holders and those who live in rental accommodation are among the most disadvantaged.

That report ties NZS with other forms of savings and wealth. Are we saving enough so that consumption can continue beyond the years of paid work? Research by Scobie and his collaborators (2007, for example) on modelling consumption smoothing for 45- to 64-year-olds based on wealth surveyed in the Survey of Family, Income and Employment (SoFIE) suggests that the highest proportion of inadequate savers fall in the middle income group (couples with incomes

Figure 1

Lower Poverty Rates among Older People than for the Total Population in One-third of OECD Countries
Poverty Rates for People Aged 65-plus and for the Total Population, 2000
(percent)



Source: OECD (2005), *Society at a Glance, Social Indicators*.

between $15,000 and $50,000). As expected, for the majority of people in the lower income group (quintile 1) no further saving should be required as NZS offers a higher income than their projected pre-retirement income. Wealthy individuals and couples (quintile 5) would not need to save more than they are doing already. Overall, 70 per cent of single individuals and 50 per cent of couples are estimated to require no more saving for retirement. This work, in other words, suggests that for the majority, NZS is playing a role at providing a base for consumption in retirement for the lower income groups.

Since 1977, New Zealand has changed the parametric settings many times, often after heated debate, and has twice made changes, with little warning, to the age at which the pension can be taken up. Promises to improve settings are often part of political platforms and these settings are the subject of deals between potential coalition partners.

The latest change to the NZ pension system is the addition of an auto-enrolment scheme with private individual accounts (KiwiSaver), a variant of a compulsory scheme that was introduced in 1975 and lasted for only a year and another proposed scheme that was comprehensively rejected in a referendum in 1997. The first KiwiSaver accounts were opened on 1 July 2007 and it has been taken up enthusiastically so far by about 40 per cent of the labour force under 65.

NZS differs from systems in many other countries in several key ways. It is:

- universal,
- paid at a flat rate,
- almost impossible to access before 65,
- paid if working or not.

NZS is now available to everybody (subject to a residency requirement) on turning 65. It is paid out at a rate, for a couple, equal to around 66 per cent of the average ordinary-time earnings, net of tax, and generally grows with growth of the average wage.[1] At present about 520,000 people receive "Super," about 95 per cent of people aged 65 and older.

The fixed age of eligibility means there are very limited options for someone wishing to retire before that age, unlike the situation in many other countries. There is no trade-off between the amount of NZS and when you start to receive it. Before age 65, the only public support is through the income-tested benefit system, where payment is lower than NZS, subject to tight income tests, and other conditions (such as the requirement to look actively for work, or being sick or an invalid). The one exception is for the younger partner of someone 65 and older who can choose to receive NZS, but the combined NZS payment is abated against their joint incomes. This "non-qualified spouse" (usually female) can therefore receive NZS before 65 and explains the tendency for early retirement of some females.[2]

Since the late 1990s, NZS has not been income- or asset-tested. The payment level is unconnected to past income. Most importantly, a person can receive NZS and still remain in work. This means there is no implicit tax on earnings beyond age 65, since you can receive NZS while continuing to work. As a result of these institutional settings, the financial conditions around eligibility for NZS tend to discourage early retirement.

In addition, since 1999 it has been unlawful for an employer to require the retirement of an employee just on the basis of age. This has probably been a driver of the rise in employment rates among those above NZS eligibility age.

Two changes to the eligibility age have occurred since the mid-1970s: an instantaneous drop in 1977 and a progressive increase in the age from 1992 to 2001. As Hurnard notes, these two natural experiments enable us to estimate the strength of the labour force response to NZS eligibility age by older workers.

OECD's *Pensions at a Glance* (2007) examines the role of private pensions across the OECD. In 1990, the coverage in New Zealand was 23 per cent of workers. By 2006 only 14 per cent of the labour force was covered by private schemes. This fall may be a consequence of the success of NZS at poverty prevention over the past three decades. The OECD report concludes that for New Zealanders to reach retirement incomes at average OECD rates, voluntary provision needs to be boosted by something around 5-7 per cent of earnings for an average earner.

Shortly after the present pension system was introduced in 1977, the fiscal cost rose to around 8 per cent of GDP. Subsequently lowering of the relativity with wages, raising of the age of eligibility through the 1990s, lower birth rates in the 1930s, some income-targeting and a buoyant economy have brought the ratio of total payments to GDP down to 4 per cent. But the accelerating ageing of the population suggests that by mid-century the ratio will return to 8 per cent, or more.

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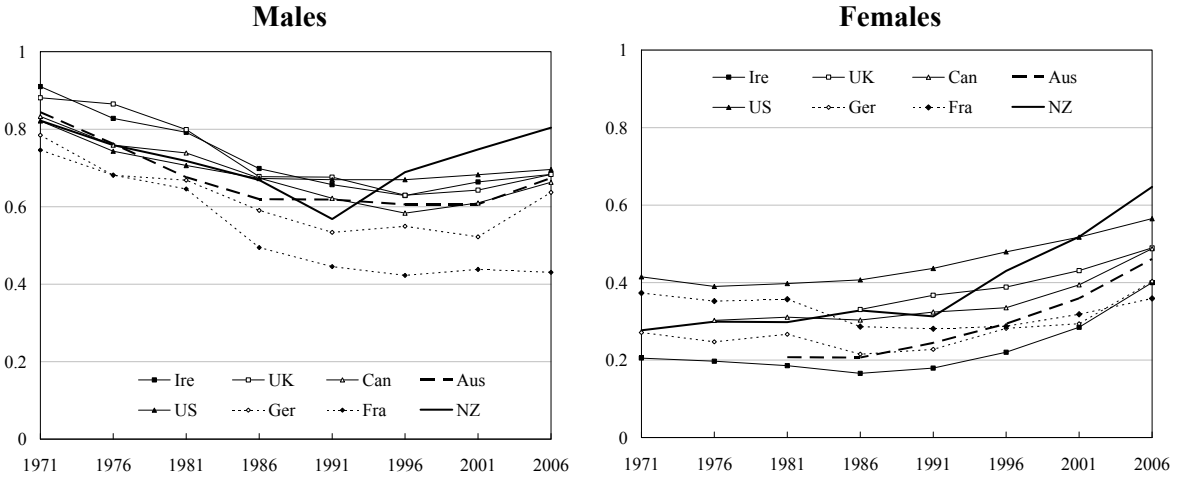
[1] It is indexed to the CPI, but the net amount paid to a couple must lie between 66 and 72.5 per cent of the net average wage. As wages generally grow faster than consumer prices, this usually means that it grows with wages.

[2] This gender difference is supported by OECD estimates of the average effective age of retirement in New Zealand for the period 2002-07: 63.9 years for women and 66.5 for men. These estimates are derived from changes in participation rates over a five-year period for successive cohorts of individuals aged 40 and over (OECD, 2009).

Figure 2

Labour Force Participation Rates, 55-64, by Sex, 1971-2006



Source: OECD Labour Market Statistics for countries other than New Zealand. NZ data are taken from Census documents (in 1971 and 1976, these have been adjusted for a change of coverage of "actively engaged").[3]

Public pension expenditure, health and aged care are the items in public spending that are most dependent on population changes and other pressures. Hence an awareness about what the effects of changing or not changing our public pension system mean for other spending is important for the on-going debate about fiscal sustainability over the coming decades.

3 Trends in older labour force participation

Across many OECD countries, the trend since the 1970s has been for people to retire at a younger age, despite evidence of rising life expectancy. Figure 2 shows the generally falling rates of labour force participation rates in selected OECD countries among males in the age group 55-64 and rising rates for females.

The figure for males shows New Zealand's experience stands in contrast with (some) other countries. All shared the declining trend in older male participation from 1971 to 1991. The reasons for this trend are the increasing coverage and generosity of retirement benefits and actuarially unfair returns from postponing retirement. This changed in New Zealand from 1991 onwards and has continued to 2006 (and beyond). Some countries have introduced policies that are starting to slow or reverse this trend. The picture is similar for older females, but the break since 1991 has been overlaid on a generally rising trend in participation.

It is also instructive to look at 2006 census data on full-time and part-time employment rates (Figure 3). For both men and women, the overall employment rate falls by about 10 percentage points between 64 and 65, the present age of eligibility for NZS.

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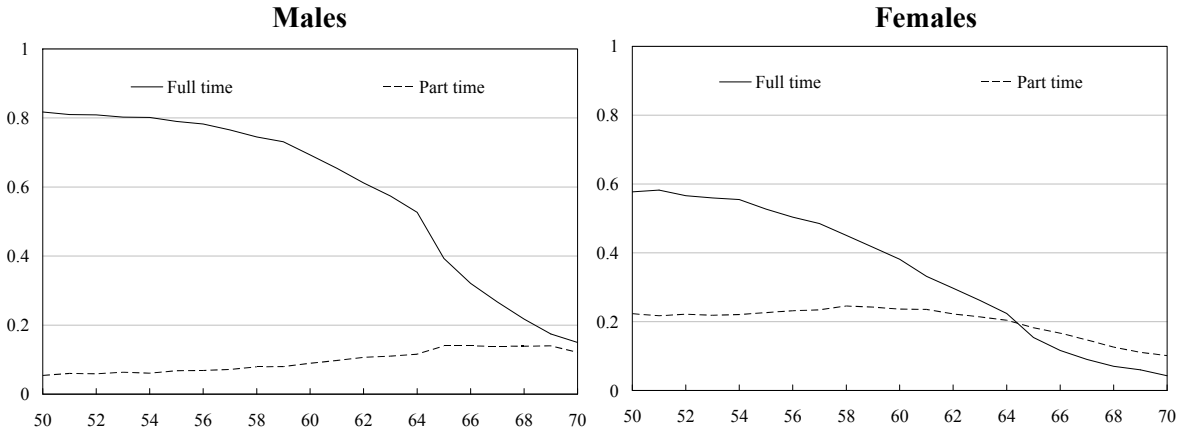
[3] There are two sources of NZ participation data: the 5-yearly censuses for single years of age, 15 to 90+, labour force status, and the Household Labour Force Survey, 5-year age groups, 15-19, . . .60-64, and 65+, quarterly, starting in 1986. Here we use the census numbers to cover the period of the eligibility changes.

Figure 3

Full-time and Part-time Employment Rates, by Sex, 2006



Source: Statistics New Zealand, Census 2006.

Many factors can influence individual decisions about when to leave paid work. Financial factors could include accumulated assets, current and prospective earnings and the value of any pensions. Examples of non-financial reasons for leaving the labour market include poor health, family care responsibilities, the retirement of a spouse, informal age-based discrimination, layoffs, and a wish to do voluntary work or to enjoy more leisure time.

The next section uses aggregate census data and an analysis of changes in public pension policy settings to estimate the strength of each of these factors. The following sections summarise work using unit record data of a cross-sectional survey (so far) and a longitudinal survey to explain the variability of individual retirement behaviour.

4 Effect of NZS on aggregate participation

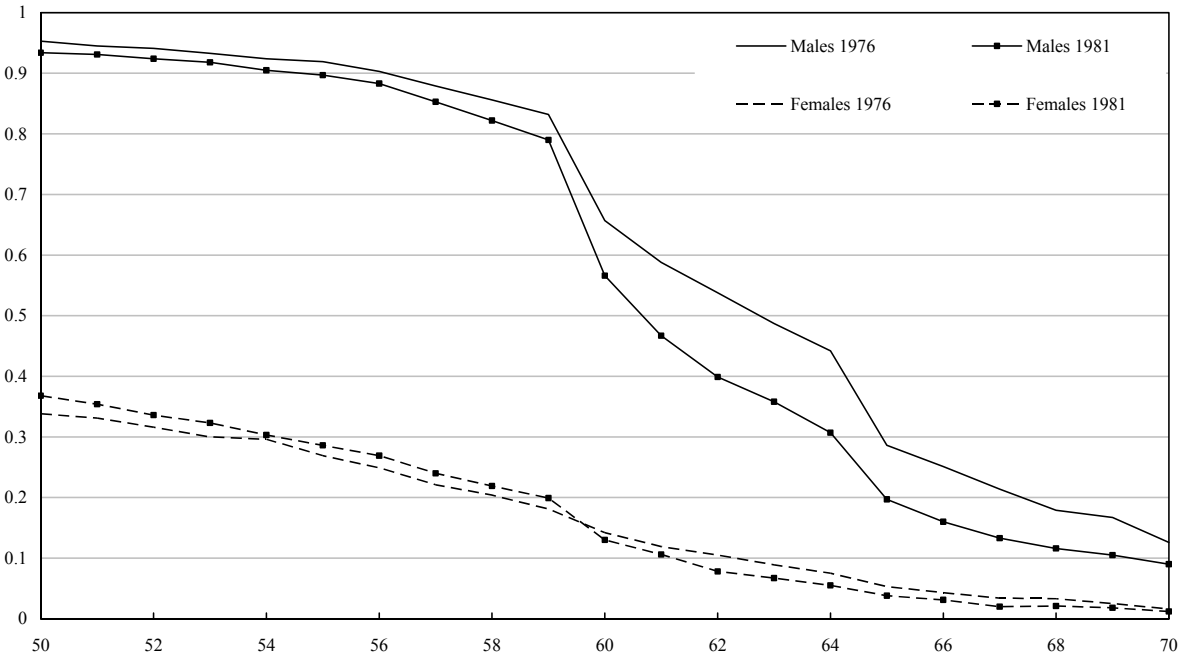
This section updates the work of Hurnard (2005) in using a simple aggregate model to explain the effect of changes in the age of eligibility on participation trends. Two policy changes in opposite directions are used to estimate the effects of these changes. These were very rapid policy decision processes and transitions compared with those in other countries.

The first change occurred in 1977 when the qualifying age for universal superannuation was suddenly dropped from 65 to 60 and at the same time the amount paid was boosted. For 40 years to the mid-1970s, New Zealand had two pensions: the universal pension for those 65 and older and an income-tested Age Pension already available at 60 and claimed by about one third of 60-64 year olds. Figure 4 shows the proportion of men in full-time employment aged 60-64 fell much more than those of a slightly younger age group. Those aged 65 and older show the effect of the larger pension on offer. The trend towards higher participation by women in their 50s becomes reversed from 60 in response to eligibility for superannuation.

The second change happened between 1992 and 2001. In 1989, the government announced that the prospective rise in pension costs would be addressed by gradually lifting the eligibility age from 60 to 65 between 2006 and 2025. Then the economy went into recession. With little debate or warning, the government moved the qualifying age progressively back up to 65, starting almost

Figure 4

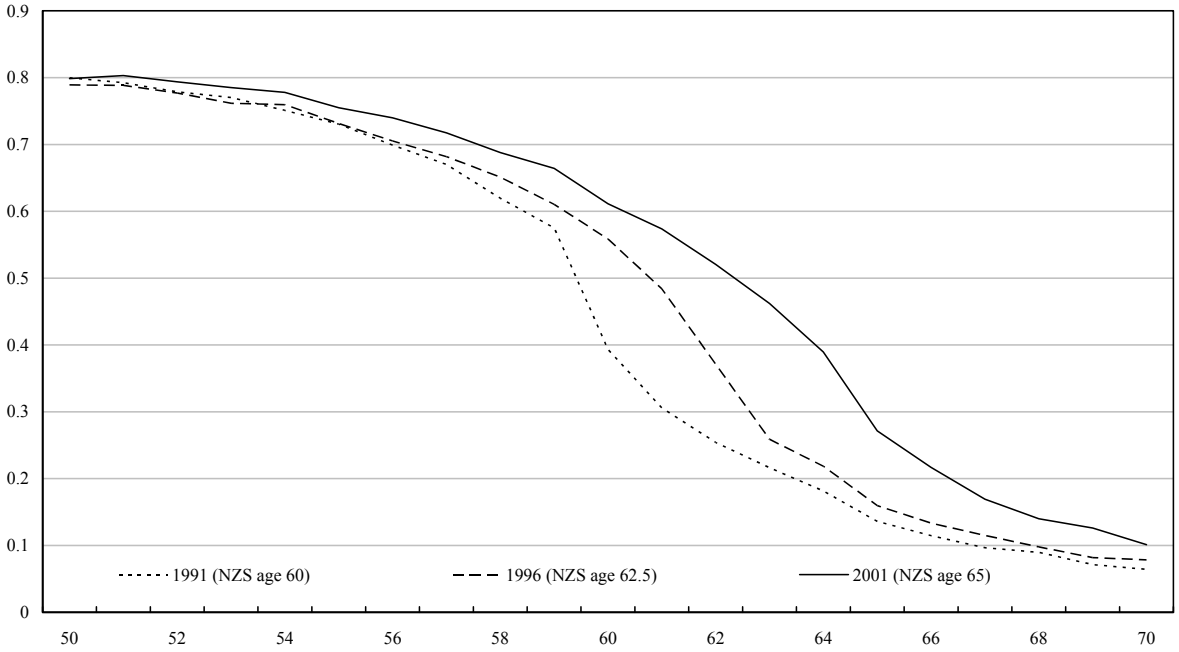
Changes in the Full-time Employment Ratios, by Sex, 1976 and 1981



Source: Rochford (1985).

Figure 5

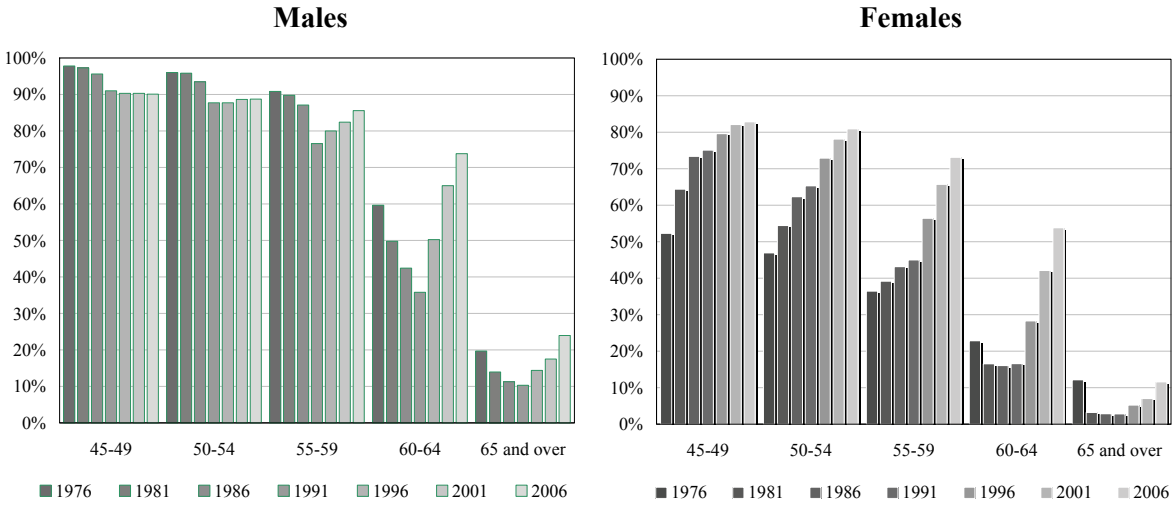
Changes to Male Full-time Employment during the Transition, 1991-2001



Source: Statistics New Zealand, census data.

Figure 6

Labour Force Participation Rates, by Age Group, by Sex, 1976-2006



Source: Statistics New Zealand Census documents and Hurnard's adjustments of data for 1976.

immediately with the transition taking place over the following decade. The short notice disrupted the retirement plans of older workers, but a Transitional Retirement Benefit, income-tested but not work-tested, helped to ease the transition. The 1991 census captured labour market behaviour before the announcement and the transition was complete by the 2001 census. The 1996 census marked the half-way point. Figure 5 shows the rise in participation rates for males aged 60-64 was 20 percentage points or more between 1991 and 2001.

The data for the Hurnard study consist of census participation rates for people aged 45 and older for the seven census years from 1976 to 2006 covering the period of eligibility age changes. Definitions of the labour force participation have changed over the years, reflecting the exclusion of part-time employed and then the change in the number of hours per week constituting part-time employment. The data from 1976 are adjusted to reflect the current definition of a labour force participant: someone who works regularly for one or more hours per week or is unemployed and seeking work in the week prior to the census.

From Figure 6, note that rates for younger females generally rise from census to census, while rates for the males generally are static or falling. Also the 60-64 year age groups show a change in trend compared with the younger groups for both sexes.

Hurnard developed a relatively simple model that controls for the general unemployment rate, age group, whether that age group is currently eligible for NZS, gender and a secular rising trend in female participation. This model can explain a high proportion of the variation in participation rates.

All the coefficients in Table 1 are statistically significant at the 99 per cent level except for one age-group dummy. When the unemployment rate, an indicator of the tightness of the labour market, rises, participation falls. Both male and female participation lowers with age, as you might expect as a result of factors such as the maturing of private savings and rising health problems. Over the period, when eligibility for NZS is triggered, male participation drops by a further 24 percentage points. For females, there is a direct fall of a further 8 percentage points after they

Table 1

Determinants of Labour Force Participation
Dependent Variable: Age Group/Gender Participation Rates in Census Year
(percent)

Explanatory Variables	Coefficient	*t*-stat
Constant	98.76	66.62
Unemployment rate for year to census date *(percent)*	–1.19	–6.16
Eligibility of age group for NZS (0, prop,1)	–24.25	–8.80
Female eligibility for NZS (0, prop, 1)	16.35	2.95
Female near eligibility for NZS (0, prop, 1)	–11.27	–3.87
Female (0,1)	–42.79	–19.77
Log time trend for females not eligible for NZS (trend based on 1976=1, 1981=2, …)	18.41	16.16
Dummy, males 50-54	–2.05	–1.24
Dummy, males 55-59	–8.60	–5.18
Dummy males 60-64	–26.29	–11.79
Dummy, males 65 and older	–52.89	–16.44
Dummy, females 50-54	–6.97	–4.20
Dummy, females 55-59	–15.25	–6.57
Dummy females 60-64	–24.92	–6.47
Dummy, females 65 and older	–36.04	–7.91
Adjusted *R* square		0.99
Observations		70

Source: Update of Hurnard (2005) to include Census 2006.

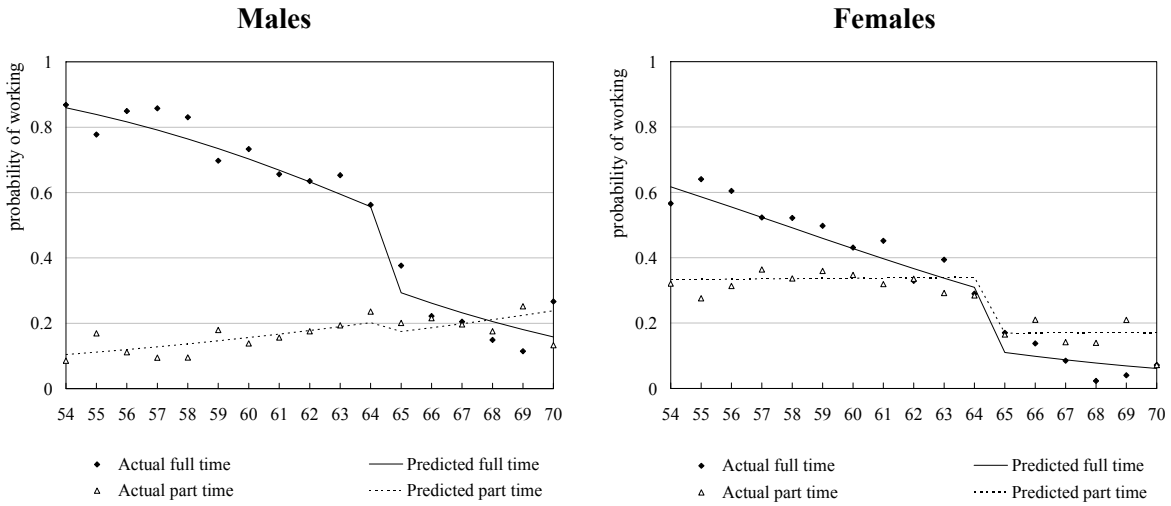
become eligible for NZS (–24.25+16.35). Put another way, if the eligibility age in 1991 had been 65 instead of 60, then participation rates of people aged 60-64 would have been 24 points higher.

The regression results also indicate that average participation rates for women fall if they are within five years of becoming eligible for NZS. This "non-qualified spouse" effect is estimated to lower participation in the near-eligible band by 11 percentage points. This reflects the "joint retirement" decision by couples when the male (typically) starts to receive NZS. An estimated 6 per cent of couples take this option.

It is worth remarking that eligibility for NZS lowers participation rates for men and women, despite the incentive to stay on working (no legal retirement age, NZS is not work tested, absence of early retirement provisions, crowding out of private provision). For many in the lowest quintile of income, NZS is a good replacement for income received in the year before 65. For many, 65 is still a strong signal for retirement.

Figure 7

Unconditional Probabilities of Working Full or Part Time, by Age and Sex



Source: Enright and Scobie (2009).

5 Other drivers of older participation

The next stage of analysis is to examine unit record data in an attempt to sort out what factors are driving people to decide whether to participate, or not, in the labour market, or to change from full-time to part-time work. Since Hurnard, the results of two surveys have become available: Statistics New Zealand's longitudinal Survey of Family, Income and Employment (2002-05) and the Massey University's Health, Work and Retirement survey (2006, first wave).

Enright and Scobie (2009) have drawn on results of the HWR survey. This survey is designed to investigate factors surrounding work and retirement for those aged 55 to 70. It is a national sample of around 6,000 respondents with a heavy over-sampling of Māori.

Among many other things, their paper addresses the question whether the age of eligibility for NZS affects the decision to remain in the labour force. It examines such questions, using logistical regressions to predict behaviour based on binary and continuous data.

"Retirement" is not tied down precisely in the survey. As some respondents say they are continuing to work after retirement, it may mean for them the period after age of eligibility for NZS.

Figure 7 certainly supports the proposition that there is a deterrent effect. For males in the sample, the probability of participation in full-time work falls with age as was also shown in the census data (figure 3). There is a predictable drop at 65, but even so almost 20 per cent of males remain in full-time employment at 70. Contrast this with part-time employment which rises with age, except for only a small fall back at 65. Despite this, at age 66 more than 40 per cent remain active in the labour force.

The female patterns have some differences. The probability of being in part-time employment is much higher than for males until age 68 and drops at 65 by as much as the full-time rate. At the age of eligibility of 65, participation rates for males and females fall by more than 20 per cent. This is twice the size of the fall in the British state pension at age 65. Enright and Scobie attribute this difference to NZS being more generous and universal.

Table 2

Factors Associated with the Decision to Work, by Sex

Explanatory variable	Male	Female
Physical health	***	***
Mental health	***	ns
Age	---	---
Secondary education	ns	***
Tertiary education	*	***
Years in New Zealand	***	*
Separated	***	***
Widow/er	***	***
Never married	ns	***
Married with working spouse	***	***
On a benefit	ns	--
Receiving NZ Super	--	--
Receiving other super	---	ns
No. of dependents	***	**
Plan to stop work	---	---
Family health important	*	ns
Positive retirement reasons important	-	ns
Negative retirement reasons important	*	**
Income of other family members	ns	ns
Wealth	ns	ns

ns = not significant at the 10 per cent level.
*** = significant at the 1 per cent level; ** = significant at the 5 per cent level; * = significant at the 10 per cent level.
Source: Enright and Scobie (2009).

While the data indicate falls in participation at 65, it is difficult to sort out from this how much is due to NZS and how much is due to other factors such as health, marital status, age, ethnicity, region, income, wealth, other forms of super, and so on. These need to be controlled for. To this end, Enright and Scobie run logistical regressions with dependent binary variables such as "working," equal to one if the respondent is in the labour force, and zero otherwise.

As an example, Table 2 shows only those variables that are significant (generally). Health status, as measured by the mental component score, has no significant effect on the labour force participation decisions of women. This contrasts with males, whose decisions to work are strongly related to both their physical and mental scores. Having a tertiary education significantly raises the probability of males and females are working. Compared with being married to a non-working

Table 3

Factors which Change the Probability of Males Remaining in the Labour Force

Variable	Unit Change	Probability of Remaining in the Work Force *(percent)*		
		Initially	After the Change	Marginal Effect
Married with working spouse	Binary	76	94	+18
Widowed	Binary	76	93	+16
Separated	Binary	76	91	+14
No. of dependents	1	85	90	+5
Tertiary education	Binary	88	91	+4
Family health important	Binary	88	92	+4
Negative aspects of retirement important	Binary	89	92	+3
Physical health	5 units	90	92	+2
Mental health	5 units	90	91	+1
Years in New Zealand	5 years	90	91	+1
Age	1 year	90	89	–1
Positive benefits of retirement important	Binary	92	88	–4
Receiving NZ Superannuation	Binary	92	76	–16
Receiving other superannuation	Binary	91	75	–16
Plans to stop work entirely once retired	Binary	93	63	–29

Note: Variables whose coefficients are not statistically significant are omitted from the table.
Source: Enright and Scobie (2009).

spouse, for both men and women, being separated or widowed significantly lifts the probability of working, as does having a working spouse. Receiving a benefit or NZS significantly lowers the chance of being in the labour force for both males and females.Surprisingly, the level of total wealth and the level of income of other household members have no effect on the probability of males or females working. Enright and Scobie suggest that the wealth results might be because the survey does not record liabilities and so cannot test for the effect of net wealth. In addition, the implied stock of wealth associated with NZS forms a major share of the total retirement wealth of many New Zealanders, but is not included in the wealth questions. This may reduce the incentive to accumulate wealth and hence it may be possible that some of what is actually a wealth effect is being picked up by the highly significant effect of receiving NZS.

In interpreting the effects in a logit regression, it is useful to consider the magnitudes as well as the significance. Tables 3 and 4 therefore show the estimates of the marginal effects – the

Table 4

Factors which Change the Probability of Females Remaining in the Labour Force

Variable	Unit Change	Probability of Remaining in the Work Force *(percent)*		
		Initially	**After the Change**	**Marginal Effect**
Separated	Binary	50	92	+42
Married with working spouse	Binary	50	87	+37
Widowed	Binary	50	84	+34
Tertiary education	Binary	73	84	+11
No. of dependents	1	78	86	+8
Negative aspects of retirement important	Binary	79	85	+7
Physical health	5 units	81	83	+2
Years in New Zealand	5 years	81	82	+1
Age	1 year	83	81	–2
Receiving NZ Superannuation	Binary	85	68	–16
Receiving a benefit	Binary	83	61	–22
Plans to stop work entirely once retired	Binary	87	56	–31

Note: Variables whose coefficients were not statistically significant are omitted from the table.
Source: Enright and Scobie (2009).

percentage point change in the probability of working for a one unit change (or in the case of the health variables, five units) in the significant variables.[4]

The probability of remaining in the labour force, in contrast to being retired (no paid work), is calculated by setting all variables in the logit regression, except the one of interest, to their mean values for continuous variables or zero for binary variables. The calculation is then repeated with a change made to the variable of interest. For the physical and mental health scores a difference of five units was chosen, as a change of this magnitude is deemed to be clinically significant.

Male and female results are broadly similar. Changing marital status produces the largest changes in the probability of working. The probability that males who are not separated or divorced are in the workforce is 76 per cent. For those who are, the probability of working rises to

[4] The health variables in the table are indexes constructed from 22 questions in the survey. The study also estimates the separate effects of 19 chronic diseases on the probability of remaining in the work force, again holding constant as many variables as possible. Arthritis, blood pressure and heart conditions are the illnesses having the largest aggregate affects on LFP. In all studies of the effect of health on retirement, there is the question of causality; Is it possible that work status influences health? And can this influence be corrected by appropriate statistical methods? Enright and Scobie attempted to find suitable instrumental variables which might determine health status, but not influence the labour-supply decision. These attempts proved unsuccessful.

Table 5

Factors Influencing the Choice of Full-time Work among Those in the Labour Force

Variable	Male	Female
Physical health	ns	ns
Mental health	ns	ns
Age	---	---
Māori	ns	***
Main urban	ns	*
Tertiary education	-	ns
Separated	ns	***
Widowed	**	**
Married with working spouse	***	ns
Receiving a benefit	---	---
Receiving NZ Superannuation	---	--
Receiving other superannuation	---	--
Has a super scheme	ns	***
No. of dependents	***	**
Income of other members of household	---	ns

Note: ns = not significant at the 10 per cent level.
*** significant at the 1 per cent level; ** significant at the 5 per cent level; * significant at the 10 per cent level.
Source: Enright and Scobie (2009).

93 per cent or so, meaning that the marginal effect is a rise of around 16 percentage points. For females, the figures rise from 50 to 92 per cent for those separated or divorced, a marginal effect of 42 percentage points. At the other extreme, a clinically significant improvement in physical health raises the probably by only 2 percentage points for both sexes. NZS shows up, after holding other things constant, as having an appreciable and significant negative effect on the decision to remain in the labour force (–16 percentage points).

The survey has some insights on the choice between full- and part-time work, given that a person is employed (full = 30 or more hours per week). In this case, the logit regression model is estimated with a binary dependent variable set at 1=full-time and 0=part-time using only those employed in the sample. The levels of significance for factors were similar to the decision to work or not outlined above. The exception was the health measures, where the probability that a person in the labour force chooses full-time employment is not significantly related to either the physical or mental health scores. So while physical health status has a significant effect on the decision to join the labour force, the survey indicates that if a person is employed, their choice about full- or part-time work does not depend on their health status.[5]

Both sexes have a lower probability of working full-time as they age, receive a benefit or have income from superannuation and where the income of other family members is higher. On the other hand, they are more likely to be in full-time employment if they are Māori (in the case of

[5] The discussant expressed scepticism that a "clinically significant" change in physical or mental health could have only a small marginal effect. The authors concede that perhaps a five-unit change is too small to produce sensible effects on participation.

females), are separated or widowed and have a working spouse (for males), and have more dependents.

The very large longitudinal SoFIE survey also throws some light on the effects of health status on labour market participation. Holt (2009) has used the first three waves in a major study of this relationship covering ages from age 15. SoFIE does not contain direct information about the effect of NZS. Enright and Scobie restrict the SoFIE sample to 55-70 and find similar levels of significance for various factors as for the HWR survey. Being on a benefit significantly reduces the probability of older people working in both surveys.

6 Conclusions

This paper is a brief guide to some recent work done at the New Zealand Treasury, principally on the effect of New Zealand Superannuation on the labour market behaviour of older people. The first study, using aggregate time series data, deals with the effects of changes to the age of eligibility for New Zealand Superannuation on the effects of on the decisions by older workers to retire. The second, covering a much wider set of issues than just this topic, draws on a recent survey of about 6,000 individuals and shows the effect of factors such as New Zealand Superannuation, health status, education levels, and marital status, on the decisions by older workers to retire or reduce their hours.

These results add to the international evidence on the question of the disincentive effect of pension policy on the decision to remain in the labour force, even under the fairly benign arrangements in New Zealand.

Many factors, financial and not, can affect the employment decisions of older workers. Enright and Scobie have shown that changes in marital status compared with a base of having a non-working spouse are associated with a large rise in the probability for remaining in work. Smaller rises occur with better health status. Becoming eligible for NZS or receiving a benefit tends to be associated with a large fall in the probability of working.

The acceleration of population ageing means that, under the present structure, payments of NZS will double as a share of GDP over the next 30 plus years (Treasury, 2006). Driving this are the post-war baby boom, more people surviving to 65, and rising life expectancy at 65. Health status may be improving, but the signs are mixed. Functional disability rates appear to be falling, but chronic disease rates may be rising. This makes it difficult to tie down long-term health costs and whether the effect of improving health status on participation can be depended on to lift participation of older workers.

Changing the parameters of NZS would help both the economic growth and the fiscal position – weakening the indexation or indexing the age of eligibility to changes in period life expectancy at 65, but such changes have been ruled out by the current Government.

A decision to maintain present settings for NZS (principally, age of eligibility and indexation to average nominal wages) will mean that fiscal sustainability will require offsets in other areas of expenditure or potentially growth-harming rises in tax rates.

If health status continues to improve along with life expectancy at 65 and levels of education rise, more older people may continue to work past 65. This has several benefits. They maintain strong connections with society, potentially build greater retirement savings, and add to GDP and tax, at a time when the working age population under 64 is experiencing only weak growth because of population ageing.

KiwiSaver, the government-promoted defined contribution scheme, may help maintain the overall participation rates of older workers. Older higher income individuals will contribute more in tax, and are also likely to be more educated and experienced. Preliminary calculations, however, show that the contribution rates are not sufficient to provide sufficient annuity income, along with NZS, to achieve an acceptable income replacement rate for median- and high-income couples and individuals.

Policy changes that soften the fall in participation after age 65 will be beneficial for individuals, the economy, and the fiscal position. One suggestion is to allow NZS payments to be diverted to a worker's KiwiSaver account which unlike now would be permitted to continue for several years after 65. This would allow people a choice to continue working and get a larger payment of NZS due to returns on their savings when they finally stop paid work.

The present severe recession may produce a fall in participation of older workers as firms reduce their staff. On the other hand, the loss of wealth by older workers, reflected in the price of houses and equities, associated with the recession over the past year, may cause people in their 60s during the next decade to decide to remain in work after 65 to recoup these losses.

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AN AGEING EUROPE AT WORK: ARE THE INCENTIVES TO WORK SUFFICIENT TO PROVIDE ADEQUATE AND SUSTAINABLE PENSIONS IN THE FUTURE? LESSONS FROM THE OPEN METHOD OF COORDINATION

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1 Introduction

Traditionally, pension systems have generally been designed for a different demographic and socio-economic situation than that prevalent today. Pension systems have typically been designed with contribution rates, working patterns, monthly benefits, and retirement ages that have been established to suit an era with shorter life expectancy, longer weekly working hours, shorter holidays, a different distribution of labour between men and women and higher fertility rates. The entry of women into the labour market has not been sufficient to address the increasing demographic dependency ratios due to longevity increases and low fertility rates.

The more than doubling dependency ratios in the European Union by 2050[1] illustrate the exertions on the public expenditure due to the ageing population and the growing proportion of the inactive population. The economic dependency ratios have worsened also due to shorter working lives (Figure 1). The relative costs of social security systems are expected to increase, including pension expenditure as well as expenditure on long-term care, health care and other social services for the elderly. At the same time a shrinking number of labour-active would bear the burden of the increasing expenditure.

On average, pension expenditure today, makes up more than 40 percent of social protection expenditure aggregated in EU Member States.[2] As the population ages, European countries have experienced a decade of ongoing reform to their old age pension systems to make them more financially sustainable and adaptable to changing demographics. On average, if there were no offsetting factors, such as the increase in employment rates, higher coverage of beneficiaries in schemes, increasing retirement ages, or lower benefit levels, demographic pressure alone would be estimated to relay into an increase in public pension by over 70 per cent in real terms in the EU15.Projections show that recent pension reforms will curb the rise in public pension expenditure from around 9 percentage points between 2007 and 2060 to 2.4 percentage points, so that so that projected expenditure would reach 12.5 per cent of GDP in 2060. At the same time, public spending on pensions is not expected to rise in parallel with the old-age dependency ratio. In 2060 people over the age of 65 will get, on average, a smaller share of GDP from public budgets.[3] This reflects, to a large extent, that the financial challenge addressed in pension reforms may have spilt over into a social or adequacy challenge.

Pension reforms providing expenditure sustainability must not do so solely at the cost of lower pensions, from a social sustainability point of view. The main instrument for policy exchange and coordination between the Member States in the area of pensions and social protection is the Open Method of Coordination (hereafter OMC). Lessons from the OMC implemented by the European Union has indicated the importance of emphasizing the need to increase the ratio of

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The views expressed in this paper are those of the author and do not necessarily reflect the opinions of the institution.

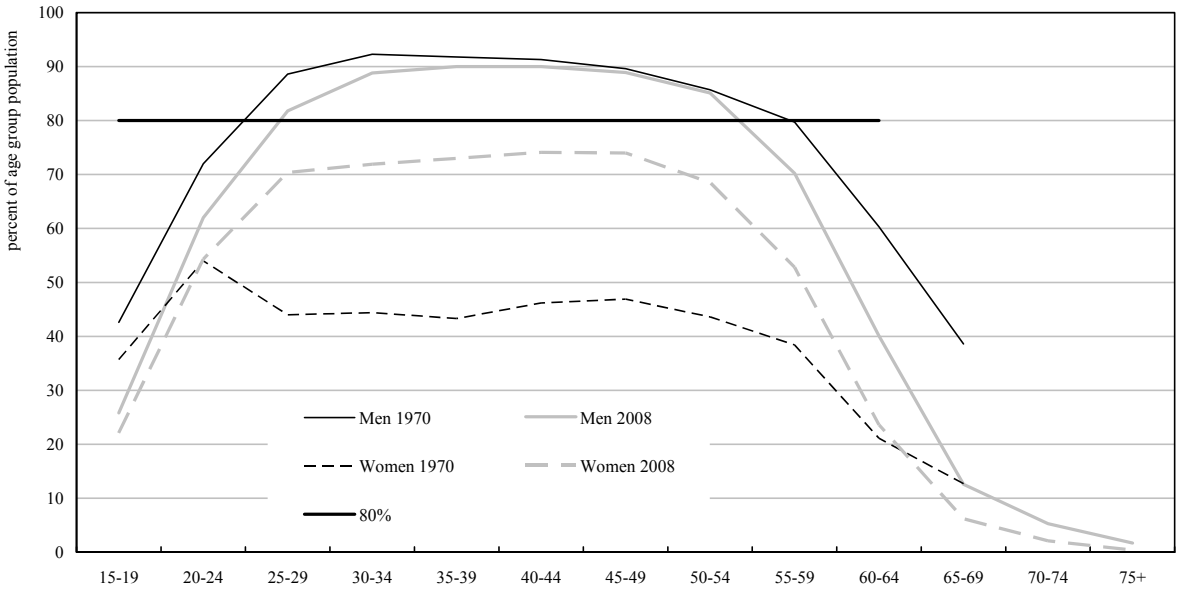
[1] The dependency ratio is measured as the ratio of people over 65 to people of working age (aged 15 to 64).

[2] Source: ESSPROS.

[3] Source: Calculations by the Ageing Working Group (AWG) of the Economic Policy Committee (EPC), Ageing Report 2009.

Figure 1

Employment Rates by Gender in the EU-15, 1970 and 2008



Source: OECD, OECD Stat database, *Employment in Europe* (2007).

labour active in order to ensure that financially sustainable and yet adequate pension can be provided despite demographic pressures and pension reforms.

The mathematics of the issue is straightforward. In an ageing society where more people are living longer and relatively people are working less, either more people have to work more or longer to sustain the same relative monthly pension benefits as in the past, contribution rates have to be increased or the relative monthly benefits have to be cut. Most countries have chosen a mixture of these solutions in order to deal with the pressures on their pension from an increasing number of benefit recipients. Many pension reforms have, therefore, incorporated legislations into their pensions systems to prolong working lives and to give increased incentives and possibilities for individuals to work longer.

The aim of this paper is to look at the effects of pension reforms on the prolonging of working lives and how successfully they help attain the goal of reaching financially sustainable and adequate pensions as observed within the OMC for the 27 Member states (EU27) of the European Union (EU). Section 2 of this report defines the role and summarize the main findings of the OMC in the area of pensions in the context of the Lisbon Strategy. Section 3 analyses the different types of incentive structures that have been used in pension systems in EU Member States. Section 4 discusses possible impediments to these incentive structures through related financial security schemes and labour market conditions, whilst Section 5 shows the importance of information formation in order to ensure the effectiveness of work incentives.

The main source of the findings in this paper are from the OMC, unless stated otherwise, primarily from the Joint Report of 2009 and the two part study on Promoting longer working lives through pension reforms by the Social Protection Committee (SPC).[4]

[4] For more information, please refer to: http://ec.europa.eu/social/main.jsp?catId=757&langId=en

2 The OMC and pension policy

2.1 The Open Method of Coordination in the field of pensions in the context of the Lisbon Strategy

Pension reforms require long term strategies. The process of reform itself is lengthy as pensions reforms are usually built on broad consensus as they are a fundamental part of our social protection systems and of social cohesion. Furthermore, Member States dedicate significant amounts of public expenditure to old age provision, which in light of demographic trends is set to grow significantly. Therefore reforms of pension systems should be seen both in the context of ensuring adequate and sustainable retirement provision, and in the context of sustainable public finances as a whole and sustainable growth across the EU.

The Laeken European Council of December 2001 recognised that there could be significant benefits by enhancing dialogue and cooperation on issues related to the reform of pension systems. It endorsed common objectives of adequacy, financial sustainability, adaptability, and a working method based on the OMC.

The basic structure of this coordination process is as follows: Member States and the European Commission have agreed to work within the OMC on social inclusion and social protection. The open method of coordination works through the common setting of objectives by the European Commission and the Council of Ministers, the reporting by the Member States on the basis of these objectives, and the Commission synthesising the findings in a report which is subsequently endorsed by the Council. Then, at the EU level, overall progress, challenges and arising areas of future concern are reported on, as are the type of action to be taken.

Common objectives for pensions

The common objectives of the OMC in the field of pensions are to provide adequate and sustainable pensions by ensuring: (g) adequate retirement incomes for all and access to pensions which allow people to maintain, to a reasonable degree, their living standard after retirement, in the spirit of solidarity and fairness between and within generations; (h) the financial sustainability of public and private pension schemes, bearing in mind pressures on public finances and the ageing of populations, and in the context of the three-pronged strategy for tackling the budgetary implications of ageing, notably by: supporting longer working lives and active ageing; by balancing contributions and benefits in an appropriate and socially fair manner; and by promoting the affordability and the security of funded and private schemes; (i) that pension systems are transparent, well adapted to the needs and aspirations of women and men and the requirements of modern societies, demographic ageing and structural change; that people receive the information they need to plan their retirement and that reforms are conducted on the basis of the broadest possible consensus.

Concerning pension reforms, there is agreement that pension systems should provide adequate retirement incomes in a financially sustainable way while adapting to societal and economic change and that the objectives of adequacy and sustainability are mutually reinforcing and need to be achieved together.

2.2 Main lessons learnt from the OMC

The pension's strand of the OMC has shown that pension reform in Europe has basically been triggered by long term projections showing increasing pension expenditure and the financial unsustainability of pension systems. In order to, simultaneously, ensure the continued financial sustainability of pensions and provide an adequate replacement income at retirement Member States employed a mix of different types of pension designs: public and private, pay-as-you-go and funded, mandatory and voluntary. At the same time they have also sought to underpin changes to pension systems by improvements in labour markets, notably by raising employment rates of women and older workers.

Over the last decade reforms have improved sustainability by braking and counteracting the effects of declining ratios of working years to retirement years and of workers to pensioners. The 2006 report reiterated that financially sustainable systems must be balanced with adequate benefits. The 2007 and 2008 joint reports included in-depth analyses of specific issues, dissemination of policy findings and development of indicators for progress towards the common objectives. Amongst these issues were the three main findings in the OMC to date:

- the identified need for more people working more and longer and the subsequent creation of incentives to prolong working lives and close early exit pathways,
- a reinforcement of the link between contribution and benefits balanced by a reinforcement of minimum pensions for those that will not manage a full contributory history,
- greater pre-funding of pension schemes to help to smooth the demographic transition by bringing forward some of the pension expenditure.

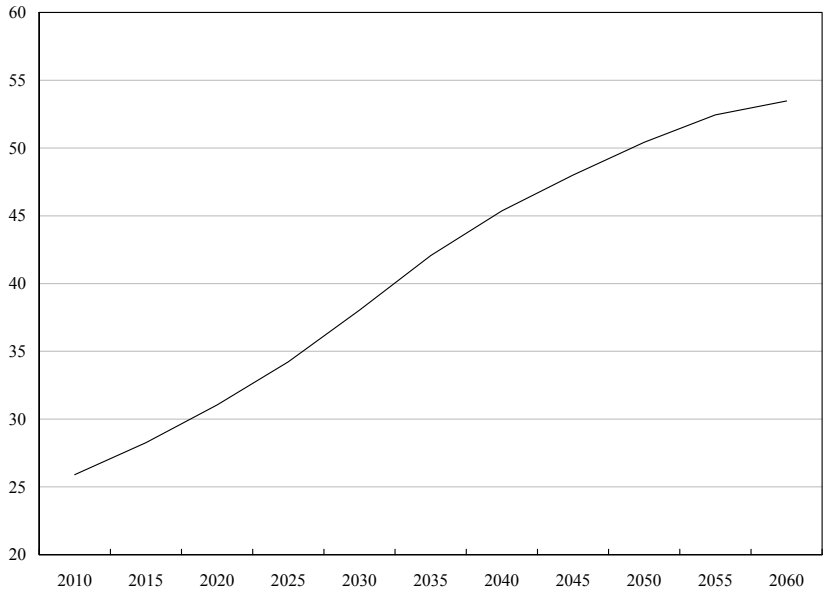
Most countries have recognised the need of more people working more and longer. Therefore, during reforms Member States have built work incentives into the design of pension systems. Some prolong working lives at the end of the individual's career, through actuarial benefit calculations based on remaining life expectancy calculations. Others provide financial incentives to promote labour activity throughout the career by increasing the minimum eligibility requirements of contributory years for a full pension or strengthening the link between contributions and benefits.

3 Incentive structures in pension systems

Meeting the pension challenge is essentially about balancing the periods of life out of work with those in work and hence closing the gap between shorter contributory lives and longer retirement periods – with the first resulting from later labour market entrance and decreased employment rates of older workers and the second triggered by premature exit and longevity. Maintaining the adequacy and sustainability of pension provision in an ageing society depends crucially on more people working more and longer. The 2007 Joint Report identified the need for 16 out of 25 Member States to promote longer working lives and increase the employment rates of older workers further in order to cope with future burdens on pension and social security systems without compromising the adequacy of benefits (CZ, DK, GR, ES, FR, IT, CY, LT, LU, MT, NL,

Figure 2

Projected Old-age Dependency Ratio in EU 27, 2010-60
(percent)[*]



[*] This indicator is defined as the projected number of persons aged 65 and over expressed as a percentage of the projected number of persons aged between 15 and 64.
Source: Eurostat.

AT, PT, SI, FI, and SE).[5] The 2009 Joint Report reemphasized this message stating the need for more people to work more and longer throughout their careers. Some Member States have sought to respond through new initiatives in pension and labour market policies as depicted in the latest round of National Strategy Reports for 2008-10. Despite progress in recent years in many Member States (for instance LV, BG, LT, DE, SK, EE and NL), there is still a need for extending working lives across the Union even further as the working age population shrinks in comparison to the overall population.

Pension systems can support labour market objectives through the inclusion of all labour active groups, by signalling appropriate ages of retirement and by establishing economic incentives (bonus/malus systems) in support of desired behaviour. Although activity and employment rates are influenced by a whole range of factors unrelated to pensions, the norms about retirement and retirement practices are primarily influenced by the institutional framework created by the state legislation. Rules of pension accruals, the pensionable age and designs of early retirement benefits represent signals for workers and employers that impact on the process of age management.

As Members States are seeking to reestablish a sustainable balance between contributory working years and years spent in retirement they are faced with a combined need for: lowering the entry age, widening the contributory base, lowering the incidence and length of careers breaks and increasing the effective labour market exit age. A number of Member States have widened the financial base of a pension system through increases in the contribution rates or by promoting coverage of groups previously not covered (self employed, atypical workers). However, most efforts have been directed at influencing the effective labour market exit age.

Recent pension reforms in EU member States have included different types of designs and incentive structures to encourage lengthier careers or a mix of these. Typically, most incentive structures for longer working lives in retirement systems are focused on extending working lives closer to retirement rather than earlier in the career. More focus is often put on postponing labour market exit and typically, the incentive structures include increasing statutory retirement and pension eligibility ages; improving flexible retirement options, allowing and encouraging people to

[5] Please see Annex 1 for a list of the EU 27 abbreviations.

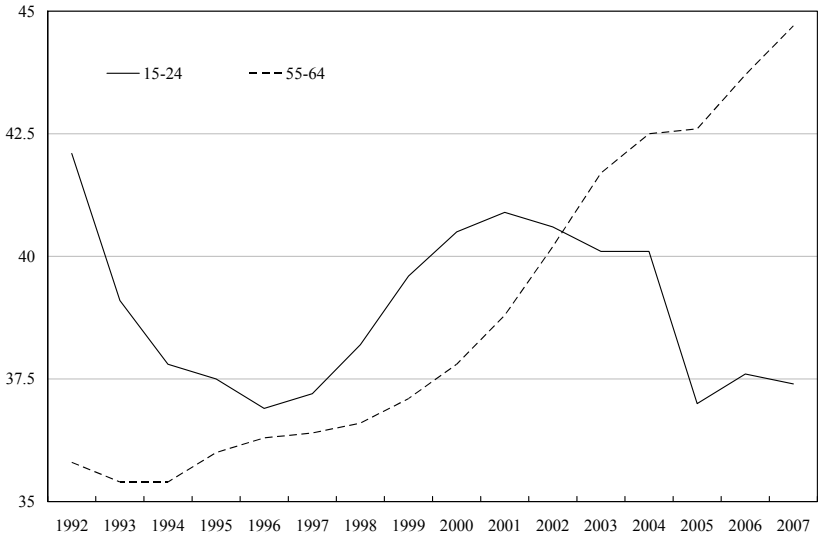
continue working, by allowing for possibilities to combine work and retirement; and introducing more actuarial calculations of pension benefits and bonus/malus systems which give reductions and increments in benefits for earlier or later retirement. The positive effects of reforms during the last decade to encourage delayed exits from the labour market effects can be seen in the improving employment rates of older workers.

In most cases, incentives to extend working lives need to be given also to younger workers, especially in light of the observed increase in labour market entry ages. High unemployment figures for younger workers also indicate that young people are not entering the labour market to the same extent as before. A common approach is to increase the link between contributions and benefits by moving towards a life cycle approach by extending the number of years needed to obtain a full pension.

Since the young of today are the old of tomorrow high unemployment levels among the young might

Figure 3

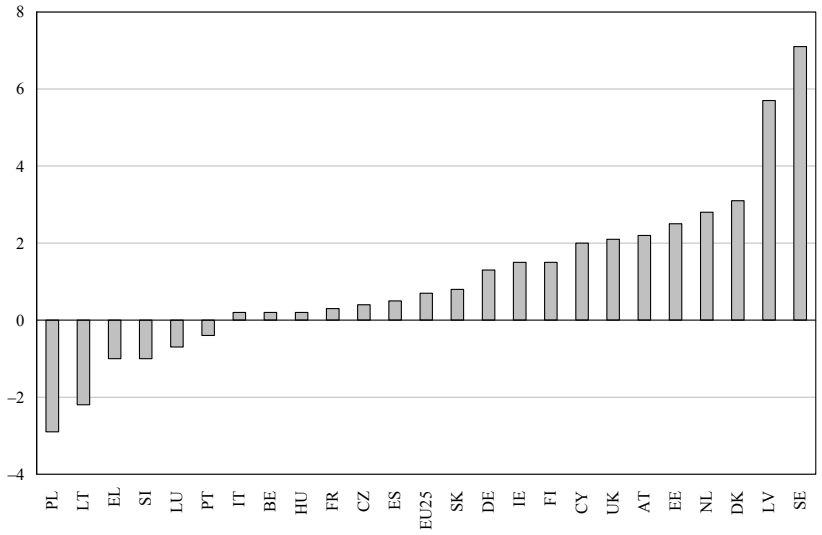
Employment Rates for Workers in Different Age Groups Over Time



Source: Eurostat, *EU Labour Force Survey*.

Figure 4

Change in Employment Rates Between 2000 and 2008 for the Population aged 65 and over in the EU
(percent)



Source: Eurostat, *EU Labour Force Survey*, 2000 Spring and 2006 Second Quarter Results.

lead to lower pensions in the future and thus higher future poverty rates. Even more so if persons caught in unemployment during their working life are unable to affect their pensions levels later by prolonging their working lives to make up for the long periods out of gainful employment. This can cause a persistent poverty trap. High and persistent unemployment rates among the young also threaten the generational contract between young and old, inherent in most pension systems.

It is also interesting to note that developments in employment rates for the age group 65 and over also show rises in the vast majority of Member States since the year 2000. This indicates a move toward older workers staying in work beyond the age of 65, which has traditionally been considered the age for retirement in most EU Member States. The overall change in the employment rates of those above the age of 65 and their actual level is still low at an EU level averaging at around 4 per cent.

3.1 Raising retirement ages and increasing flexibility

Politically, pension reforms are difficult to initiate and implement due to the inter-generational nature of pension systems. Legislating increases in the retirement age of the statutory scheme is one of the more effective and definitive methods of delaying retirement, but also one of the more difficult reforms to implement. The legislated retirement age is socially connected with a sense of right and tradition and thus is politically unpopular to increase. The inter-generational characteristics of most statutory pension schemes add a perceived sense of unfairness if an increase in the retirement age is implemented. Furthermore, rules regarding the receipt of benefits from other social protection systems may also be connected to the statutory retirement age, sometimes making it economically expensive to carry out such increases.

As of today, there are Member States where the statutory retirement age is below 65 with no current legislation to raise this age. (e.g., BG, EE, FR, IT LV, LT, HU, MT, SI, SK). A number of EU Member States have, however, legislated an increase in the statutory retirement age, but often the legislation is softened in its design. For example, most Member States have chosen to phase in the reforms on retirement ages over a long period, thus being raised primarily for younger cohorts (e.g., CZ, DK, DE, LT, MT, UK). This also tends to dampen some of the current political responsibility with regards to the actual implementation of these legislated reforms (see Annex 2).

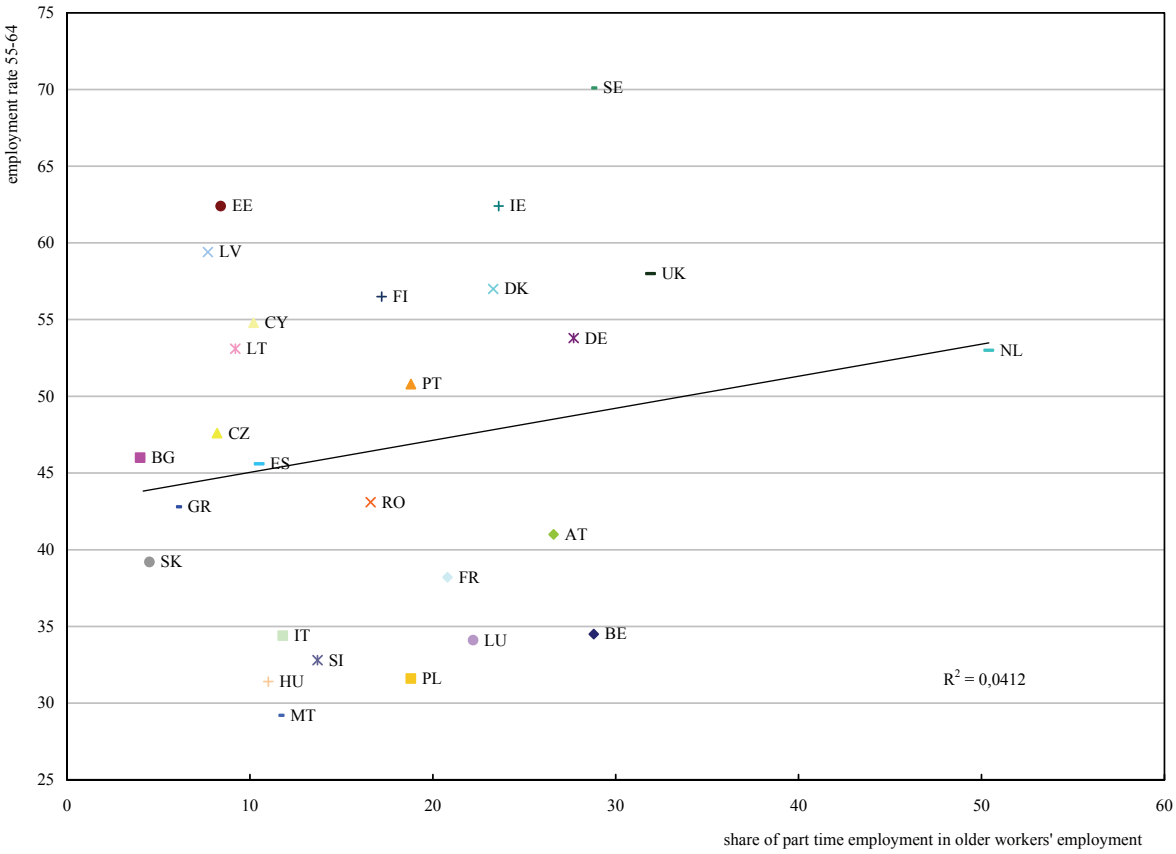
In many Member States, a more viable solution to increasing the retirement age is to primarily aim for an equalisation of retirement ages between women and men. Some Member States foresee such an equalisation in the near future (e.g., BE, LV, HU) whilst others, even in this case, have longer transitional rules (e.g., EL, EE, LT, MT, AT, CZ).Whilst closing the gap between the retirement ages for men and women, Some countries still do not legislate a full equalisation (e.g., BG, RO, SI), whilst others have so far not taken any steps in this direction (e.g., PL).

Other Member states have instead chosen to introduce a flexible minimum pension eligibility age at which old-age pension benefits can be received (often below 65) but with actuarial reductions to the pension the earlier it is retrieved (e.g., FI, SE). Under specific circumstances more flexible paths out of employment into retirement can help to promote longer working lives especially if possibilities to combine work and retirement are given, particularly for groups that may not have chosen a full-time employment over full-time retirement.

The increase in the employment of older workers over the past decade is partly due to a rise in part-time work, notably by men. About 25 per cent of employment among older workers in the EU-15 is now part-time and 22 per cent in the EU-27. Therefore, a number of Member States have designed their systems allowing individuals to take a share of their pension whilst continuing to work (given particular conditions). This type of provision is reported in a number of Member

Figure 5

Share of Part-time Employed as Compared with Employment Rates for Older Workers in the EU, 2008



Source: Eurostat (2008), *EU Labour Force Survey*, annual.

States (CZ, ES, FR, IT, NL, FI, and SE).[6] Experience in Member States however shows that whilst possibilities for work time reduction can be essential for facilitating and encouraging people to remain in work after 60, introducing more flexible retirement provision requires a careful design to ensure the desired results. If the structure of incentives and the focus on a proper target group of workers (for instance in terms of age) is badly designed, the flexibility may lead to a shortening rather than an extension of working lives. Ineffective designs may also not be able to lure groups others than those that would have extended their working lives in any case leading dead weight costs for the pension systems.

The introduction of increased flexibility, therefore, also calls for increased monitoring of retirement behaviour and of the actual labour market exit age. In all but a few exceptional cases (Table 1), labour market exit on average takes place prior to the legislated retirement or old-age pension eligibility age, indicating the opposite effects of flexible rules and the possibility to exit the labour market early through other types of financial security schemes.

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[6] SPC Working longer study.

Table 1

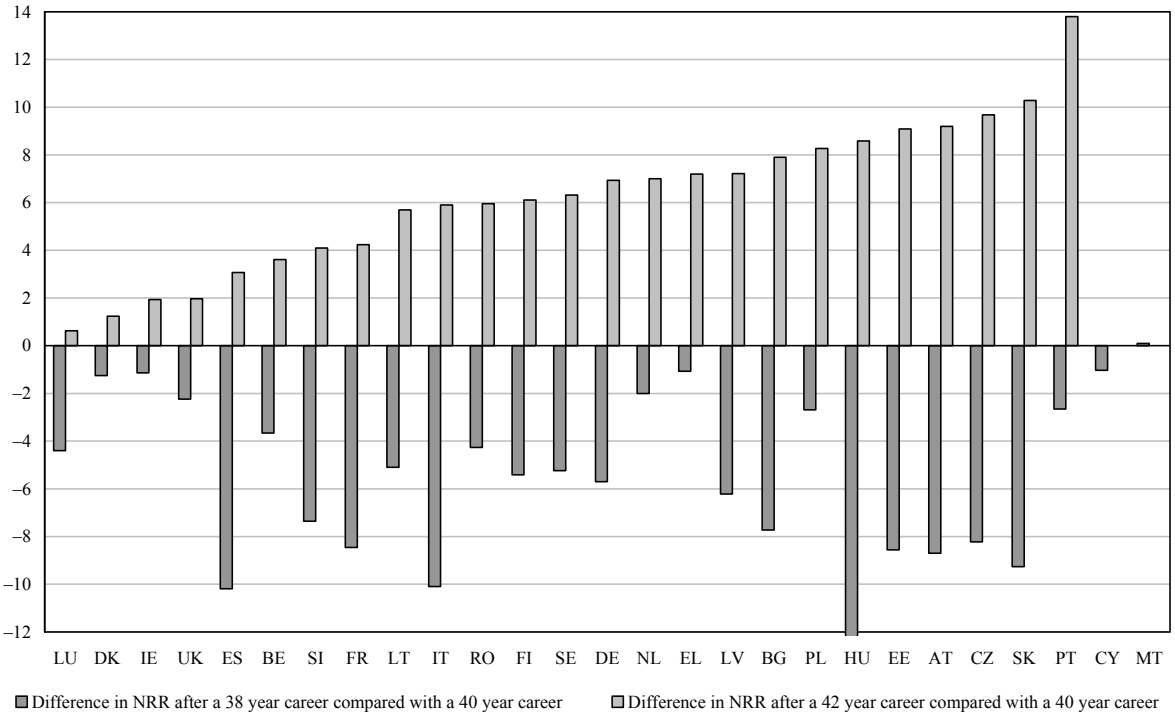
Standard Pension Eligibility Age and Labour Market Exit Age

Country	Legislated Minimum Retirement Age		Effective Exit Age from the Labour Market	
	Males	Females	Males	Females
Belgium	65	64	61.2*	61.9*
Bulgaria	63*	59*	64.1	64.1
Czech Republic	61y 6m	59y 8m	61.8	59
Denmark	65	65	62.5	61.3
Germany	65	65	62.1	61.6
Estonia	63	59y 6m	62.6+	62.6+
Ireland	65	65	63.5	64.7
Greece	65	60	61.8	60.4
Spain	65	65	61.8	62.3
France	60	60	58.7	59.1
Italy	65	60	60.5	60
Cyprus	65	65	:	:
Latvia	62	61	:	:
Lithuania	62y 6m	60	:	:
Luxembourg	65	65	:	:
Hungary	62	60	61.2**	58.7**
Malta	61	60	:	:
Netherlands	65	65	62.1	62.1
Austria	65	60	61.3	60.6
Poland	65	60	61.4*	57.5*
Portugal	65	65	62.9*	62.3*
Romania	63*	58*	65.5	63.2
Slovenia	63	61	:	:
Slovakia	62	62	59.7*	57.8*
Finland	63-65	63-65	62.3	62.5
Sweden	61-67	61-67	64.2	63.7
United Kingdom	65	60	63.8	62.6

Source: Eurostat
Note: * 2007 data, ** 2005 data, *** 2004 data, + common data for both sexes.

Figure 6

Difference in Net Theoretical Replacement Rates for an Average Earner Working until the Age of 63 and 67 with 38 and 42 Contributory Years Respectively as Compared with Working until the Age of 65, 2044-48
*(percent)**



Source: SPC/ISG.

3.2 Giving financial incentives to delay retirement

A common way to promote longer working lives for older workers pursued in recent reforms is to strengthen the bonus-malus system in schemes with delayed and early retirement possibilities. This is a crucial instrument in prolonging working lives as pension eligibility ages become more flexible. Workers who decide to work longer are rewarded for every additional month or year in work.

In a number of Member States higher accrual factors as a reward for later retirement, or lower accruals as penalties for early retirement, were recently introduced or increased (e.g., BE, BG, CZ, ES, GR, HU, NL, PT and UK). The incentive structures differ significantly between Member States as can be interpreted using calculations on theoretical replacement rates.[7]

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

[7] Theoretical replacement rates defined in accordance with the methodology agreed upon by the Indicator Sub-Group (ISG) of the Social Protection Committee (SPC), show the ratio of pension income to earnings at the point of retirement increase or decrease with delayed or early retirement. For more information, please refer to: http://ec.europa.eu/social/main.jsp?langId=en&catId=443&newsId =551&furtherNews=yes

replacement rates. In all but a few Member States (e.g., DK, ES, FR, HU, IT, LU, SI, UK), the increments in pensions for prolonged working lives are higher than the fall in replacement rates with earlier retirement. In most cases the difference is small, but there is a trend towards rewarding late retirement more than early exit is penalised.

Yet, experience is showing that the impact of these specific measures can be rather limited. For instance the pension bonus introduced in France by 2003 reform attracted only 7.6 per cent of older workers to defer retirement in 2007. In Sweden, the use of the flexibility in the retirement ages is being exercised, but just as many people tend to take out their retirement earlier as later compared with the previously fixed retirement age of 65. These examples show that people may be more attracted to the idea of early retirement rather than the financial incentives provided for delayed retirement. In many countries the flexibility of systems is not used also indicating a lack of information and the strong establishment of previously fixed retirement ages. The reestablishment of such norms is sometimes confirmed through other schemes and social insurance systems.

In some Member States no specific incentives are given for extending working lives beyond the actual retirement age in the statutory retirement schemes (e.g., IE, LU, MT, NL, CY). Typically, these schemes are defined-benefit where the possibilities for flexible retirement are restricted, as in Malta. In other cases they are flat rate schemes where the number of contributory years needed for a full pension is lower than those used in the calculations of theoretical replacement rates and thus do not show any incentives to work longer after 40 years of contribution and at the age of 65 (e.g., IE, LU, NL). In these Member States there are, however, greater incentives to work longer in the private sector occupational pension schemes. Although the work incentives are usually lower than in other Member States' statutory schemes in all the above mentioned countries except the Netherlands. In Member States where the pensionable age is planned to be higher than 65 in 2046 (e.g., DE, UK), the effects of deferring retirement beyond the legislated retirement age are not captured by the exercise.

On the other hand, those Member States with the highest changes in replacement rates per extra year worked are also typically countries that have large defined benefit components, but with more flexible retirement conditions (e.g., CZ, EE, AT, PT, SK). In notional-defined contribution schemes the financial incentives for delaying retirement are typically calculated on an actuarial basis taking into consideration remaining life expectancy at the point of retirement (e.g., SE, PL, LV, IT), whilst in defined contribution schemes the transformation of investments into an annuity are also often actuarially calculated.

The effectiveness of actuarially calculated incentive structures needs to be further monitored to ensure that the financial incentives are sufficient to postpone retirement. At the same time, the generosity of the incentives in defined-benefit schemes need to be balanced with their cost in the pension system and also deadweight problems connected to the risk of subsidising those who would in any case have postponed retirement.

3.3 Extending contributory periods

Minimum contributory periods in order to receive a full pension are generally being extended. As the time spent in retirement is generally increasing due to increasing longevity, so must the time spent contributing to one's pension in order to avoid an imbalanced burden on working age populations, which can decrease their incentives to work.

Contribution periods required for a full pension have been recently increased in some Member States (e.g., CZ, FR, AT), so the link between contributions paid into the system and benefits paid out has been tightened. In France, for example the statutory retirement age is the same as before, however, the contribution period needed for a full pension has been recently increased.

Table 2

Average Seniority at Retirement and Remaining Average Life Expectancy at 60, 2006

Country	Average Seniority at Retirement of New Flows of Retirees in Statutory Retirement Schemes Seniority (Including Non-contributory Periods)		Life Expectancy at 60	
	Males	Females	Males	Females
Belgium	42.6	30.5	80.8	84.9
Bulgaria	n.a.	n.a.	76.2	80.3
Czech Republic	44.4	39.6	78.2	82.4
Denmark	35.7	20.3	80	83.3
Germany	n.a.	n.a.	81.1	84.8
Estonia	45.6	42.9	75.9	82.2
Ireland	27.5	20.8	80.8	84.5
Greece	40.3	30.4	81.4	83.9
Spain	40	31.7	81.7	86.5
France	n.a.	n.a.	82	87
Italy	34.9	27.9	81.4**	85.9**
Cyprus	n.a.	n.a.	81.8	84.2
Latvia	30	29	75.2	81.1
Lithuania	37.5	34.2	75.5	81.5
Luxembourg	42.9	38.8	80.7	84.4
Hungary	39.9	38	76.5	81.6
Malta	29.1	23.5	80.1	83.8
Netherlands	n.a.	n.a.	80.8	84.5
Austria	n.a.	n.a.	81.1	85.1
Poland	36.5	33.3	77.7	82.9
Portugal	32.3	23.9	80.4	84.6
Romania	n.a.	n.a.	76.7	80.5
Slovenia	30	24	79.4	84.3
Slovakia	n.a.	n.a.	76.5	81.4
Finland	30.9	28.6	80.6	85.5
Sweden	40	34	81.8	85.2
United Kingdom	42	26	80.9*	83.7*

* 2005 data, ** 2004 data.
Source: National Data and Eurostat.

In other countries, the lengths of contributory periods have been redesigned to correspond more to the pension eligibility ages rather than the concept of a full pension. The pension is instead calculated in accordance with the number of years during which the pension is accrued. In both these cases there is clear move towards extending the number of contributory years in pension schemes, a so-called life-cycle approach.

The issue of the balance and the link between contributions and benefits as well as the transparency of this link are important for the financial sustainability of both defined-benefit pensions systems (that are common among statutory pay-as-you-go systems), and for defined-contribution schemes, for which it is inherent in the system.

Experience in some Member States shows that extending contributory periods is politically more acceptable than the increasing the pension eligibility age in statutory schemes. Increasing the link between benefits and contributory periods also encourages longer working lives during the whole period of the career rather than just at the end of the career. It encourages shorter career breaks, earlier entry into the labour market and delayed retirement.

A lifecycle approach to contributory periods also allows for a more fair calculation of pension benefits as it is closer to the concept of "getting what you paid for". This is often to the advantage of those with a longer and more flat earnings career rather than those with a short and steeply increasing earnings career. Therefore, if the right to receive a full pension depends on the contribution period, people who start working at a late age are not unduly rewarded. For example, women and low income earners often have earnings careers that develop more slowly than those of men and high income earners. For women, this is due to the wage structure in typically female dominated professions, career breaks and a higher degree of part-time work. Reforming pension provision to incorporate such a design gives encouragement to work longer, minimise career breaks and to move out of the black economy.

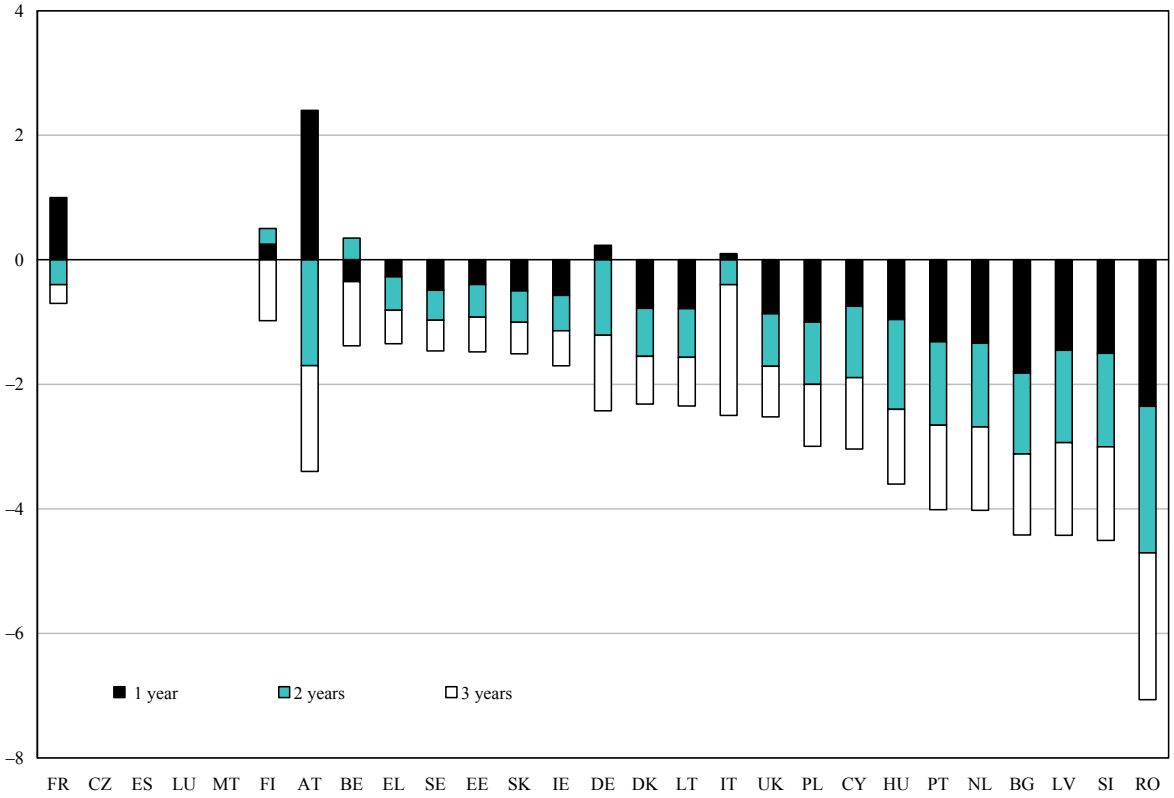
Reinforcing the link between contributions and benefits, however, has to be also combined with a careful monitoring of the accrual of pension rights during breaks in careers that reasonably should not be penalized, such as child care, other caring responsibilities, unemployment, sickness or education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

Calculations of theoretical replacement rates can show us how different types of career breaks are protected within the pension system. For example, given that the distribution of care burdens today are still mainly borne by women, it is important to monitor the effects of policies whereby replacement incomes and pension entitlements are given for care-related absences from the labour market in order to avoid the arising of new dependency traps. As caring years have a significant negative effect on women's long-term participation in the labour market in many Member States, a careful balance must be struck between care crediting and incentives to get women back into paid work.

In many Member states, absences from the labour market for childcare are typically protected to a certain extent for the first few years of absence and usually the protection is equally spread over these years (Figure 7). In a few Member States pension rights for up to three years of absence are so well protected that calculations show no drop in replacement rates (e.g., CZ, ES, LU, MT, FI). Whilst this improves the adequacy of benefits accruals during childcare absences, the work incentives in the system can be questioned. In the Czech Republic, the retirement age for women is decreased depending on the number of children they bear and the years of retirement before the age of 65 are accredited giving no change in the replacement rates. In Malta, where the minimum statutory retirement age is 61 and only 30 contributory years are needed for a full pension, the replacement rates do not change with a prolonged or shortened retirement age in this exercise which is based on a 36 year contributory period. However, recent legislation credits social security contributions for interrupted careers of up to 2 years.

Figure 7

Difference in Net Theoretical Replacement Rates for an Average Earner Entering the Labour Market at 25 and Retiring at the Statutory Retirement Age with a 1, 2 and 3 Year Career Break for CHILDCARE Compared with No Break, 2046*



* The calculations assume two children are born and that the timing of the childcare years is such that full childcare benefits are received for each child. Retirement at the legislated statutory retirement age for women is calculated here. Please note that the values for CZ, ES, LU and MT are equal to 0 and should not be interpreted as missing.
Source: SPC/ISG.

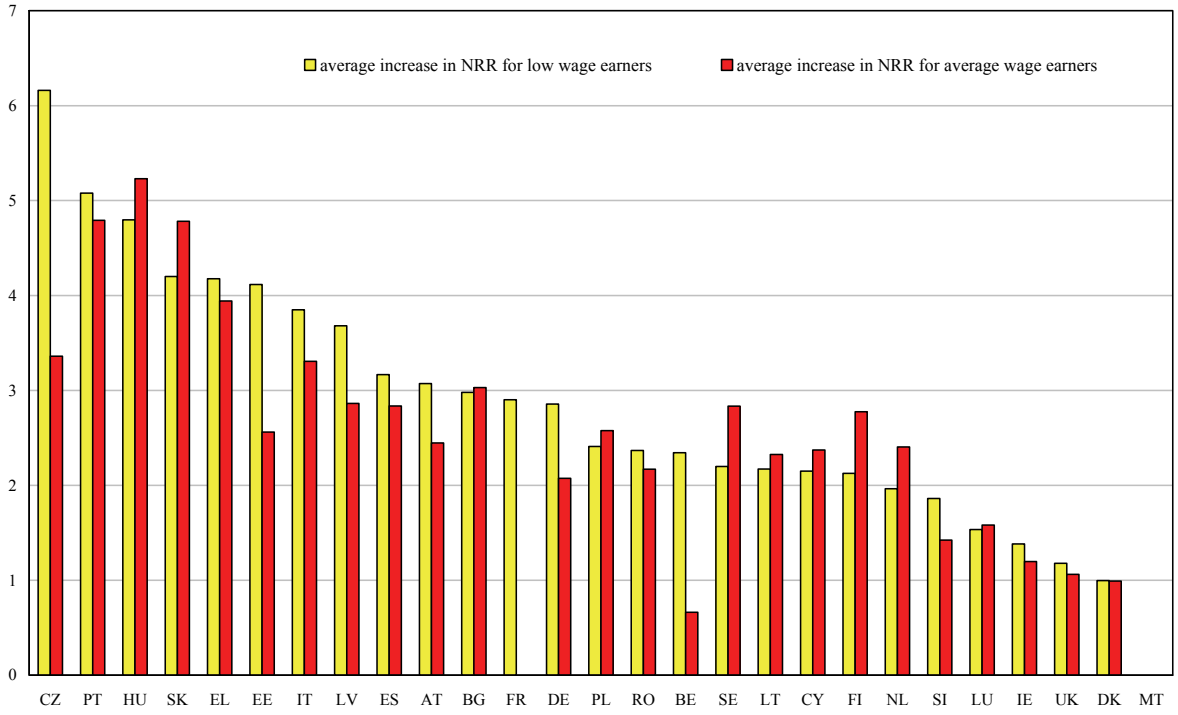
In some countries childcare credits are connected to the birth of the child rather than an absence from the labour market (e.g., DE, FR, IT) resulting in an increase in pension entitlements when a child is born. In Romania, childcare breaks are less well protected than in most other Member States. In the BE, IE, NL and UK the decline on the state pension side is marginal, and results depend more on whether private pension schemes award care credits or not.

3.4 The effects of minimum pension provision on working longer

When considering the role of minimum pension provision on the extension of working lives, however, it is important not to loose sight of the role of these pensions in maintaining adequate benefit levels and evading poverty in old age. Calculations showing the average increase in theoretical replacement rates for an extra year of work, indicate that incentives to work longer can be significantly lower for those more dependent on minimum pension provision incentives, therefore, the design of minimum pension need to be coherent incentive structures in standard earnings related schemes.

Figure 8

Average Change in Net Theoretical Replacement for an Extra Year of Work between the Ages 60-68 for an Average-wage Earner and a Low-wage Earner Rates, 2046
(percent)



Source: Calculations on Theoretical replacement rates carried out in the OECD APEX model.

The theoretical replacement rates for low wage earners would typically include minimum pension provision for these groups. By taking an average of the annual change in replacement rates for each year of prolonged working lives for an average earner and a low wage earner it is possible to see if minimum pension systems give a comparative disincentive to longer working lives. Most Member States retain incentives to work longer for those with lower incomes and in some the incentives are even stronger than for an average worker (e.g., BE, CZ, EE, HU, IE, LV, HU) (Figure 8). In these cases it is important to keep in mind that experience shows that low wage earners are often more reluctant to extend working lives than average wage earners. At the same time it is important to consider that the minimum pension guarantees are enough to give financial security and avert poverty in old age.

On the other hand, countries with a traditionally high level of minimum pension guarantee (e.g., SE, FI) or flat rate defined benefit pension with a lower number of contributory years than the 40 years used in the exercise display lower incentives to work longer for those with lower incomes in comparison to average workers (e.g., SK, AT). It is important to consider balancing the adequacy of pension benefits and the disincentives to work longer that they innately provide.

Most Member States perceive minimum income benefits as providing negative incentives towards longer working lives. This can depend on a number of issues. Firstly, if the eligibility criteria of the minimum pensions are set at a reasonably high fixed age, such pension cannot be used as an early exit pathway from the labour market. In most Member States minimum guarantee

pensions are rarely, if ever, available before a fixed statutory retirement age. The qualifying period for a minimum pension has, for example, recently been extended in some Member States (e.g., CZ, CY, ES, and RO). If a minimum pension scheme guarantees the major part of pensioners' income, and the contribution period is too short, it can act as a disincentive to stay in the labour market.

Secondly, if the level of the minimum pension is low, this may provide an incentive to work longer, yet bringing the adequacy of the protection provided by these pensions into question. In contrast, too high a minimum level of pension could provide a disincentive to prolong working lives beyond the minimum eligibility age. This, especially in combination with other labour market early exit routes may provide disincentives to work longer for some low-wage groups with incomplete contribution records, as the added value of working for these individual's pensions is in many cases minimal compared with spending the last few years before retirement on unemployment, sickness or disability benefits..

Thirdly, the means testing criteria can affect retirement behaviour. For example, if extra accruals of pension entitlements result in a one to one reduction of the minimum pension working longer may not be perceived as worthwhile. In some Member States, experience shows that disregarding work income in means tests gives possibilities to increase incentives to work longer. Ireland has introduced an income disregard of 100€ on earnings from work in the calculation of means tested pensions. Simultaneously cumulating minimum benefits and income from work is not possible in a few Member States (like in LT). Most Member States provide the possibility to cumulate at least a share of earnings from work and retain minimum benefits or pensions (e.g., DE, DK, NL, FI, SE).

4 Obstacles to work incentives in pension systems: early exit routes

The incentives to work longer incorporated in pension systems are often affected by other design features in the pension scheme or by other financial security systems. In the design of work incentives it is also important that complementary schemes and systems do not impediment the built-in incentives in the pension scheme. This, however, is often the case.

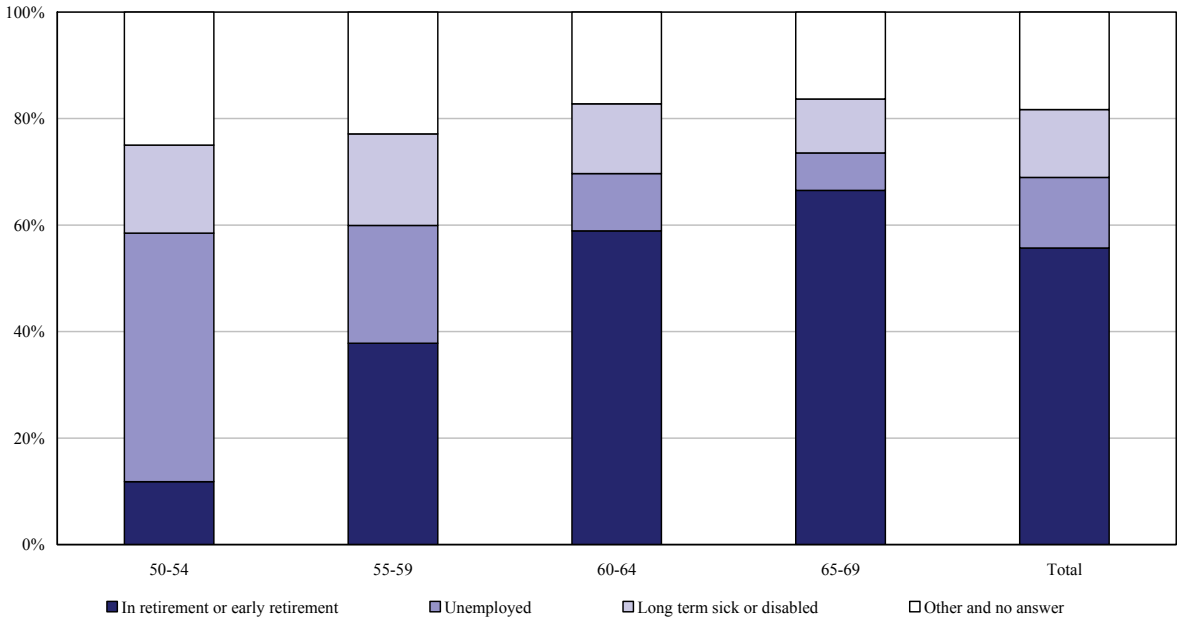
As pension and social security systems become more complex, there are also more actors involved in the design of these systems. Statutory pension schemes have different components with different purposes; some might be of a social safety net nature whilst others aim to provide an income related benefit. Statutory pension schemes are more commonly being complemented or replaced by privately managed provision where the work incentives might differ. This also gives a bigger role to private actors, rather than policy makers in the cumulative work incentives in a multi-tier pension scheme.

With increasing flexibility in the retirement decision, the role of other complementary social security systems, often under the jurisdiction of different policy makers, may end up affecting the incentives in the statutory pension schemes. In order to design efficient incentive structures it is vital that these are designed collectively with complementary systems.

The average age of exit from the labour market is often lower than the average age at which an old-age pension is drawn (See Table 1 above). Experience shows that transitions from the labour market into retirement are not direct and only half of older workers leave their last job or business to take up an old age pension. Only 35 per cent of older workers leave their last job or business to take up a pension. 20 per cent take up an early retirement benefit, 13 per cent leave due to unemployment and 12 per cent for reasons of long-term sickness or disability. Furthermore, a slight decline in direct transition from the labour market into retirement can be observed in the EU 25 Member States (Figure 9).

Figure 9

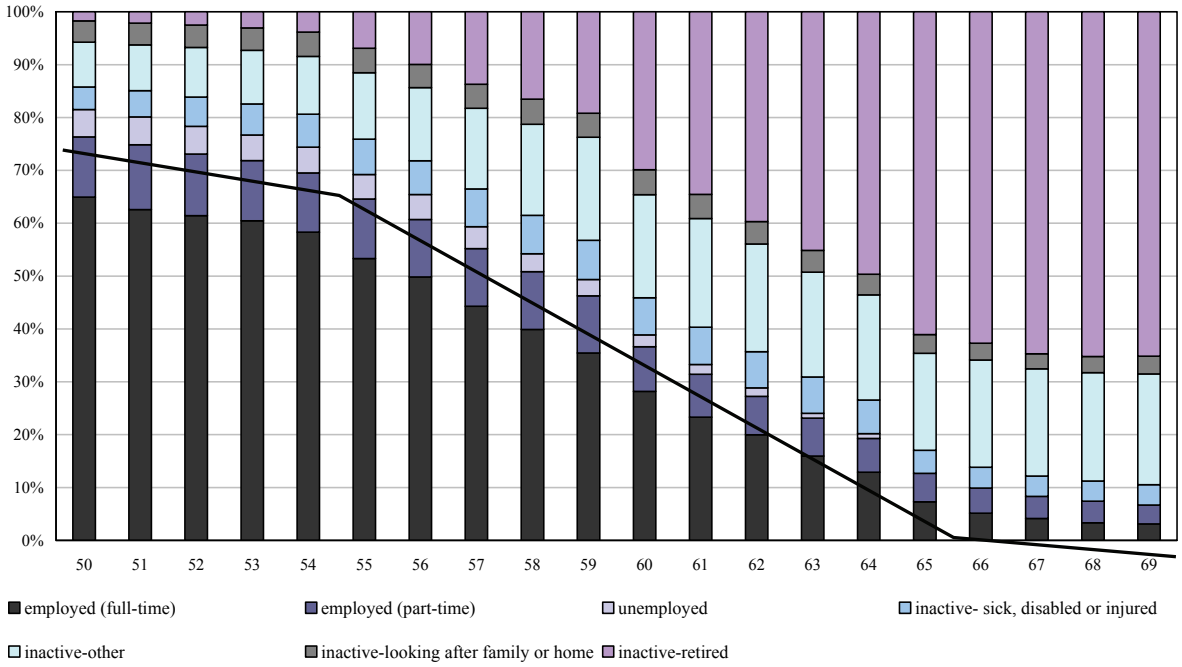
Main Labour Status just after Leaving Last Job or Business in EU by Age, 2006
(percent)



Note: The variable is based on self assessment. Unemployed may include government training, persons waiting to start a job, etc.
Source: 2006 *ad hoc* module LFS.

Figure 10

Economic Activity by Age in EU27, 2006



Source: LFS.

Table 3

Take-up of Early Retirement Schemes in EU27

	Low (<3%)	Medium (Between 3% and 10%)	High (≥10%)
Take up as a share of population 55-59	DK, ES, FR, LT, PT, SE	BE, DE, HU, LU, RO, SK	PL
Take up as a share of population 60-64	CY, FR, HU, PT, RO, SE	DE, ES, IE, SK	BE, LU, DK, PL

Figures generally refer to 2006.
These figures are generally taken from administrative sources are not necessarily completely comparable. Member States for which information is not provided do not have such information available. This table refers to specific early retirement schemes opened for all categories of the population.
Source: National replies to a questionnaire submitted to Members of the Social Protection Committee.

The main labour market exit pathways that have been identified are through invalidity or sickness benefits, early retirement schemes and unemployment benefits that have been specifically designed for older workers. Few workers may also leave the labour market through other systems such as with survivor's pension, or due to specific tax concessions granted to older workers leaving the labour market, but the take up rates of these benefits are minimal. For example survivor's benefits are often granted to those who have not been labour active in any case, whilst taxation rules show indications of curbing rather than promoting early exits in most member states. Whilst incentive structures in pension systems are being increased, complementary systems both with the social security systems and private schemes (often occupational) may affect negatively these incentives.

4.1 Early exits through early retirement schemes

Specific early retirement schemes creating exceptions from general rules for certain occupational groups are common in a number of member states. The proportion of early or indirect exits varies considerably from one Member State to another, but can be a main reason for early labour market exit in some Member States. Differences range from approximately 20 per cent of those aged 55-59 in receipt of early retirement benefits in Poland and close to none in Sweden.

The type of early retirement scheme, the eligibility criteria and the groups to which it is directed are for great importance. Usually early retirement schemes are open to all categories of the population. Some countries with less flexible retirement options use such schemes to provide flexibility of working careers and a smoother transition to retirement (e.g., BE, RO, FI). In some countries, however, they are designed as a source of protection for professional groups that are identified as having arduous or hazardous occupations, a list that varies greatly between Member States. In a few Member States they are explicitly made available due to major economic restructuring (e.g., ES, FR, HU). In some cases the schemes were primarily expected or are still expected to contribute to reducing statistically recognized unemployment levels (e.g., BE, ES, IE, LU, PT).

The possibility to retire early along with flexible transition from work to retirement is recognized as key to actually prolonging working lives. In some statutory old age pension schemes this flexibility has been incorporated. If the idea is to utilise special early retirement schemes to provide this flexibility it is important to create incentives for delaying the take up of early

retirement benefit in these schemes as well. This also pertains to the flexibility in the transition to retirement for special occupational groups, often for those in so-called hazardous or arduous occupations. Most Member States allow certain categories of worker to take out early retirement benefits prior to the legislated statutory retirement or pension eligibility age. In some of these Member States this is also possible without actuarial reductions to old age pension benefits. However, the extent to which these schemes can be an impediment to work incentives also depends greatly on the earliest retirement age. In some member States this is as low as 50 years.

The use of early retirement benefits in economically strained times to cope with labour market issues can on the other hand become a long term disincentive to longer working lives. This is primarily due to the fact that once these financial security systems have been put into place it can be politically difficult to dismantle them, thus having a serious long term impacts on the employment rates of older workers. Employers may also encourage early retirement possibilities in times of financial strain to ease necessary redundancy processes. This, however, would give a disproportionate affect on the labour market participation of older workers in times of economic strain. Ensuring that employers bear all or at least a significant share of these costs can reduce such behaviour (e.g., BG, DK, HU, SI).

Nevertheless a number of Member States are adopting reforms to discourage the take-up of or close access to early retirement paths from the labour market, but not without difficulties. These reforms include increasing the age of entitlement to early retirement (e.g., BE, CZ, SK, UK), equalising the rules of access for both genders (e.g., DE, HU), plans to limit the number of professions entitled to benefits (e.g., PL), tightening the rules of access to recently introduced schemes that turned out to be unexpectedly popular (e.g., FR), or simply phasing out the schemes (e.g., IE). Other Member States strengthen the financial disincentives to retire early, by increasing the value of penalty factors (e.g., CZ, GR, PT, UK). Another solution adopted is suspension of early pension benefits for those who earn more than a minimum wage (e.g., HU). Since January 2006 the Netherlands has tightened fiscal treatment of early retirement and pre-pension schemes, and a reform of unemployment benefits is aimed at preventing the use of the scheme as an early retirement path.

Yet some Member States have delayed planned reforms (e.g., IT, AT, PL) decided to slow down the process of tightening the minimum requirements for early retirement. To what extent this is a result of the current economic recession or simply due to the political unpopularity of such decisions is difficult to determine. Also announcing restrictions on early retirement schemes can provoke early retirement choices as individuals feel pressured to take up such benefits before the restriction are imposed (e.g., FR, LT, PL, SK). However, shorter working lives and less hours worked implies lower economic growth and activity and through this lower and less sustainable pensions.

4.2 Early exits through disability schemes

In some member states, the take up of sickness benefits and disability schemes in older workers are quite high. The high take up rate and in countries with increasing life expectancy and healthy life years raises issues as to whether there is a issue of such benefits being used as a way to exit the labour market early or if there is genuinely a health issue that needs to be addressed. For example, invalidity and sickness benefits may have become a tool to manage labour market difficulties in the 1980s and 1990s. Recent work from the OECD[8] highlights that developments in

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[8] M. F. Forster Sickness (2007), *Disability and Reintegration strategies: A Comparative Overview*, Santander, 16-20 July, available at: http://www.oecd.org/dataoecd/43/60/39154239.pdf

Table 4

Take-up of Specific Invalidity Benefits in EU27

Take-up of Invalidity Benefits as Share of Population 55-59		
Low (< 5%)	**Medium (5-15%)**	**High (>15%)**
	BG, LV	EE, HU, LT, PL, RO, SK
IE, PT	BE, DK, LU, SI	MT, UK
ES	CY, DE, FR, NL	FI, SE
Take-up of Invalidity Benefits as Share of Population 60-64		
Low (< 5%)	**Medium (5-15%)**	**High (>15%)**
LV, SK	BG, EE, PL, RO	HU, LT
PT	BE, IE, SI, UK	DK, LU, MT, NL
CY, ES, FR	DE	FI, SE

Source: National replies to questionnaire submitted to Members of the Social Protection Committee. Figures generally refer to 2006.
Note: These figures are generally taken from administrative sources are not necessarily completely comparable. Member States for which information is not provided do not have such information available.

sickness and disability benefits are not necessarily related to trends in objective or subjective health indicators but are influenced by policies and social phenomena. Namely, in some countries it can be socially less stigmatising to be out of work because of health reasons than unemployment. It can also be observed, that many people with health problems can work, and want to work. Having policies based around an assumption that they cannot work can be fundamentally flawed. Helping those people to work is potentially a "win-win" policy: it helps people avoid exclusion and have higher incomes, at the same time as raising the prospect of higher economic output in the long term.[9]

A number of member states have identified the above mentioned as a reason to reform their sickness and disability benefit schemes. Member States have sought to extend working lives by curbing exits through sickness and disability schemes (e.g., CZ, DK, ES, HU, MT, NL, PL, AT, SE). Measures generally involve rehabilitation efforts in connection with stricter eligibility rules and greater cooperation between institutions involved to allow for a quicker transition back into the labour market.

Changing attitudes to the acceptance of being in receipt of sickness or disability benefits, changing eligibility criteria for different types of health conditions, and putting more financial responsibility on employer's for the cost absences for ill health (both work and non-work related) are common approaches.

Restricting the use of sickness and disability schemes as pathways for early exit should, however, not preclude the use of such schemes for the contingencies they were meant for. Member

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[9] *Sickness, Disability and Work: Breaking the Barriers (Vol. 1): Norway, Poland and Switzerland*, published 7/11/2006, available at: http://www.oecd.org/document/25/0,3343,en_2649_37411_37600345_1_1_1_37411,00.html and *Transforming Disability into Ability*, published 27/02/2003, avaible at: http://www.oecd.org/document/14/0,3343,en_2649_37411_35290126_1_1_1_37411,00.html

States are looking for ways to integrate people into the labour market according to their capabilities and the dichotomy of "employable" versus "unemployable" persons with disabilities is being challenged.

4.3 Private pension provision and the incentives to work longer

Member states have identified that relative benefit levels in pension systems are bound to decline in the future given pension reforms that have been carried out. To avoid this projected decline whilst still sustaining financial stability in pension expenditure, Member States have been promoting the development of private pensions.

Individually funded and pre-funded pension provision has often been viewed as providing a possibility where the costs of future pensions are shifted to the present as opposed to pay-as-you-go schemes and as being schemes where the returns on contributions are higher.

In most Member States a combination of providing incentives to extend working lives and increasing privately managed pension provision is being implemented. Some Member States promote or mandate extra contributions for occupational and private pension provision (e.g., BE, DK, DE, IE, SE, UK). A number of Member States that have introduced mandatory funded schemes by allowing for a transfer of contributions from old pay-as-you-go systems to the funded schemes or by an increase of overall contribution rates to statutory pension schemes (e.g., BG, EE, HU, LT, LV, PL, RO, SK, SE).

The interplay of the two strategies, providing work incentives in statutory defined benefit, pay-as-you-schemes and increasing privately managed pension provision, is vital to the success of providing adequate pensions in the future.

Privately managed pension provision typically shifts a lot pension risk from the provider to the beneficiary. This is especially true for defined contribution funded (both pre-funded and individually funded) schemes, which are becoming more predominant. Privately managed pension provision in most countries involves that individuals make active choices regarding their pension. This type of an active choice instigates an interest at an earlier stage in a person's contributory life in even other types of choices that can affect the pension of an individual, such as career choices, through a sort of spill-over effect. In many countries, however, most systems allow for a default choice when and active choice is not made which works adversely to this aim.

On the other hand, supplementary pension schemes occupational or private, mandatory or voluntary can give a significant addition to the statutory pension. These pensions, historically, have also had elements that have reversed certain work incentives legislated in the statutory pension schemes contributing to earlier retirement. These impediments can include the possibility to withdraw an occupational pension earlier than the statutory retirement or pension eligibility age or the receipt of lump-sum payments facilitating earlier exits from the labour market.

In a few Member States, early exits through supplementary private pensions used to be a common practice, though now diminishing (e.g., BE, UK). In Some Member States there are still specific private pension schemes designed to provide early retirement (e.g., FR, IE, NL, SI, SK, FI, SE), but in a growing number of Member States supplementary pensions cannot be used for bridging early exits from the labour market and old age retirement through statutory retirement schemes (e.g., DK, EE, PL, BG, CZ and CY).

The early take-up of private pension benefits depends strongly on eligibility rules and age limits. In some cases, a lower age is fixed by law (e.g., BG, DK, PL, FI) or by wide extending agreement between labour market actors as in the case of Sweden. The eligibility age for private pension provision can be as low as 50 in some cases (e.g., UK, IE and CZ) In some Member States,

private pension benefits are, however, actuarially reduced in case of early withdrawal (e.g., IE, UK, SE) providing the same kind of incentives to work longer as in statutory schemes with the similar design. Some Member States consider the frequent use of private pensions to bridge between early exit and statutory retirement age attributable to low awareness of the consequences of such behaviour. For instance, in the UK, employees are often even unaware of actuarial reductions of their private pension in the case of early labour market exit.

The effects of the current economic situation on privately managed pension schemes where the beneficiary bears much of the investment risk is an area that need to be monitored carefully in terms of longer working lives. Most existing funded schemes have experienced a fall in asset values during the recent financial turbulence. Low returns can lead to pension benefit levels that force the incapable to continue to work longer but it is important to note that the share of income from such schemes is quite limited for those in or close to retirement today. However, the experiences of the turbulence in financial markets can act as an early warning signal of the need to evaluate the situation as we move towards a higher amount of funded and prefunded pension provision. A lack of knowledge of the effects of investments on these systems can also lead to people making the wrong investment or retirement choices. For example, early withdrawal of a pension in a time of downturn can lead to unnecessary low benefits.

In this sense, the importance of information and knowledge regarding one's pension is crucial for incentives to be effective. This also has significance with regard to an individual's choice to invest in individual private pension savings. An incomplete picture of one's pension provision from different schemes affects the choices that individual's make concerning their retirement decision, such as career choices, including breaks from gainful employment, saving levels for retirement and labour market exit and the extension of working lives. . Early exits through unemployment schemes

Unemployment benefits are a key reason for early labour market exit in some Member States. As calculations for theoretical replacement rates show how results drop for unemployment breaks in an individual's career (Figure 11). In many Member States unemployment breaks lead to a bigger drop in replacement rates than for instance childcare breaks (e.g., CZ, DE, EE, EL, ES, IT, CY, LU, AT, PL, SK, FI, SE, UK).[10] In some Member States, the drop in replacement rates are six percentage points or more in after three years of unemployment (e.g., SK, RO, FI), bringing the adequacy of protection of pension entitlements during unemployment into question, which has to be balanced with the financial incentives for individuals to return to the labour market.

At the same time, in a number of Member States specific unemployment schemes are opened, that do not count in the general unemployment level. This provides a form of hidden unemployment of older workers that may not be visible in the normally calculated unemployment figures. Specific schemes of this type may include, extended benefit disbursement periods (e.g., CZ, EL, FR, IT, LT, AT, PL, SI, FI) extra benefits paid after the expiration of standard unemployment benefits (e.g., BE), or relaxing of other eligibility criteria, for example with regards to job search. Whilst these types of special conditions or too generous benefits systems for periods of unemployment may protect older workers from a difficult labour market situation, they can also act as a disincentive to work longer, and become an old-age poverty trap. Therefore, while many Member States do not have any distinguishing rules for unemployment benefits for older workers, others are attempting to progressively phase out such rules (e.g., DK, DE, FI).

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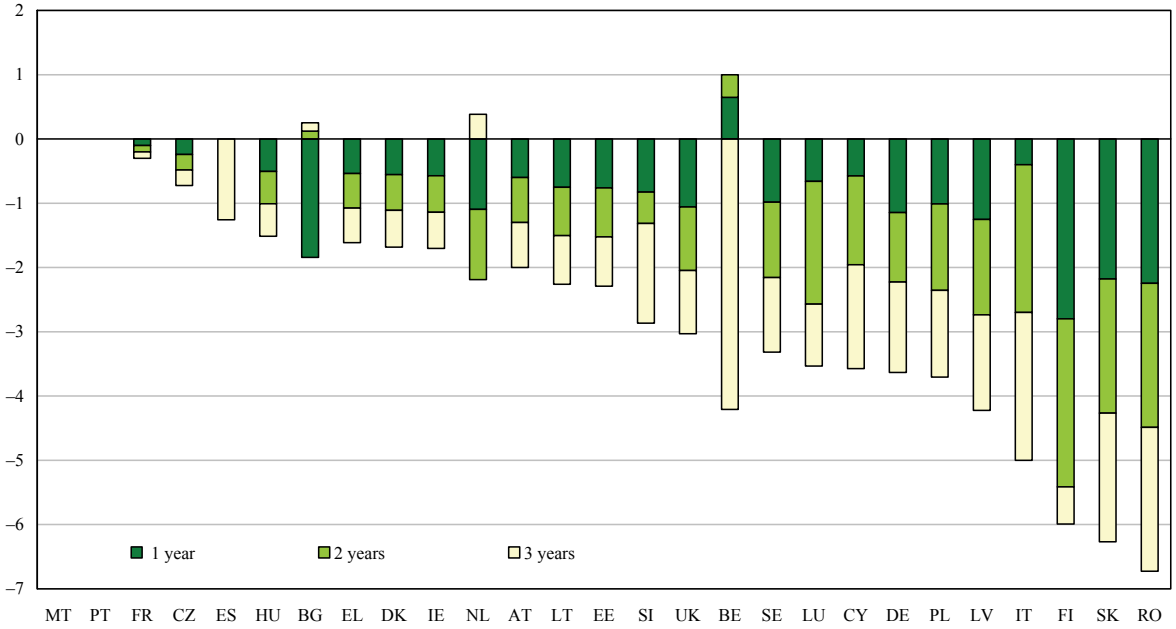
[10] In BE, this has to do with the nature of the calculation. Unemployment is assumed to take place at the end of the individual's career. In BE this entails that the individual loses the entitlement to the pension bonus which is given to those who work beyond the age of 62, as compared with a person who continues to work. If the unemployment is instead assumed to take place earlier in the career the results would be as those for the childcare case.

Figure 11

Difference in Net Theoretical Replacement Rates for an Average Earner Entering the Labour Market at 25 and Retiring at the Statutory Retirement Age with a 1, 2 and 3 Year Career Break for Unemployment Compared with No Break*



* The unemployment break is assumed to take place in the years just prior to old age retirement which is assumed to take place at the legislated statutory old retirement age for men.
Source: SPC/ISG.

5 Information and the effectiveness of incentives

With these increasingly complex structures it is also vital that collective information including all complementary schemes gives individuals a clear picture of their retirement options and their subsequent effects on benefit levels. In order to ensure effectiveness of the incentives to work longer it is important to ensure transparency and information regarding the design of these incentives and how they affect a person's pension benefits ad entitlements. For example, the link between contributions paid in and benefits paid out has to be clear for the general public, since pension contributions, by and large, are viewed by the public as general taxation rather than as a build-up of individual pension rights. This can especially be the case if employers pay the contributions. Some Member States have clarified the link between benefits and contribution by imposing a part of the contributory burden on the individual (e.g., CZ, DE, EL, FR, IT, LV, LT, LU, HU, AT, PL, FI, SI, SE SK).

Pension reforms have taken place in most Member States and have often become a continuous process. In this context, it is becoming increasingly difficult for the people concerned to understand how the changes introduced affect them and how they should respond. At the same time pension reforms are also demanding more choices of the individual that affect their pensions by increasing flexibility around retirement conditions and prolonging maximum and minimum contributory criteria. Therefore, without transparency and general knowledge of the systems the incentives to work longer that may have been built into the system will be futile.

Table 5

Take-up of Specific Unemployment Schemes for Older Workers in EU27

	Low (< 3%)	Medium (3-6%)	High (>6%)
Take up as a share of population 55-59	UK, SE, SK, LU	EE, CZ, LT, MT	BE, CY, FR
Take up as a share of population 60-64	CZ, BG, LT, PL, UK, SE, SK, LU	FR, CY, NL	BE, FI

Note: These figures are generally taken from administrative sources and are not necessarily completely comparable. Member States for which information is not provided do not have such information available. In DE a special scheme for 58+ unemployed individuals could make up an estimated 5 per cent of the population aged 55-64. However, this scheme is about to phase out as of 2008.
Source: National replies to questionnaire submitted to Members of the Social Protection Committee. Figures generally refer to 2006.

There is widespread recognition in Member States that the level of financial literacy among the general public is inadequate for people to be able to make educated choices between the various options open to them. All the increased individual responsibilities and risks imply that information policy should play a more important role in pension policy.

Additional to this there is also a recognised problem of short-sightedness suggesting that even knowing and understanding the significance of different choices may not ensure sound consumer choice simply due to a lack of interest in one's pension, or interest arising too late. This is especially pertinent in systems where there is a life cycle approach to earning pension entitlements making decisions made in the early years of a person's career important to the pension eventually paid out.

In efforts to complement other types of pension formation a growing number of Member States are now also providing or developing calculations of how these pensions rights may translate into a pension income, based on projections given certain economic assumptions (e.g., BE, DE, DK, IE, ES, FR, LT, FI, SE, UK). In Finland, the projections are only provided for those closest to retirement, as projections for younger cohorts are considered too hypothetical. Yet with a move towards longer contributory periods it would seem important that individuals understand the effects of shorter careers early on. As the pros and cons of different approaches are weighed, even younger cohorts might appreciate forecasting tools which provide different scenarios depending on economic assumptions, contributory years and point of retrieving the pension.

However, many countries have recognized that at the same time projections are usually provided for each scheme in isolation even though individuals ideally would need to know how their different entitlements combine into a full package of potential retirement income. But in a few of the Member States with widespread occupational and private pension provision, steps are being taken to develop web-based pension portals where people can check how their pension accruals from different schemes would come together in an overall amount of pension income (e.g., DK). This will help citizens to avoid making retirement decisions based on incomplete or fragmented information.

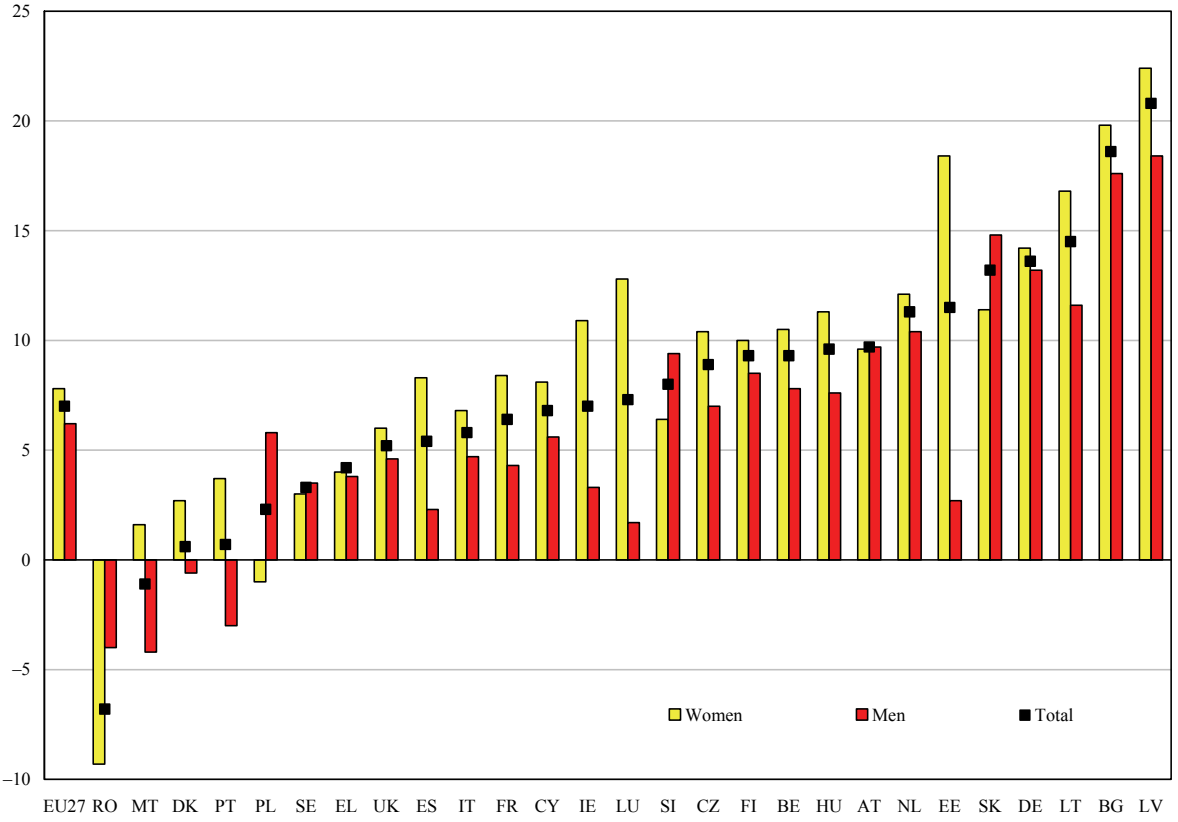
6 Labour market conditions for older workers

6.1 Developments 2001-08

The European Union has identified a target under the growth and jobs strategy is to reach a

Figure 12

Change in Employment Rates of Older Workers (55-64), 2001-07
(percent)



Source: Eurostat, *Labour Force Survey*, Annual averages.

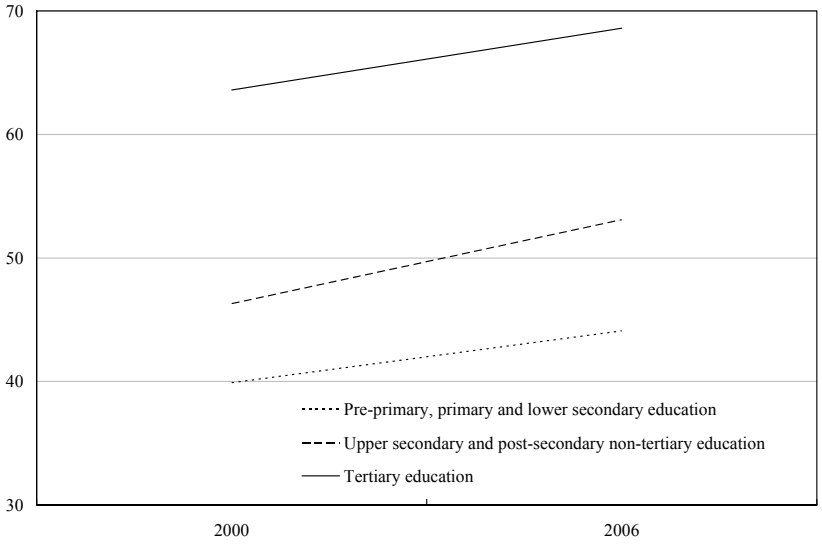
50 per cent employment rate for older workers by 2010. In 2007, the employment rate for older workers in the EU-25 was 45 per cent compared to 37 per cent in 2001, and 11 countries now exceed the 50 per cent target (Figure 12). This general increase in employment rates results from two main factors. Firstly, the relative share of people aged 55-59 – who have a higher employment rate – has grown due to the ageing of the baby-boom generation. In addition, most Member States experienced a higher increase in the employment rate for women than for men between 2001 and 2007.

Moreover, since 2000 the increase in the employment rate among 55-64 year olds has benefited all categories of workers, although it has been relatively slower for the less qualified within the EU25: it has been 5 points for the less qualified, compared to 6 or 7 points for medium or highly qualified (Figure 13). At the same time the evolution of employment rates for the less qualified was more favourable for the age bracket 25-54, probably reflecting targeted employment measures.

The employment rates of older workers are often monitored as an indicator of the effect of pension reforms on the extension of working lives. It is, however, clear that incentives structures included in pension reforms have only a small role to play unless complemented by a labour market that supports these initiatives.

Figure 13

Employment Rates of Men 55-64 by Skill Levels, EU25



Source: Eurostat, *Labour Force Survey*.

The National Strategies show that there are two commonly used instruments to boost the labour market activity of older workers. First, Member States are actively adopting a culture of lifelong learning, offering more training designed to make older workers' skills more adaptive and to help them keep their jobs (e.g., AT, BG, and CZ). This plays in line with the life-cycle approach to contributory periods in some pension schemes as well. Second, subsidies are offered to employers to boost financial incentives to employ older workers (e.g., AT, DK, ES, LT, HU, and SE). In Germany, financial incentives are also given to unemployed older workers to reenter the labour market by offering a compensation allowance to unemployed people aged 50 or more who accept a low-paid job. On a European level, the European Social Fund (ESF) contributes to the financial sustainability and adequacy of pension systems by encouraging activities related to life long learning, active ageing and prolonging working lives (e.g., AT, HU, SK). Some Member States are also using European anti-discrimination law in their promotion of better age management (e.g., DK, NL, UK).

Additionally, European legislation on age-based discrimination (Council Directive 2000/78/EC) states that less favourable treatment of employees on the grounds of age needs to be objectively justified. A recent court ruling has, however, confirmed that reaching the pension eligibility age or statutory retirement age could be a sufficient reason to terminate the employment without it being considered discriminatory.[11]

However there is still a need to fight age discrimination and to open up employment opportunities for older workers, including opportunities for training and retraining.

6.2 The effect of the crisis on labour market conditions

In May 2009, the European Commission revised its forecast with regard to the financial and economic downturn in the EU. The forecast predicts a contraction of GDP in the EU by 4 per cent in 2009 and to stagnate during 2010. In line with this, employment rates are expected to fall

[11] Case C-388/07 The Incorporated Trustees of the National Council for Ageing.

significantly and EU-wide unemployment rates are expected to reach almost 11 per cent in 2010 as compared with 7.0 per cent in 2008.[12]

The economic crisis has already had an impact on the labour market and employment growth has come to a standstill whilst unemployment rates have started to rise. The number of employed people will decline by 2.5 per cent in 2009 and by 1.5 per cent in 2010 or by about 8.5 million jobs. Some categories of workers are expected to be more affected by the stagnation on the labour market such as new and young workers, the low skilled, employees holding temporary contracts, EU mobile workers, migrants and the elderly.[13]

The current situation can cause further delay in the establishment of younger workers on the labour market. This can have a long term impact on the pension levels of these individuals, possibly causing pension benefit adequacy problems later as is displayed by the calculations in Figure 11. This can be especially pertinent in systems where contributory years have been extended. This problem is compounded by the increase in long term unemployment.

The long-term unemployment share for older workers (percentage of unemployed for more than 12 months) is especially high, at 55 per cent. Sustaining a well-functioning labour market and a high activity rate among the population of working age can be especially difficult in times of economic downturn. Often groups that are extra vulnerable are more susceptible to unemployment and lay-offs, including older workers who can often be considered both a more expensive yet more ineffective source of labour. Such labour market behaviour can, however, lead to more significant problems later on in the sustainability of pension systems and other financial security systems. The reason for this is that often older workers are more difficult to reintegrate into the labour market. For example, if early retirement systems or specific unemployment's schemes are used these may provide more long-term and generous benefits than those provided to other groups, as a way of enticing an easier redundancy. The individual incentives to reenter the labour market are then often smaller and the labour market demand for a person who has been absent for a longer period tends to diminish.

In earlier economic crises, older workers tend to be amongst the majority of those affected by redundancies. It is important to implement proactive labour market policy strategies that keep older workers in the labour force and that help to curb such labour market distortions as the impact of the current labour market and economic situation such as redundancy packages, and early retirement.

Most Member States have taken measures to preserve employment, support activation and promote reintegration in the labour market, and anticipate and manage the impact of restructuring. However, most of these measures build on existing labour market policies that have developed along the principles of flexicurity and active inclusion. It is important that all labour market actors work together in order to keep a balance in the age distribution of the labour market and those in unemployment considering that certain groups such as young and older workers are already proportionately underrepresented on the labour market.[14]

Integrated plans in Member States to cope with the current economic downturn indicate an understanding of the multi-faceted nature of the crisis.[15] A common approach is to cushion the impact of the crisis by giving support in the field of employment to both employers and workers

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[12] European Commission Economic Forecast Spring 2009, available at: http://ec.europa.eu/economy_finance/publications/publication_summary15046_en.htm

[13] Source: DG ECFIN.

[14] Source: National replies to questionnaire submitted to Members of the Social Protection Committee.

[15] Updated joint assessment by the Social Protection Committee and the European Commission of the social impact of the economic crisis and of policy responses, available at: http://ec.europa.eu/employment_social/spsi/spc_opinions_en.htm

and by investing in the economy. Labour market measures that have been observed include flexible working-time arrangements (e.g., BE, DE, NL, SI); measures to raise the employability of workers, including the most vulnerable through enhanced training programs (e.g., DE, HU, NL, AT, PT); or public support to SMEs (e.g., BE, BG, AT, PT, FI, SE). Other examples of measures to preserve jobs entail cuts in non-wage labour costs (e.g., BE, BG, DE, PT, SI, FI, SE) and corporate income taxes (e.g., PT, SI). Specific measures are also targeted at older workers and aim at avoiding the use of early retirement schemes (e.g., PL, PT).

Measures to support activation and promote reintegration in the labour market, especially of the most vulnerable include the strengthening of public employment services allowing in particular for more individualised support (e.g., BG, DK, DE, FR, SI); greater access to training (e.g., BG, DE, FR, FI, PT, UK) including training schemes targeted at specific groups of workers (e.g., PT), subsidised employment for those furthest away from the labour market (e.g., FR), and to child care (e.g., AT) and other enabling services.

Preserving a close link to the labour market for those made redundant is an important measure. Although the current social costs of this may be high, it is important that a long-term thinking is maintained.

6.3 The crisis and the take up of benefits

In light of the current economic downturn, it is also important to monitor the effects on the situation of older workers in the labour market and on their path to full retirement.The direct impact of the recession is most apparent in the increase in the take up unemployment benefits in 2008, and especially during the second part of the year. The impact of the crisis has also had a slight impact on the percentage of older workers claiming early retirement schemes (e.g., LV, LT, PL and SK).[16] The number and age and gender distributions of claimants of social assistance is not clear yet, however, most MS expect increased pressure on minimum income safety net schemes.

Areas more frequently pointed out as deserving special attention when adopting recovery packages or specific measures in the current context are linked to unemployment, the adequacy of safety nets, funded pension schemes, and access to housing. Moreover a number of Member States have also delayed pension reforms or the activation of automatic mechanism which in the current climate would otherwise lead to lower pension benefits.

Member States have taken action to reinforce the support to people's income through measures that include increasing the level of minimum income or minimum wage, extending the coverage or duration of unemployment benefits, reinforcing other social benefits, introducing tax rebates or exemptions for specific groups. They have done so either by advancing measures that were already planned or by adopting new measures, either on a temporary or permanent basis. These measures build on the active inclusion strategies that many Member States have started implementing, and attention is paid to avoiding that the new measures compromise efforts to build integrated approaches that combine income support, access to services and reintegration incentives.

7 Conclusions

Pension reforms have to deal with demographic developments and in particular increased longevity, which is a key driver for increasing pension expenditure in the future. This increase in a financially balanced scheme would require either higher contributions by workers or lower benefits

[16] In Poland the increase is also due to the ongoing reforms.

for pensioners, if the increase in life expectancy were spent in retirement. However, increases in life expectancy can be shared between the years in employment and retirement, thereby resulting in a better balance between life-time contributions and benefits.

The hesitation to maintain older workers, into the labour market can also depend on what is socially acceptable. There is, however, a growing recognition amongst policy makers and also amongst the general population for the need to extend working lives. The clearest example of this success is the recognition that has been given to the need to increase retirement ages. This is now becoming a politically legitimate and viable reform in some countries.

Giving flexibility to retirement choices and putting more responsibility on the individual in determining the pension ultimately received, also allows for a social dimension in work incentives. Individuals are allowed to prolong working lives according to individual ability and choice.

Creating incentives to work more and longer in pension systems is only part of the solution to extending working lives. The success of these incentives is dependent on their interaction with other benefit systems and on labour market conditions. If incentives in pension systems are counteracted in other social security systems, private or public, the incentives will not be as effective in attracting people to prolong their working lives. Moreover even the best designed incentive scheme will fail to take effect if the demand for older and younger workers is lacking on the labour market. This is clearly more of a problem in phases of employment destruction, but also in periods of employment growth it is important to ensure labour markets are open for younger and older workers.

ANNEX 1

List of Abbreviations of EU Member States

BE - Belgium

BG - Bulgaria

CZ - Czech Republic

DK - Denmark

DE - Germany

EE - Estonia

EL - Ireland

ES - Greece

FR - Spain

IE - France

IT - Italy

CY - Cyprus

LV - Latvia

LT - Lithuania

LU - Luxembourg

HU - Hungary

MT - Malta

NL - The Netherlands

AT - Austria

PL - Poland

PT - Portugal

RO - Romania

SI - Slovenia

SK - Slovakia

FI - Finland

SE - Sweden

UK - United Kingdom

ANNEX 2

Recently Enacted Changes in Retirement Age in the EU Member States

MS	Measure	Decision	Implementation
BE	Equalisation of retirement age: gradual increase in retirement age up to 65 for women	1996	Gradual increase to reach age of 65 in 2009
BG	Increase in retirement age up to 60 for women and 63 for men	2000	Since 2000 retirement age increase by 6 months per year: age of 63 for men reached in 2005.Age of 60 for women in 2009
CZ	Increase in retirement age from 60 to 65 for men and from 57 to 65 for women (and to 62-64 for women who raised two or more children)	1995, revised 2008	Since 1996 retirement age increased by 2 months per year for men and 4 months per year for women
DK	Increase in retirement age from 65 to 67 for both genders (and further possible increases)	2006	Between 2024 and 2027. A framework for further increases in the retirement age after 2030 (adjustment mechanism based on trends in the remaining life expectancy)
DE	Increase in retirement age from 65 to 67 for both genders	2006	Gradual increase between 2012 and 2029 (one month per year starting from 2012 and two months per year from 2024)
EE	Increase and equalisation of retirement age (63 years)	1999-2000	Gradual equalisation till 2016
GR	Increase in retirement age for women insured before 1993 in IKA-ETAM[17] from 57 to 60. Increase in retirement age for women insured after 1992 to 65.	1992	Retirement age of 65 for those women insured since 1993 (to be achieved in 2058)
IT	Increase in minimum retirement age from 58 to 61	2007	Gradual increase between 2008 and 2013 combining age and years of contributions

[17] IKE-ETAM is social insurance fund covering most of private sector employees.

MS	Measure	Decision	Implementation
LT	Increase in retirement age from 60 years for women and 62.5 years for men to 65 years for both genders		Gradual equalisation between 2012 and 2026. Yearly increases by 4 months for women and by 2 months for men
LV	Increase and gender equalisation of retirement age (62)	1996	Increases in retirement age by 6 months per year: men reached retirement age of 62 in 2003, and women in 2008
HU	Increase in retirement age from 60 years for men and from 55 for women to 62 for both genders	1996	Gradual increase by year every two years so that the retirement age of 62 was reached in 2001 for men and in 2009 for women
MT	Gender equalisation: increase in retirement age from 60 years for women and 61 years for men to 68 years for both genders	2006	Equalisation of the retirement age till 2013
MT	Increase in retirement age from 62 to 65 for both genders	2006	Gradual increase between 2014 and 2026
AT	Equalisation of retirement age: increase from 60 to 65 for women	1990s Constitutional Court ruling	Increases by 6 month per year between 2024 and 2033
RO	Increase in retirement age from 57 to 60 for women, and from 62 to 65 for men	2000	Gradual increase between 2001 and 2014
SK	Equalisation of retirement age: increase from 60 years for men and 57 years for women to 62 years for both genders (women with children lose their right to retire at the age of 53-56)		Gradual increase for men between 2004 and 2006, and for women between 2004 and 2010 (women with 5 children and more till 2015)
FI	Increase in retirement age from 63 to 65 for both sexes	2009	Retirement age will be raised by two months per year starting in 2011
UK	Gender equalisation: increase in state pension retirement age for women from 60 to 65	2007	Between 2010 and 2020
UK	Increase in state pension retirement age for both genders from 65 to 68	2007	increase to 66 between 2024 and 2026, 67 between 2034 and 2036, and 68 between 2044 and 2046
UK	Increase in age when private or occupational pension can be drawn from 50 to 55	2008	From 2010

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RETIREMENT BEHAVIOUR AND RETIREMENT INCENTIVES IN SPAIN

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In this paper we analyse the role that Social Security wealth and incentives play in the transition to retirement in Spain. We use the labour records and other relevant information contained in a newly released database (Muestra Contínua de Vidas Laborales, 2006), to construct incentive measures stemming from the Social Security provisions in relation to retiring at old age and investigate the role played by such incentives and by other socio-economic variables on the retirement hazard. We compute the effects of the reform that took place in 2002, which made the requirements to access an old pension stricter in general. We carry out a dynamic reduced-form analysis of the retirement decision using a duration model.

Our results show that both the pension wealth and substitution effects have a significant role on retirement decisions, but that the latter has less relevance as from the reform introduced in 2002.

1 Introduction

The sustainability of pay-as-you-go systems is a matter of concern in ageing economies, such as Spain, as they were designed at a time when demographic structures were characterised by a much lower life expectancy and a much higher fecundity.[1] Therefore, both, the number of people and the number of years that these people were in a situation to receive a public pension was much lower when the system was launched than nowadays.[2]

On top of such demographic developments, in recent years we have also observed a decline in the labour force participation of older workers. While in the seventies, the participation rates of males over 55 were above 50 per cent, in 2008 they do not reach 30 per cent. The combination of both factors has lead to the prediction that the ratio between people in working age and people of 70 or more years of age, which is nowadays around 5.5 in Spain, will be only 2.25 in 2055. So, a smaller proportion of people than what is currently the case will be providing the revenue that will be transferred to older people in the form of pensions. In this sense, the behaviour of older workers is reinforcing the negative impact that demographic factors have on the sustainability of the pension system.

The role of pension benefits rules in relation to labour market participation of the elderly is regarded as central in many countries, as not only they may be too generous in providing income support, but they may also create incentives to retire early from work. In this sense, three issues are relevant here: the amount of the pension that the system provides, the pattern of benefits associated with each age of retirement and the entitlement rights that define the conditions to be met to be able to claim a pension at each age. Parametric changes for the Social Security system have been and are being discussed in Spain under the so-called Toledo Agreement while some countries have

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[1] It is the decline in fecundity, more than the longevity increase, what explains the forecast that more than 30 per cent of total Spanish population will be older than 65 years of age in the middle of this century.

[2] In fact, the average number of years that a man aged 65 was expected to live from that age was around 12 in the middle of the 20th century, it has grown up to 15 now, and is forecasted to increase to 20 years in the middle of this century, according to the Spanish National Statistics Institute (Instituto Nacional de Estadística, INE).

already implemented large reforms. Many changes have been directed to reducing incentives to early retirement embedded in the pension system and to increase incentives to leave the labour market at a later age. Governments have also promoted active labour force measures that should stimulate the demand for elderly workers, thus contributing to raising or maintaining labour market participation of the elderly.

The goal of this paper is to study and quantify the role that Social Security provisions for old-age pensions are playing on the retirement decision of the elderly in Spain. We propose estimating a reduced form model for retirement to capture the effects of pension incentives on pension claiming, controlling for some socio-demographic characteristics. In particular, we analyse the probability of retiring at a given age, given that the person has not retired yet, as a function of individual variables.

Boldrin *et al.* (1999, 2004) have carried out an analysis of similar characteristics, estimating the probability of retiring at a given date. The objective of the work that we are presenting here is to widen such study in three main directions. On the first place, we propose estimating a duration model and not a point in time estimation, so as to allow a consideration of the determinants of the retirement decision at different ages, and, particularly to assess the role of the SS incentives for early retirement and for retirement at each age.[3] Moreover, we use a new database, the *Muestra Continua de Vidas Laborales (MCVL)*, which has recently been released to explore this issue further. The advantage of the MCVL for the analysis in relation to previous samples obtained from the same source, and used in empirical work,[4] is that the sample design is known and, therefore, it allows for a better and broader understanding of the results obtained. A duration approach seems to maximize the informative content of this database, as it allows to follow the workers' decisions across time. Finally, we address the quantification of the impact of the change in pension rules whose full implementation took place in 2002.

The paper is structured as follows. In the next section, we briefly summarise the empirical results obtained so far on the determinants of retirement for old people in Spain. Section 3 contains a description of the dataset that we use in the analysis. In Section 4 we discuss the empirical model that we estimate and whose results are summarised in section 5. Section 6 contains the conclusions. A Data Appendix is included, as well as an Appendix containing the main features of the Spanish Social Security pension system.

2 The empirical analysis of the role of social security on retirement decisions

The vast majority of empirical analysis carried out to measure the role of Social Security on retirement decisions has been done for the USA, while evidence for other countries, and specially Spain, is more limited.[5]

One of the most revealing evidence of the dependency between withdrawal from labour force and pension regulations in Spain is the presence of spikes in the benefit claiming moment around the ages of 60, the earliest age a pension can be, in general, claimed, and 65, the ordinary retirement age. Such pattern is also observed in other western countries (Gruber and Wise, 1999

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[3] Villagarcía (1995) and Muñoz (1995) apply the duration model approach to analyse the age of retirement, using the EPA database, which is cross sectional by construction. Because of the data source they cannot address the role played by SS incentives.

[4] A previous version of a similar database with information up to 1995 and whose description can be found in Martínez (1999), has been used in Boldrin *et al.* (1999 and 2004), Boldrin and Jiménez-Martín (2002), and Jimenez-Martín *et al.* (2000, 2006). The main drawbacks of such database are that the detailed sample design has not been disclosed and that it is not publicly available.

[5] This literature has been reviewed in detail in Diamond and Gruber (1999) and Coile and Gruber (2000). Evidence for other countries can be found in Gruber and Wise (1999, 2004), where also the case of Spain is addressed (Boldrin *et al.*, 1999 and 2004).

and 2004), where eligibility ages prescribed in country-specific provisions also play a major role in defining the observed pattern of retirement by age.

The microeconomic evidence that has been gathered so far shows that the Spanish early retirement provisions play an important role in the modal age of retirement and its pattern in different ages (Boldrin *et al.*, 1999, 2004) and that, in general, labour force transitions of elderly men depend on Social Security regulations (Alba, 1997; García-Pérez and Sánchez- Martín, 2008a and 2008b)[6] and their interdependence with health considerations (Blanco, 2000; Prieto *et al.*, 2002).

There are few papers that attempt at quantifying the impact of pension Social security incentives on labour force participation. In particular, Boldrin et al.,1999, 2004 and Jiménez, 2006 do so through changes in the social security framework. These works follow a regression-based approach, being based on reduced-form behavioural equations, to model the effect on the decision to retire of pension wealth, the incentives embedded in the pension system and individual demographic characteristics. Estimating retirement hazard rates, using a probit model on a sample of individual work histories randomly drawn from the historical files of Social Security affiliates, they conclude that a substantial portion of the retirement behaviour cannot be explained by Social Security factors. On the other hand, García Pérez and Sánchez Martín (2008b) find evidence of the relevance of the social security incentives on the transitions from unemployment for older workers. Using a sample of individuals aged between 56 and 70 from tthe European Union Household Panel (PHOGUE), wave 7 (2000), Utrilla de la Hoz and Ubago (2005) find that a replacement rate (pension over total income) below 80 per cent reduces the probability of retiring.

The effect of the successive pension reforms has been empirically addressed and point out, in general, to its effectiveness in lowering retirement. Jiménez (2006) carries out a simulation exercise that computes the effect of the Spanish old age pension reforms that took place in 1997 and 2002 and concludes that they reduce the hazard rates. A similar qualitative result is found in Gutiérrez-Domenech (2006), where, using a longitudinal survey of Catalan population, it is shown that the 2002 reform contributed to the increase in the staying-on employed probabilities of the individuals older than 60. On the other hand, Sánchez Martin (2005), using a calibrated overlapping-generations model finds that the overall effect of the 2002 reform is a clear drop in the average retirement age, as younger cohorts of low income workers benefit from the opportunity of leaving the labour force early.

As for the impact of truncations in the system, Jiménez-Martín and Sánchez (2000, 2006) show, through the estimation of the behavioural parameters of a structural model, that the existence of minimum pension's regulations has an impact on early retirement decisions. They find that the combination of age penalties and minimum pensions generate large incentives to early retirement for those workers with low wages and short labour histories. Jiménez-Martín and Sánchez (2006) conclude that there is a threefold increase in retirement at 60 with respect to the economy without minimum pensions and total early retirement (before or at 60) is almost 50 per cent larger.

Finally, there is the line of research devoted to analysing the sustainability of the pension system which is usually formulated within the framework of an overlapping generations model. The evidence gathered on the effects of delaying the normal retirement age a number of given years (Sánchez-Martín, 2003; Boldrin and Jiménez-Martín, 2003; Díaz-Giménez and Díaz-Saavedra, 2008) shows that this strategy has an important impact on the system deficit.

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[6] See García Pérez and Sánchez Martín (2008a and 2008b) for some results on the links between unemployment, retirement and their associated public insurance programmes calibrated with data from the MCVL.

3 The data

3.1 The MCVL

The database *Muestra Continua de Vidas Laborales* (MCVL 2006) includes all the electronically recorded information that the Social Security administration keeps in relation to labour and contributory pension history for more than one million of individuals, whose anonymity is preserved. It is a 4 per cent random draw from a reference population, which is composed of all the people who at any time during 2006 had a registered record with the Social Security system, either because they were contributing or because they were receiving a pension. Therefore, it does include those that were unemployed for the whole 2006, either if they received a contributory pension or if they received unemployment benefits, as in the latter case, the National Employment Service pays their social contributions to the Social Security Funds. The sample does not contain any information relating to the scheme called the *Regimen de Clases Pasivas* that covers public sector employment, so that most civil servants cannot be included in the analysis. It must be pointed out that as a consequence of the definition of the reference population a large proportion of non-working females is also included, mostly as preceptors of a widowhood pension.[7]

Most of the labour, contributory and pension history of the over one million individuals has been recovered, so that their employment history can be reconstructed. The data contain, for each employment spell, information on *covered earnings*, which are the amount of the earnings that the Social Security regulations takes into account for the computation of pension rights. *Covered earnings* can be regarded as a good proxy for actual earnings, although they have both a ceiling and a floor: on the one hand, a minimum contribution must be paid over earnings, independently of the actual amount perceived, so that there is a minimum *covered earning* associated to it; on the other hand, earnings above a given ceiling do not pay contributions and therefore do not generate further rights. *Covered earnings* are used in the empirical analysis to proxy the wage variable.

Moreover, for each employment spell we have also information on length and type of contract, the Social Security regime and contributive group that are associated with the job and that define the amount of the contributions and the conditions to access the pensions, as well as information about the firm, such as its activity sector and location (province).[8] Available data also include some personal characteristics such as sex, age, place and year of birth. We can also know the place where the worker first affiliated, which could be regarded as the place where the first job was taken. Data on people's socio characteristics, such as marital status are poorly recorded in the sense that the available information corresponds to the situation when the affiliation took place, and in no case there is any reference to the spouse's working status, so that it is not possible to take into account the joint decision to retire.[9] As far as social transfers are concerned, the database contains information on periods and amounts enjoyed for old-age and disability pensions or survivors' pensions such as, orphanage, widowhood and family help. There is no data on other sources of individual wealth or other sources of income.[10]

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7 A detailed description of the sample can be found in Seguridad Social (2006), *La muestra contínua de vidas laborales. 2004*, and an overview in Argimón and González (2006).

8 Active policy measures to promote retaining or offering a job to old people cannot be taken into account as the dataset does not include enough information to do so.

9 The MCVL has been matched with information coming from the Census. In the Census' module "Co-inhabitants" there is information about the number of people living with the person in the MCVL dataset, their age and sex, but not their working status.

10 The MCVL has also been matched to Personal Income Tax data corresponding to one fiscal year. In that sense, information on additional sources of income could be obtained, but not in a longitudinal dimension.

Table 1

**Distribution by Year of Birth and Retirement Age.
Sample of Men Born between 1936 and 1946 Having Worked in the General Regimen and with a Relation with the Social Security in 2006**

Born	Retirement Age						Not Retired	Total
	60	61	62	63	64	65		
1936		205	199	152	295	892	189	1,932
1937	880	201	162	149	295	866	195	2,748
1938	817	136	159	153	285	819	170	2,539
1939	652	103	135	134	243	732	190	2,189
1940	948	168	225	232	401	1,225	314	3,513
1941	704	140	187	192	332	981	893	3,429
1942	607	186	170	188	350		1,956	3,457
1943	600	213	231	205			2,671	3,920
1944	554	200	220				2,963	3,937
1945	546	209					3,449	4,204
1946	388						3,597	3,985
Total	6,696	1,761	1,688	1,405	2,201	5,515	16,587	35,853

3.2 The sub-sample

Given that we are only interested in retirement decisions taken by the elderly, we restrict our initial sample from the 2006 wave to people that are aged between 60 and 70 in 2006 (*i.e.*, those born between 1936 and 1946) and that have already become entitled to a pension benefit, defined in terms of being able to prove at least 15 contributory years. It means that we exclude those for which the Social Security system does not record any contributory life, those that have retired before their 60th birthday[11] and those who started receiving an old age pension before 1997, when a large pension reform was introduced.[12] We have also excluded those that receive an old-age pension coming from incapacity, as the determinants to claim such kind of pension are most likely linked to health factors, which are not comparable with the rest of the determinants.[13] We additionally restrict the sample to men as the labour history of women is quite different from the one for males, so that the determinants of their decisions may be rather different. Finally, to ensure homogeneity in pension rules, the sample is limited to those whose longest recorded labour relation has taken place in the General Regime, the Social Security scheme that gathers the largest proportion of workers.[14]

Finally, we also exclude some individuals with incomplete recorded contributory information so that the sub-sample we use for the analysis is composed of 35853 men, whose distribution by year of birth and retirement age is reflected in Table 1.

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[11] Early retirement before the age of 60 is only possible for dangerous and unhealthy jobs such as air pilots, some miners, railways workers, bullfighters and artists.

[12] Very few records relating to pensions awarded before 1997 are available.

[13] Moreover, the transition to the old-age retirement scheme is deterministic, so that disability pensions are converted into retirement pensions once the beneficiaries turn 65 years of age. These pensions receive a very favourable tax treatment.

[14] See Appendix 2 for a description of the regulatory framework.

4 Empirical framework

The earliest empirical work in this area considered reduced-form models of the retirement decision as a function of Social Security wealth and pension level. While the estimation strategies employed differed, depending mainly on the nature of available data, the results consistently suggested a role for Social Security. The main limitation of this type of studies is that they consider Social Security effects at a point in time, but cannot account for the impact on retirement decisions arising from the time pattern of social security wealth accruals. In order to address this shortcoming, different approaches were followed in subsequent analysis. The accrual of Social Security or other more forward-looking incentive measures were developed and their effect was analysed with the estimation of reduced-form models.[15] Alternatively, a different approach was to consider structural models where workers were facing a budget constraint which was discontinuous or kinked.[16] Another line of research is the "option value" model of retirement where it is postulated that not only the level of pension wealth or its increment with one additional year of work is a determinant of the retirement decision, but that what is relevant is the evolution of future wealth and work. So retirement decisions are modelled as a function of the difference between the utility of retirement at the current date and at the date that maximizes one's utility (Stock and Wise, 1990). In its structural form this model is difficult to implement, so numerous authors (Samwick, 1998; Gruber and Wise, 1999; Hakola, 2002; Blundell et al, 2002) have used the option value in reduced form models. More recently, applied general equilibrium models are also being used to explore the pensions issue (for instance, Imrohoroglu *et al.*, 1999) so that they need to be calibrated to be able to produce numerical results.[17]

The paper follows the hazard model approach followed in Grubber and Wise (2004), and Blundell *et al.* (2002), among others, to capture the effects of changes in social security wealth and other variables on retirement. Although the option value model is the theoretically most intuitive model and the structural model should provide more insight into the issue, we choose the simplicity of this reduced form technique because of the computational complexity of the alternative approaches.[18] Moreover, it is partially forward looking, as it allows for continuous updating of information as individuals grow older. That is, for an individual who complies with the requirements to retire at age t, the probability of retiring at age t+1 is modelled in terms of the ratio of annual wage earnings over pension benefits, public pension accruals and labour situation at time t. The retirement decision is analysed in this paper following a duration model approach that treats it as a dynamic discrete choice.[19]

We define T (our duration variable) as the period between the age the person becomes entitled to receive a retirement pension until the age that person claims the benefit. We treat it as a discrete variable, defined in years, that changes as time goes by.[20] We let C_i be the maximum number of years that we could observe the individual in the sample, which only depends on his year of birth and the moment he became eligible, so that it is constant. So, that, for example, if a

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15 Spataro (2005) proposes a set of alternative measures that feature the forward-looking aspect and applies them to Italian data.

16 The lifetime budget constraint is analogous to the standard labor-leisure budget constraint, with annual hours replaced by years of labour force participation, and annual earnings replaced by cumulative lifetime compensation. The kinks are produced by changes in the accrual rates (the rise in retirement income entitlement caused by continuing to work for one more year). See for instance (Burtless, 1986).

17 See Jimeno *et al.* (2006) for a survey of the features of different approaches used in the literature to study the effects of population aging on Social Security expenditures.

18 Moreover, Spataro (2002) finds that a reduced-form model is preferable to the structural option value model.

19 We assume that individuals will choose to remain with the current situation if the utility of remaining exceeds the utility of retiring.

20 We must remind that not all individuals in the sample are either working or have claimed an old-pension. Some of them are unemployed and receive benefits, some do not receive benefits, but are also contributing and some do not contribute. Moreover, some go through different labour situations before claiming the pension. (See Argimón, González and Vegas, 2007). The situation immediately preceding retirement is conditioned upon, but duration is defined independently of the situation.

person born in 1941, becomes eligible in 2001 (when he is 60), and only claims a pension benefit in 2003 (when he is 62), will have in 2004, T=3 and C=5. In our estimation we restrict C_i to be at least 1 and no greater than 6 as we assume that the decision to retire only takes place between 60 and 66, as only very few people retire after that age, or do not retire at all. The dataset contains some individuals that either can only be observed before they take the decision of interest (*i.e.* claim pension benefit) because we only observe the individuals up to the year 2006 or either did not claim a retirement pension before the age of 66. In both cases, data is right censored. For these individuals we can only observe that $T>C$, so that they remain in the current situation for a larger number of years than the ones that the sample allows us to observe them. That is, we observe claiming at T only if $T=<C$. Otherwise, we observe that $T>C$. We assume that T is independent of C.[21]

The intensity of transition to claiming or the hazard function (*i.e.* the probability of an individual retiring precisely at time t, given that he has not retired before t), is defined as:

$$\phi(t_i \mid \mathrm{X}_i) = prob(T = t \mid T >= t) = prob(T = t) / prob(T >= t) = F[\theta_0(t) + \theta_1(t)x(t)]$$

where X_i is a vector of explanatory variables, some of which are age dependent and others are constant and independent of the age. It provides the probability of not claiming benefits for exactly t years relative to the group of individuals who have been not claiming for at least t years. In other words, it gives the probability of retiring T years after having become entitled to a pension, given that the person has not retired before.

A discrete duration model can be regarded as a sequence of binary choice equations (with cross equation restrictions) defined on the survival population at each duration.

We are, therefore, interested in the conditional distribution of T in relation to variables x: $F(t_i \mid x_i)$.

So the likelihood function could be expressed as:

$$L = \sum_{i=1}^{N-C} \ln f(t_i \mid x_i) + \sum_{i=N-C+1}^{N} \ln(1 - F(t_i \mid x_i))$$

$$L = \sum_{i=1}^{N-C} \ln\left[\phi(t_i, x_i)\exp\left(-\int_0^{t_i} \phi(u, x_i)du\right)\right] + \sum_{i=N-C+1}^{N} \ln\exp\left(-\int_0^{t_i} \phi(u, x_i)\,du\right)$$

where ϕ is the vector of parameters to be estimated.

The dependent variable in the model is the probability of retiring (claiming a retirement pension) at a specific age, given that the person has become eligible to do so[22] and has not retired the preceding years.[23] The explanatory variables that have been included in the specification (X_i) can be grouped in three main categories: social security framework, personal characteristics, and

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[21] It must be reminded that for some cohorts we can only have observations of people retiring after a given age (60 for those born in 1936) or before a given age (for instance, at most at 60 for those born in 1946), in the latter case, given that this is the age when the sample was extracted, as shown in Table 1.

[22] It could be the case that they withdrew the labour market much in advance and remained unemployed or were inactive for some time. In fact, in the case of Spain, early retirement regulation stipulates that in some cases, workers need to be unemployed to be able to claim retirement pensions before the age of 65, the ordinary retirement age. Moreover, up to 2002, pension regulations required total or substantial withdrawal from any form of employment requiring affiliation to the Social Security System to be able to perceive an old-age pension. In 2002, partial retirement was regulated, so that employment and old-age pensions could be simultaneously enjoyed, while the mandatory retirement age at 65 was effectively abolished. An alternative would be to study the transitions from employment to a non-employment status, as in Gutiérrez-Domènech (2006).

[23] So, for each person, the decision moment is different and is defined in relation to his birthday, assuming that they are yearly decisions.

Table 2

Descriptive Values of Social Security Incentives and Working Status. Sample of Men Born between 1936 and 1946, Having Worked in the General Regimen and with a Relation with the Social Security in 2006

	All period considered 1996-2006			Before 2002			After 2002		
	median	mean	*s.d.*	median	mean	*s.d.*	median	mean	*s.d.*
SSW_t [(1)]	199.30	**222.50**	*96.83*	195.83	**211.84**	*87.02*	201.35	**228.17**	*101.21*
SSA_t [(1)]	6.89	**6.73**	*12.95*	10.12	**9.79**	*12.20*	4.97	**5.09**	*13.04*
PV_t [(1)]	12.65	**18.84**	*26.73*	21.68	**26.77**	*28.03*	8.32	**14.63**	*25.01*
RR_t [(2)]	57.61	**67.36**	*35.50*	50.77	**57.61**	*26.56*	61.93	**72.55**	*38.45*
l_{t-1} [(2)]		**57.49**			**62.67**			**54.74**	
u_{t-1} [(2)]		**24.28**			**27.54**			**22.55**	
N		**115,532**			**40,123**			**75,409**	
n		**35,853**			**16,212**			**28,259**	

N: Number of observations; n: people.
[(1)] In thousands of euros.
[(2)] In percentage.

labour characteristics. A detailed description of the variables that have been used can be found in Appendix 1.

We build up the traditional measures of the incentive mechanisms that are standard in this literature. In particular, we use the Replacement Rate (RR_t), which is the ratio of the expected pension benefits over wages, the Social Security Wealth (SSW_t), that is, the present discounted value of the future stream of pension benefits, the Accrual Rate (SSA_t) which measures the discounted increase in SSW from postponing retirement one year and the Peak Value (PV_t), that compares this year's social security wealth to the maximum social security wealth that could be attained in the future. They are constructed under the assumptions that the age of death is certain, no changes in social security regulation are expected by individuals and it excludes any tax considerations.

Table 2 provides information about the descriptive values of the incentive Social Security variables showing that, while the average stock of wealth was higher after the 2002 reform than before, the incentives linked to it were lower. On the other hand, the RR increased after the reform. It also contains information related to working status, distinguishing between those observations corresponding to a working situation (l) previous to the decision moment and those corresponding to an unemployment situation (u). The rest of the observations correspond to either an already retired situation or another situation where there is no work involved. Additional data concerning the rest of the variables can be found in Table 6 in Appendix 2.

We make that both the level of social security wealth and the different incentive variables enter the equation. The level captures wealth effects: the larger the value of wealth, the larger the demand of all goods, including leisure, if leisure is a normal good. The incentive variables capture a substitution effect: the higher the price for leisure, the lower its demand, so that if there is a larger financial incentive to additional years of work, then individuals will retire later. The specification chosen also allows us to test whether the sole act of being entitled is a determinant for retirement,

in the sense that the individual leaves his current situation as soon as he is entitled to collect a pension benefit. Finally, the impact of the regulatory change introduced from 2002 is also analysed, both as it could have affected the average probability of retiring and through its effects on the incentive mechanisms.

As for the labour characteristics, the control variables include the individual's labour situation the year preceding the decision date, distinguishing between working and unemployed, the activity sector and some measures of labour mobility or precariousness.

Finally, we also include some standard demographic controls such as age, education and health status. We also control for the collection of other benefits as they may interact with the old age pension. Finally, regional dummy variables and GDP growth are also included to control for the macro environment.

The duration dependence of the hazard rate is captured in two ways. On the one hand, following Bover et al (2002) we do not impose a specific functional form for duration, so that we introduce additive dummy variables for each of the possible discrete values of the duration variable. Durations of more than 6 years (which would necessarily imply that the person is at least 66) are treated as censored at 6 years, due to the relatively small number of observations under such circumstance. On the other hand, interaction of certain independent variables with the duration are included to see if the variable effects change with the number of years that a person takes to retire. Table 6 in Appendix 2 contains the summary of the variables used.

5 Results

The qualitative impacts of the variables on the hazards are discussed in terms of the sign and statistical significance of the estimated coefficients, which are reported in detail in Table A2 in Appendix 1. We present in that Table three different specifications with two different sets of Social Security incentive variables. So, under model A we present the estimated coefficients obtained for the basic specification, distinguishing between the Accrual Rate (SSA) as incentive variable, and the the Peak Value (PV). Model B tries to capture the impact of the 2002 reform through the inclusion of dummy variables that test for its relevance and effect on the response to the social security variables, while model C, also include dummy variables that capture the effect on the retirement hazard rate of being entitled to perceive the minimum or the maximum pension benefit at each age.

The size of the impacts of the Social Security measures on the probability of retiring is reported in Table 3. In particular, they are measured as the predicted effect of a change in the Social Security variable on the hazard, computing it as an elasticity, for the variables that are continuous. For the qualitative ones, its impact is computed from the change from 0 to 1 in the variable, so that they can be interpreted as the direct effect of having such characteristics on the probability of retiring. The more detailed quantitative impact of a change in all the variables included in the specification distinguishing by age is reported in Table A3 of Appendix 1.

5.1 Economic incentives and regulation

As the results in Table A2 show, all the social security variables coefficients – for SSW, SSA and PV – are statistically significant with the expected sign. Increases in the total present value of the flow of pensions that a person will receive from the year she retires to the year she dies, *i.e.* an increase in SSW, increases the hazard. Increases in the difference of this amount

Table 3

Quantitative Effects of Social Security Measures on the Retirement Probability*

	MODEL A		MODEL B		MODEL C	
	SSA	***PV***	***SSA***	***PV***	***SSA***	***PV***
SSW_t	0.60	0.60	0.72	0.72	0.72	0.72
	0.29	*0.29*	*0.34*	*0.34*	*0.33*	*0.33*
SSA_t	–0.07		–0.04		–0.06	
	–0.03		*–0.02*		*–0.02*	
PV_t		–0.07		–0.04		–0.03
		–0.03		*–0.01*		*–0.01*
RR_t	0.03	0.02	0.08	0.09	0.04	0.06
	0.01	*0.01*	*0.03*	*0.04*	*0.01*	*0.03*

* Quantitative effects are computed as the discrete differences of the logistic function evaluated at a 10 per cent increase in the variables' values with respect to the logistic function evaluated at the observed variables' values.
Results are obtained from the regressions presented in Table A2 where:
• Model A represents the basic model,
• Model B represents Model A including changes in 2002 regulation as control variables,
• Model C includes Model B and income level as control variables.
Median values are in italics.

derived from postponing the retirement (either one or more years) reduce the hazard, whether SSA or PV are used to capture the substitution effecta.

In order to provide an assessment of the explanatory power of the different variables, whose statistical significance has been tested, for the hazard rate, we propose using the Akaike (AIC) and the Bayesian Information criteria (BIC), as recorded in Table 4. By providing a criterion to choose among nested models, we can compare the relative explanatory power of the different variables to affect the probability of retiring. As shown, the pension wealth and the incentive measures are jointly significant (Table 4) for all specifications. On pure likelihood grounds, the specification that does include the peak value dominates the one with the more myopic incentive measure.

In spite of these effects being statistically significant, their size is not very large. As the figures in Table 3 show, a 10 per cent rise in SSW, increases on average around 7 percentage points the probability of retiring between 60 and 65 years of age. Moreover, these probabilities show a U-shaped form with age (Table A3), reaching the highest impact at 65, so that the closer the personis to that age the more responsive to changes in SSW she is.

As for the incentive variables, we find that increasing by 10 per cent the difference between what a worker would receive if she retired now and what she would receive if she retired one year later (increasing SSA) decreases the average probability of retiring between 60 and 65 by between 0.3 and 0.7 pp and by a similar amount if the 10 per cent increase would be in PV. The effects on the retirement probability of the SSA and PV incentives are also U-shaped in relation to age (Table A3), so that they are large at 60, decline then and later start increasing again.

On the other hand, the replacement rate, does show the positive expected sign for the whole sample, but it is not statistically significant, a finding which is confirmed by the results on the AIC

Table 4

Relative Incidence of Social Security Measures on Retirement Decisions for All the Period Considered*

	SSA			PV		
Contribution of	**AIC**	**BIC**	**ln Likelihood**	**AIC**	**BIC**	**ln Likelihood**
Overall Model C	65,659.72	66,210.18	–32,772.86 *(57)*	65,648.87	66,199.34	–32,767.44 *(57)*
SSW_t	66,186.56	66,717.71	–33,038.28 *(55)*	66,164.28	66,695.43	–33,027.14 *(55)*
SSA_t	65,694.62	66,225.77	–32,792.31 *(55)*	65,694.62	66,225.77	–32,792.31 *(55)*
RR_t	65,659.82	66,190.97	–32,774.91 *(55)*	65,656.79	66,187.94	–32,773.39 *(55)*
SSW_t and SSA_t	66,212.33	66,724.17	–33,053.17 *(53)*	66,212.33	66,724.17	–33,053.17 *(53)*
SSW_t and RR_t	66,201.02	66,712.86	–33,047.51 *(53)*	66,188.33	66,700.17	–33,041.17 *(53)*
SSA_t and RR_t	65,703.37	66,215.21	–32,798.69 *(53)*	65,703.37	66,215.21	–32,798.69 *(53)*
SSW_t, SSA_t and RR_t	66,226.46	66,718.98	–33,062.23 *(51)*	66,226.46	66,718.98	–33,062.23 *(51)*
r2002	65,787.63	66,299.47	–32,840.81 *(53)*	65,792.13	66,303.96	–32,843.06 *(53)*

* Results are obtained from regressions under Model C of Table A 2. Degrees of freedom in parenthesis.
Number of observations: 115,532.

and the BIC criteria shown in Table 4.

From the calculations presented in Table 4 we could conclude that the wealth variable plays a larger role on the determination of the hazard rate than any of the incentive variables. That could imply that changing the quantity that is transferred through pensions is more relevant to retirement decisions than changing the built-in incentives in the regulation.

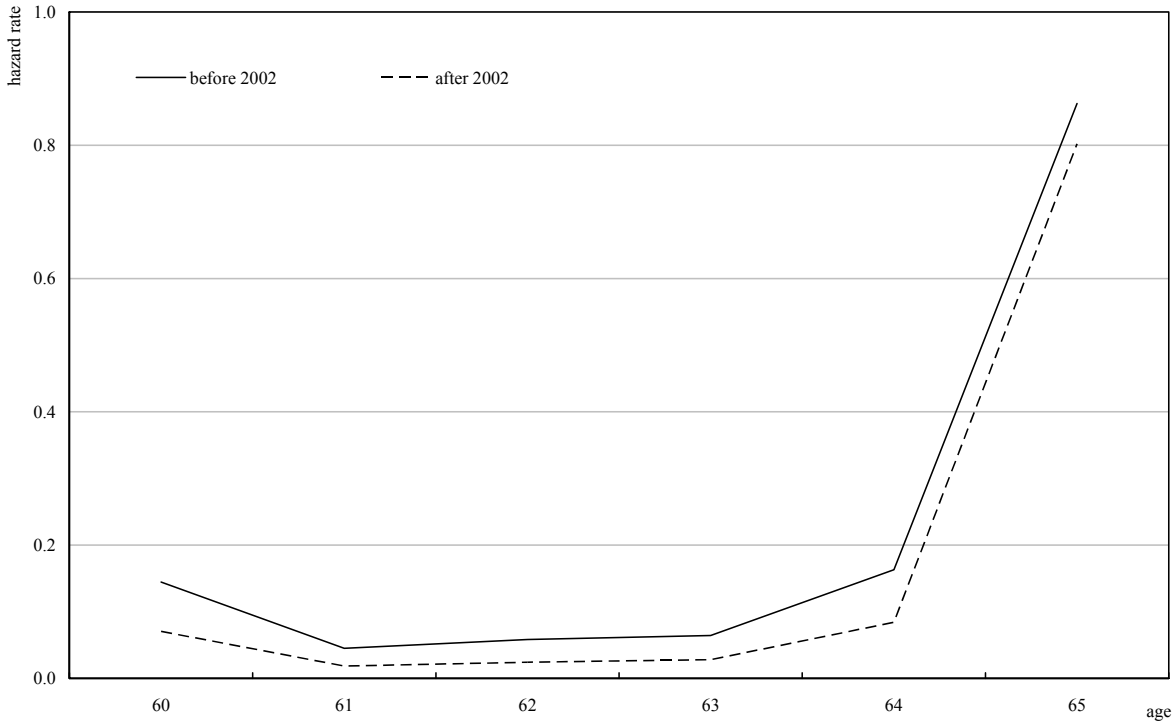
The observed probability of retiring between 60 and 65 before 2002 is higher than after 2002 and this relationship happens at every of the ages between 60 and 65 (Figure 1). The role of the 2002 reform on this change is tested with both the introduction of a dummy variable that takes value 1 from 2002 onwards and which may capture changes in tastes or other factors that are not channelled through the Social Security variables, and with the inclusion of this dummy variable interacted with the Social Security incentive and pension wealth.

If we use the sign and the *t*-ratios of both the dummy and the interacted variables to test for significance of the changes that were introduced in 2002,[24] we can conclude that the reform did not change the pattern of response to the wealth variable, but the response to the incentive variables, in general, reducing its impact on the timing of retirement (Table A2). That is: we need a larger value of SSA (or PV) from 2002 to reach the same impact on the hazard, as shown in Table A4, where a decomposition of the effects of the reform on the incidence of the different incentive variables is shown. This result could be explained as a consequence of the fact that one of the changes carried out under the reform improved the treatment for those that had more than 30 years of contribution, increasing for them the amount of the pension to be perceived at each age. The fact that most

[24] See Norton *et al.* (2004) for a discussion of such test.

Figure 1

Predicted Hazard Rates before and after 2002 by Age



workers (64 per cent) already had at least 30 contributory years (in particular, nearly a third had more than 34 years of contributions), may explain the finding that the reform reduced the incidence of the incentive structure. Additionally, the replacement rate becomes statistically significant for this period, so that a more myopic approach seems to result. Therefore, the observed reduction in the hazard rate does not seem to stem from the new regulation, which has reduced its incidence, but from a collection of other factors that are captured by the dummy.

The evidence gathered shows that those individuals that are being low topped in terms of the amount of their Social Security wealth have a higher retirement probability at 60 than those that are not (Table A4). It could be argued that the minimum pension mechanism blocks the effect of early retirement penalties so that it creates a strong incentive for low income earners to retire, that is specially strong at 60. From 61 onwards being low topped in wealth reduces the probability of retiring. In fact, the older the person, the higher is the reduction in the probability to retire. This result could be consistent with the idea that people might choose to carry on working in order to build up more pension rights, given the built-in incentives, arising from the higher dependency between the amount of the pension to be perceived and the latest wages that she receives compared to further in time wages, which, under the expectation that they increase with age could lead to a larger pension in the future.

The results also show that high earners (those that have their pensions capped) have a lower probability of retiring both at 64 and 65[25] (Table A4), in line with the findings in Villagarcía (1995), Jiménez-Martín and Sánchez (1999), Blanco (2000) and Labeaga (2008) that show that

[25] People from all ages can be low topped, but only people that are 64 or older can receive the maximum pension.

income plays a positive role on continuing in employment. This finding could result from the fact that, for those workers, financial incentives are not a good proxy for the marginal utility from working, A lower potential wage rate for a mature age worker is likely to be associated with a lower probability of labour force participation, as other things equal, a lower wage rate represents a lower opportunity cost of leisure and a higher replacement rate for government pensions.

5.2 Duration variables and cycle

Given that individuals enter the sample as soon as they satisfy the requirements to claim a pension, we can interpret the significance of the dummy coefficient for duration 1 ($g1$) as a test for the relevance of becoming entitled to access the retirement benefits.[26] We could expect that if the preference for retiring is high enough, becoming eligible would be a main determinant of the decision to retire, and people will retire as soon as the regulation would entitle them to. The regression results report a non statistically significant coefficient for g1 (Table A2), so that it can be said that the fact of becoming eligible by itself is not a relevant ground for retirement. The results show also a non-monotonic duration dependence.

We will comment on the interrelation between duration and the effect of some of the covariates when we present the results for the latter.

Early-retirement may result from fluctuations in the economic cycle. Our results show that the propensity to retire is pro-cyclical, so that the hazard retirement rate is higher during macroeconomic expansions, feature that has been observed in other studies about retirement decisions (Montizaan, Cörvers and de Grip, 2007). A possible explanation of this result could be the fact that asset cycles are highly correlated with the evolution of the business cycle. If people rely on their investments to fund their consumption in retirement, besides what they can get from the retirement pension, they are particularly vulnerable to market downturns. That could be the reason why in periods of economic prosperity, prospective retirees are more optimistic about the evolution of their other sources of income and therefore decide to retire earlier. On the other hand, Muñoz (1995), pooling the EPA data, provides evidence that in a recession individuals retire earlier.

5.3 Age

In our specification, we also include age dummies to account for differential effects arising from age itself. These dummies should capture the effect of growing older "per se", and not through the different coefficients in the calculation of pension rights that are age dependent. The results show that, even when controlling for eligibility criteria and Social security variables, 65 is a prevailing retirement age.

5.4 Working status, sector of activity and other labour history related variables

The activity status prevailing during the year before the decision is taken could be relevant for the retirement hazard. In particular, the sample allows us to distinguish between four labour status: working, receiving unemployment benefits and thus also contributing to Social Security, contributing without working nor perceiving unemployment benefits (special agreement), and not contributing.

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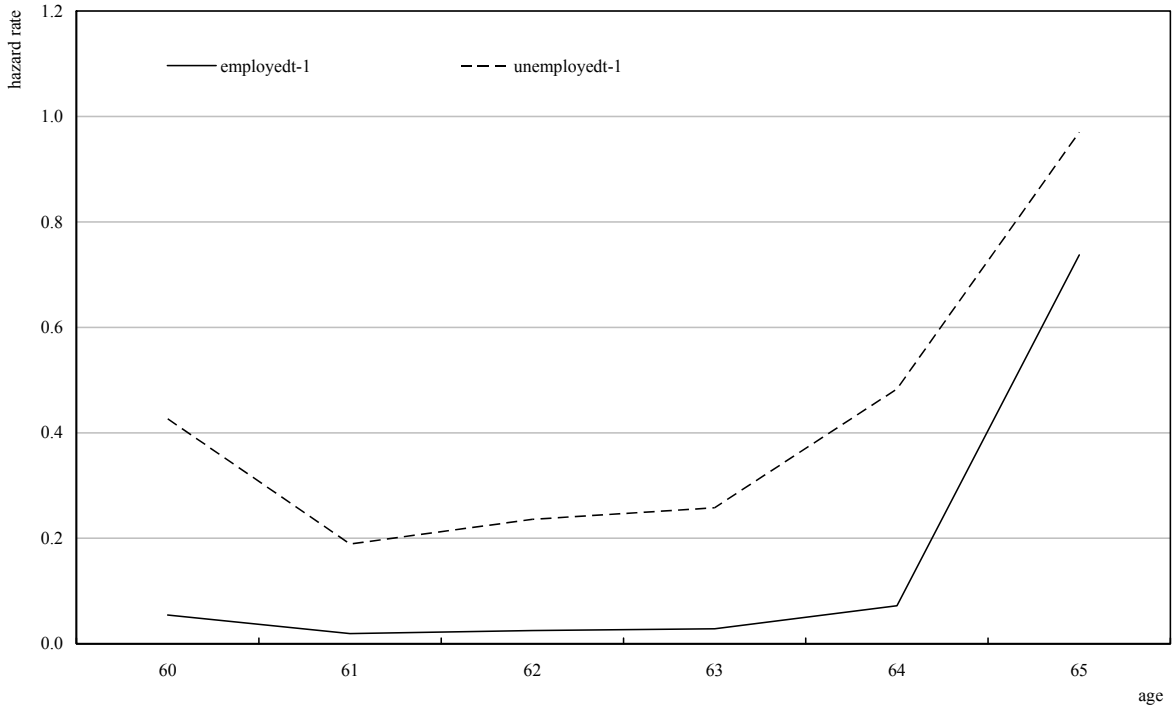
[26] See Appendix 2 for a description of these conditions.

Figure 2

Predicted Hazard Rates According to Previous Working Status and Age



The results show that a person working at a particular year has a lower probability of retiring the following year than a person who was not working, even when we condition on social security incentives. They also show that being unemployed the preceding year increases the probability of retiring. Such findings may only reflect the predominance of special early retirement programs that exist for unemployed old people.[27] We also find that the size of these effects varies with age, as can be seen in Figure 2, showing a U-shaped form.

We also include as a covariate the activity sector, which allows us to distinguish between those working in the service sector and those working in the industry sector. The estimated coefficient is, however, not statistically significant, in contrast to other works where the sector of activity is found to be playing a role (Conde-Ruiz and García, 2004; Blanco, 2000; Villagarcía, 1995; Muñoz, 1995).

The next pair of variables try to capture the quality of the labour relations, through the consideration of the number of contracts that have been recorded for a given work history up to the eligibility moment and the average length of these contracts.

The results show that job rotation (proxied by the total number of labour relations that a person has had) has a negative impact on the retirement hazard, impact that fades away as duration increases. The sign of the coefficient suggests that the higher the labour rotation the lower the probability of retiring between 60 and 65. This result could be in consonance with the findings that workers with a firm-specific training history retire earlier than workers with a general training background (Montizaan, Cörvers and de Grip, 2007).

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[27] See García Pérez and Sánchez Martín (2008b) for an analysis of the transitions from unemployment for older people.

On the other hand, the average length of the contract seems to play a significant role in the decision to retire only as time unfolds. Although in general, the higher this average the more stable the individual's working life has been, it is not a sophisticated measure of a precarious career as the same average may result from quite different job histories.

5.5 Individual characteristics and other

The results obtained for the negative role of higher education on the probability of retiring is in consonance with what is obtained in most empirical work (Villagarcía, 1995; Gutiérrez-Domènech, 2006).[28] One explanation of such finding may result from the theory that states that low-ability workers are induced to retire early because of the intra-generational redistribution built in early retirement provisions via the utility from leisure (Conde-Ruiz and Galasso, 2003). The effect of education is reinforced by duration, so that the lower probability of retiring of a higher educated worker is larger the more time it has elapsed since becoming eligible.

As for the health status, the results show a lower hazard for those receiving disability benefits the year before. Such counterintuitive finding may just reflect the fact that those receiving disability benefits, besides having a poorer health, will probably be the ones receiving retirement disability pensions when they turn 65, the only age in which this type of pensions can be awarded and which we are not including in our analysis.

Receiving public transfers other than unemployment or disability benefits reduces the retirement probability, which may be a consequence of liquidity constraints.

Dummy variables for the region (Autonomous Community) where the worker initially registered are included in the specifications, as a way to capture other differences in the economic environment. Coefficients are not reported but are available under request.

5.6 Counterfactual Regulation Schemes

Finally, we have performed a counterfactual exercise with the aim of shedding more light on what these magnitudes are likely to mean in reality, by calculating the effect over estimated retirement probabilities of small changes in the economic incentive mechanisms underlying the Spanish public pension system. The reason for applying only tiny changes to the baseline is to avoid the Lucas' critique, while providing a sensitivity analysis.

So we have computed the pension wealth that a person would receive under three alternative regulatory schemes, which imply very small changes over the current regulatory situation.[29] We have computed for each individual in the sample the SSW and incentive measures that result from the assumed setting. We then have obtained counterfactual predicted retirement probabilities so that we can compare them with the one predicted under our estimates, which act as a benchmark.[30] In particular, we compute the changes in relation to the population that in the sample are subject to the rules prevailing in 2002. In general terms, each of the three alternative regulatory schemes tries to change only one item in the pension rules.

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[28] Muñoz (1995), on the other hand, finds evidence that the education has a quadratic effect, so that those individuals with little or with a lot of studies retire later than those with an intermediate level of education.

[29] In general terms the current system is characterised by requiring at least 15 years of contribution and with the pension being at least 50 per cent of a proxy of gross average lifetime earnings (regulatory base), which raises to 100 per cent after 35 or more years of contribution See Appendix 2 on legislation for a detailed description of the system.

[30] The new probabilities are obtained using the specification in column 1 of Table A2.

Table 5

Effects of Alternative Settings on Retirement between Ages 60 and 65*

	Benchmark	Setting A	Setting B	Setting C
Predicted retirement probability(1)	77.08	76.33	76.82	76.95
Predicted retirement age	62.92	62.93	62.93	62.92
Change in number of retired people(1)	-	–1.53	–1.58	–0.08
by age:				
60	-	–1.80	–1.63	0.00
61	-	–2.45	–2.09	0.00
62	-	–2.48	–2.10	0.00
63	-	–2.59	–2.26	0.00
64	-	–2.06	–1.90	0.00
65	-	–0.60	–1.09	–0.20

(1) In percentage.
* The effects are estimated for the period beginning in 2002.
Setting A: Capping the pension to 96% of the Regulatory Base at 35 years of contribution and to 48% at 15 years of contribution.
Setting B: 18 years of contribution to claim a pension. Retiring after 65 implies 3% increase.
Setting C: Retiring after 65 implies 2% increase and 3% if 40 years of contribution.

The first counterfactual scenario, setting A, would consist of an overall reduction in the amount of the pension perceived at all ages. It caps the pension to 96 per cent of the regulatory base, not allowing individuals to get the 100 per cent of it at any retirement age.[31] Even if no change in the number of people retiring is produced, such scenario implies a reduction of the pension burden in relation to the benchmark.

Setting B affects mostly the incentive structure as it requires more years of contribution to claim a pension (18 years instead of 15), so that the increase ladder becomes stepper. Moreover, at the age of 66, if the person has more than 35 contributory years, an additional increase in the amount of the pension is added.[32] Under this scenario, it cannot be initially established whether or not the burden rises.

Setting C proposes changes in the short-term incentives to stay beyond 65, in the sense that it only introduces higher retirement benefits for each additional year beyond 65 that an individual remains not retired.[33] If effective, it could raise the burden, not the implementation year but in the middle and long run.

Table 5 shows the computed counterfactual predicted retirement probabilities for these three scenarios, the average predicted retirement age over the age interval 60-65 and the changes in the number of retirees in the same interval and its disaggregation by ages. All the changes analysed result in an extremely mild increase on the average retirement age and a reduction in the number of

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31 Under this scenario, with 15 contributory years the pension amount is only 48 per cent of the regulatory base. Moreover, up to 25 years of contribution a 3 per cent increase each year would be added, and from 26, the increase would be 2 per cent per year up to 96 per cent of the regulatory base at 35 or more years of contribution.

32 Under this scenario, there is a 3 per cent increase up to 25 contributory years, while since then the increase is 3.22 per cent up to 35. At 66 with more than 35 years of contribution the increase is also 3.22 per cent. Only 2.6 per cent of people at 60 have a labour history shorter than 18 years.

33 It reproduces part of the changes introduced by the "Acuerdo sobre Medidas en Materia de Seguridad Social", of 13 July 2006, which were implemented two years later. In particular, at 66 with at least 35 years of contribution a 2 per cent increase in the pension is added, raising it to 3 per cent for those individuals with at least 40 years of contribution.

people who retire between 60 and 65, which goes from 0.08 per cent under setting C to 1.6 per cent under setting B.

We obtain that under the first two scenarios, the retirement rates of all ages are affected by the proposed change and that the effects are increasing with age up to 63, when the largest impact is recorded. The smallest effect is at 65, reflecting, probably, how this age is regarded as normal retirement age.

The fact that under setting C there is a null impact on the probability of retiring between 60 and 64 with respect to the benchmark results from the specification chosen to compute the effects, that only reflects the impact of changes in SSA. However, the low incidence of the long term incentive (peak value) on the decision results in a very similar figure when the specification with the PV variable is chosen, instead. In any case, the decrease in the number of people that choose to retire at 65 so as to retire at a later age is rather small (0.20 per cent), as only the incentive changes, but not the social security wealth at that age.[34]

6 Conclusions

There is some agreement that generous early retirement provisions account for a large proportion of the drop in the labour force participation of elderly workers that had been observed in Spain in the nineties. This paper aims at quantifying the impact of these provisions under the Spanish Social Security System.

We have gathered evidence that, in general, the economic incentives stemming from Social Security regulations on old age pensions in Spain seem to have the expected effect on retirement. We find that the present value of the future flow of pensions has a positive impact on the probability of retiring, with larger pensions shortening the span between becoming eligible for retirement and actually claiming the retirement pension. Therefore, all measures taken to reduce the present value of such flow at early ages may have the desired effect of reducing early retirement.

Moreover, it seems that the built-in incentives in the system not to retire early have a non negligible effect on old-age retirement, so that they are effective in retaining people. The higher flow of pensions that workers receive for staying at work one additional year compensate both the loss of leisure that they experience for the additional year that they keep contributing and the wage and salary they perceive at work. The quantitative size of such effect is statistically significant so that small variations in the incentives measures have a sizeable effect on early retirement. Therefore, from a policy perspective, there is a need to reinforce such effects.

We also found that the new scheme implemented since 2002 has reduced the probability of retiring at each age, in spite of the fact that the substitution effects captured through the incentives measures seem to have reduced their incidence on retirement decisions. We also found some evidence of a more myopic behaviour of workers as regards social security incentives. The changes in the regulation that have taken place may explain such results.

Any new change in the incentive structure of pensions should take into account the longer work histories that younger people have, when becoming eligible. In fact, the counterfactual results show that a small change in the incentive structure has a small impact on the number of people retiring. It seems that to increase the number of people staying beyond 65 requires more than a tiny push. It is therefore necessary to combine economic incentives with other institutional constraints in order to effectively increase the retirement age.

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[34] In fact, those whose entire contributory life is below 35 years experience a reduction in the amount they perceive at 65 in relation to the benchmark.

There is a need to address the consequences of an ageing population on the Social Security accounts. Minor changes in the rules that define the amount to perceive at each age and in relation to the years effectively contributed may have a positive impact on the accounts, through its impact on the probability to retire at each age, but this is not enough. Prospective amendments in retirement rules should be oriented to link the possibility of retiring and the benefit rights not only to contributive efforts to, but also to life expectancy.

APPENDIX 1
DATA

This appendix contains the definition of the variables included in the different specifications. As it has already been mentioned in the text, the main data source is the Muestra Continua de Vidas Laborales 2006 (MCVL-2006), a sample of administrative data gathered by the Social Security Department.

The subsample used includes the available information on men who have contributed to social security at least once in their lifetime, have not collected an old age pension before 1997, and who were born between 1936 and 1946, so that in 2006 they were between 60 and 70 years old. Moreover, we restrict it to those men whose longest contributory relationship with the Social Security took place in the General Regime, the scheme that covers most workers and whose description can be found in the following appendix on legislation. We also drop those individuals who have collected an old pension after 1997, but whose eligibility to access a retirement pension, in terms of having at least fifteen contributory years, could not be proved with the available data, as a pension could not be estimated for them.[35] The final subsample is composed of 35853 individuals. The main statistics for each variable is presented in Table 6.

Economic Incentive Variables

To calculate the Social Security benefits to which individuals in our sample are entitled, we make use of the Social Security covered earnings histories of individual in the MCVL2006.

***SSW*$_{it}$**: Value of Social Security Wealth of individual *i* at time *t*, at 2006 prices:

$$SSW(r)_{it} = \sum_{s=t}^{s=L} [B_i(s,r)[p(s \mid t)_i /(1+\rho_i)^{s-t}]]$$

indicates Social Security Wealth at time *t* (at age *t*) if retiring at age *r*, *L* is the maximum life length, $B_i(s,r)$ is the pension benefit in period *s* (at age *s*) if retiring at *r*, *p*(*s*|*r*) is the conditional probability of an individual at time *t* to be alive at time *s* where *s*>*r*, ρ_i is the individual discount rate.

To calculate the pension we make use of data on *covered earnings* and from it we have built the Regulatory Base which has been computed as the regulation establishes. The minimum base that has been used to complete job careers has been the one corresponding to contributory group 5, senior administrative ("*oficial administrativo*"), the group with the largest volume of population. On the other hand, the maximum base has been taken to be the one corresponding to group 1, Engineers and Graduates ("*Ingenieros y Licenciados*"), the group with the highest base for all the years. The maximum life length (*T*) has been taken to be 98 years; ρ_i, the individual discount rate is assumed to be fixed at 3 per cent, *p*(*s*|*r*), the conditional probability of an individual aged *r* to be alive at age *s*, has been taken from the National Statistics Institute (INE) demographic projections scenario 2, based upon 2001 Census data and pensions are assumed to increase 2 per cent yearly from 2006. Minimum and maximum pensions are applied and the minimum one corresponds to a worker with a dependent spouse.

In order to calculate the different incentive measures, we need to project SSW for the future. Two different situations arise, depending on the age of the individual and whether or not he has

[35] The administrative nature of the data source explains that a limited number of individuals had to be deleted from the sample as the available information for them did not seem consistent.

retired. For those that are not 66 before 2006, we need to project their pension and their SSW beyond this year. To do so, we assume that their salary and, therefore, their contributory base will be increasing at a 2 per cent rate every year. For those that have retired before 2006, we project their salaries for the years before 2006 assuming that they keep the purchasing power of their last observed salary (or the following one), so that the contributory base increases by the same amount as the December over December CPI.[36]

SSA$_{it}$: the Accrual Rate,

$$SSA(r)_{it} = 1/(1+\rho_i)SSW(r+1)_{it} - SSW(r)_{it}$$

and we let:

$$SSW(r+1)_{it} = \frac{SSW(r+1)_{it+1}}{(1+\Pi_t)}$$

A limitation of this index is that it does not take into account the comparison that the individual can make between pension benefits and the level of his/her income. It could be argued that the leisure preference is such that wages can fully compensate for the forgone leisure enjoyment from postponing retirement.

PV$_{it}$: Peak Value computed between the ages of 60 and 65 is defined as:

$$PV_i(r) = \max(SSW(r,r+1)_i, SSW(r,r+2)r_i, SSW(r,r+3)_i ..., SSW(r,66)_i)$$
$$= SSA_i, otherwise$$

where:

$$SSW(r,r+j) = SSW(r+j)/(1+\rho)^j - SSW(r)$$

We follow Coile and Gruber (2000) and restrict the peak value to be equal to the accrual rate, if the individual works beyond the highest value for his social security wealth[37]

RR$_{it}$: Replacement rate, $RR_i(r)$ is the ratio of the expected pension benefits $B_i(r)$ at time *t* over wages $w_i(r)$ perceived at time *t*–1 for individual *i* at age *r*, if the person retires at age *r*:

$RR_i(r) = E_r(B_i(r)/w_i(r))$, where *E* is the expectation operator

Other variables

failurejub$_{it}$: dummy variable that takes value 1 if the person retires at time *t* and 0 otherwise. It is the dependent variable

disab$_{it-1}$: Dummy variable that takes value 1 at time *t* if the person was receiving any disability benefit while he was a year younger (at time *t*–1) and zero, otherwise

univ$_i$: dummy variable that takes value 1 if the contributory group ("*grupo de cotización*") of the longest contributory relationship with the Social Security system is the one with the highest academic qualifications (group 1: "Engineers and Graduates"), and zero otherwise

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[36] Alternatively, we could have taken the average increase in observed national accounts data for compensation of employees per employee.

[37] They also normalize the peak value by the expected stream of wages over the period between the maximum year and the current year. Hence their actual index measures the benefits of continued work relative to the social security wealth earnings in the same period. They call this measure the tax/subsidy rate. This normalization can also be made for both the accrual and the option value.

***numrel**$_i$*: number of contributory labour relations that have been recorded by the Social Security before becoming entitled to an old age pension and that include those involving the perception of unemployment benefits

Regional Government (Comunidad Autónoma) where the worker initially registered: Group of 19 dummy variables, each one corresponding to a CA, plus one for Ceuta and one for Melilla, that records the initial worker's registration (IIccaa-)

***serv**$_i$*: Dummy variable that takes value 1 if the longest job a person has held has taken place in the following CNAE sector classifications: Trade (50 to 52), Restoration (Hostelería) (55), Transport (60 to 64), other services, including education y health (65 to 67, 70 to 74, 80, 85 and 90)

***u**$_{it-1}$*: Dummy variable that takes value 1 at time *t* if the person was receiving unemployment benefits,[38] either as a subsidy or a contributory transfer, while he was a year younger (at time *t*–1), and zero, otherwise

***l**$_{it-1}$*: Dummy variable that takes value 1 at time *t* if the person was working and contributing to Social Security while he was a year younger (at time *t*–1), and value zero, otherwise

***g_k**$_{it}$*: Dummy variables that take value 1 if the person is at time *t* in the k^{th} period decision and zero otherwise, where *k*=[1,6]. That is, *g_k* takes value 1 if the value of the length of the spell from the year the person becomes entitled to a retirement pension is *k*

***age_k**$_{it}$*: Dummy variables that take value 1 if the person is *k* years old at time *t* and zero otherwise, where *k*=[60,65]

***cycle**$_t$*: Spanish GDP real growth rate (for years 1997 to 2006)

r2002: Dummy variable that takes value 1 if the year of the observation is greater than 2001

***otherben**$_{it-1}$*: Dummy variable that takes value 1 at time *t* if the person was receiving any Social Security benefit other than disability, old age or unemployment while he was a year younger (at time *t*–1) and zero, otherwise

***meanlength**$_i$*: average number of years for the spells that the individual *i* has had before becoming entitled to a pension

t: trend variable

[38] It corresponds to the people whose relationship with Social Security is coded as a TRL 751-756 in the administrative files.

APPENDIX 2
LEGISLATION

The institutional framework

The labour-market based social security is mandatory for workers in Spain. Old-age public pensions are mainly provided through three different schemes: General Social Security scheme (Régimen General de la Seguridad Social, RGSS), Special Social Security Regimes (Regímenes Especiales de la Seguridad Social, RESS) and government employees scheme (Régimen de Clases Pasivas, RCP).[39] Around 72 per cent of social security contributions are obtained from the RGSS. The pension regulations for RESS, within which the self-employed are assigned, and RCP do not, in general, allow for early retirement, so that the focus of the analysis will be on the RGSS.

The main changes that have taken place in Social Security regulation in recent years that affect the period covered by the sample correspond to the reforms introduced in 1997 and 2002 in relation to the framework set in 1985.[40]

The normal retirement age in Spain, that is the age when a person becomes eligible for the full pension benefit, is 65. In fact, in some sectors retirement at sixty-five has been compulsory for some years. However, since 2002, incentives have been built in the regulation so as to promote retirement beyond the age of 65.[41] Early retirement is possible from the age of 60, under some strict conditions that are detailed below and that imply a reduction in the amount of the pension to be perceived that is defined by a reduction coefficient.

Entitlement criteria for RGSS

A payroll tax defined for both employers and employees and levied on earnings, with a minimum contribution and a maximum pensionable earning, finances the Social Security System.

Up to 1997 only 8 contributory years were required to be entitled to a retirement pension. The change introduced in 1997 set a timetable to extend this period to fifteen years, one every year, so that in 2002, 15 years were required to be able to receive a pension at the age of 65, the ordinary retirement age. An additional requirement introduced in 1997 was that two of these contributed years had to have taken place during the last eight years.

As for early retirement before the age of 65 there are three different cases:[42]

On the one hand, those who, before January 1, 1967, contributed to the labour mutual funds system that preceded the current Social Security system are entitled to retire from the age of 60 if the total contributory years are at least 15.

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[39] The RGSS and RESS are administered and managed by the Social Security as a joint pay-as-you-go system. The RCP is administered and managed by the Central Government.

[40] In particular, up to 2002, pension regulations required total or substantial withdrawal from any form of employment requiring affiliation to the Social Security System to be able to perceive an old-age pension. In 2002, partial retirement was regulated, so that employment and old-age pensions could be simultaneously enjoyed, while the mandatory retirement age at 65 was effectively abolished. In 2006 a new agreement among government, trade unions and employers' associations was reached, but with limited impact (Ley 40/2007, de 4 de diciembre, de medidas en materia de Seguridad Social).

[41] The regulation increased the amount of the pension to be received if the worker remained employed and payment of social contributions by employers and employees with indefinite-term contacts were waived.

[42] Regulation also allows for early retirement for special professions, especially those involving dangerous or unhealthy activities or some instances of those affected by industrial restructuring regulated by special legislation. Moreover, a new regulation came into force in 2002 allowing for partial retirement that can be simultaneously enjoyed with a part-time job. Workers can partially retire starting at the age of 60 if the firm replaces the retiree with another worker (relief contract) to compensate for the retiree's reduction in work-time.

For those whose initial contribution year dates from after 1967 and only since the 2002 amendment, the earliest retirement age is 61. For them, the minimum number of contributory years amounts to 30. Moreover, in order to be able to claim the pension, they have to have spent at least six months involuntarily unemployed and registered as job seekers in the Public Employment Service Offices, immediately preceding the claim. Years spent unemployed and receiving unemployment benefits add as contributory years towards an old-age pension.[43]

Retiring at the age of 64 is also possible and is subject to different rules: from 2002 no previous period of unemployment is required, but just the minimum 15 contributory years. However, in this case, the firm needs to hire another worker for a minimum period of a year (substitution contract) to replace the retiree, if full benefits (as at the age of 65) are to be guaranteed.

The database does not provide information about contributions dating from before the seventies. On the other hand, all men born between 1936 and 1946 could potentially have been working by 1967, as the youngest would have started working at the age of 21. Therefore, the assumption in the empirical part is that all people in the sample contributed to the labour mutual funds system, so that they only require 15 years of contribution to be entitled to retire.[44] In fact, in our sample 34 per cent of those we observe retiring, do so at 60 years of age.

The pension amount

The actual level of the old age pension is defined by the interaction of different elements. On the one hand, the Regulatory Base (Base reguladora, BR) that defines the amount upon which to calculate the pension rights is directly related to wages perceived, but subject to lower and upper caps.[45] The minimum and maximum contributory periods to be included in its calculation and the inflation correction to obtain its present value are regulatory defined. Reduction coefficients for early retirement and for less than 35 years of contribution are also defined.[46] Minimum and maximum pensions are yearly defined and depend on marital status and number of dependents of the person receiving the benefit. Pensions are indexed by the Consumer Price Index. Up to 2002, any additional year contributed beyond 35 did not add to the amount of pension received.

A person retiring between 1985 and 1996 with at least 15 contributory years at year t had a regulatory base defined as:

$$BR_t = \frac{1}{112}\left(\sum_{j=1}^{24} w_{t-j} + \sum_{j=25}^{96} w_{t-j}\frac{I_{t-25}}{I_{t-j}}\right)$$

where w_{t-j} are *covered earnings* for the jth month before retiring at t and I_{t-j} is the price index for the jth month before retirement,[47] so that only eight years are taken into account to define BR.

Since 2002, the contributory base is defined as:

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[43] In fact, unemployed workers aged 52 and older can receive unemployment benefits that turn into subsidies until they are eligible for early or ordinary retirement.

[44] We also find that 40 per cent of people in the sample who retire do so with less than 30 registered years of contribution.

[45] Different caps have been in place for different types of workers depending on their group of contribution (grupo de cotización) associated with the type of job and education level.

[46] There is a special treatment for those that contributed to the system before 1967 (mutual funds contributors or "mutualistas").

[47] It is divided by 112 as pensions are paid in fourteen annual instalments.

$$BR_t = \frac{1}{210}\left(\sum_{j=1}^{24} w_{t-j} + \sum_{j=25}^{180} w_{t-j}\frac{I_{t-25}}{I_{t-j}}\right)$$

so that 15 years are taken into account. A transitory period was set from 1997 to 2002 so that a one year increase in the years considered in the indexed part of the weighted average was included per year, so that in 2002 the fifteen years were finally accounted for.[48]

The relation between the first monthly pension received at time t (B_t) and the regulatory base (BR_t) calculated at t can be expressed as $B_t = \alpha_{nt}^T \cdot BR_t$, where ${\alpha_{nt}}^T = {\alpha_{nt}}^y {\alpha_{nt}}^a$, so that ${\alpha_{nt}}^y$ depends only on contributory years (n), and ${\alpha_{nt}}^a$ depends on the age of retirement. If retirement age is equal or larger than 65 then, and up to 1997, ${\alpha_{nt}}^a = 1$ and ${\alpha_{nt}}^T$ is expressed as:

$$\alpha_{nt}^T = \begin{cases} 0 & if\ n < 15 \\ 0.6 + 0.02(n-15), & if\ 15 \le n < 35 \\ 1, & if\ 35 \le n \end{cases}$$

The reform introduced in 1997 modified the number of years to define the contributory base and the substitution rate (${\alpha^T}_n$) if age of retirement was equal or larger than 65, so that:

$$\alpha_{nt}^T = \begin{cases} 0, & if\ n < 15 \\ 0 \cdot 5 + 0.03(n-15), & if\ 15 \le n < 25 \\ 0 \cdot 8 + 0.02(n-25), & if\ 25 \le n < 35 \\ 1 & if\ 35 \le n \end{cases}$$

The new scheme thus implies a more progressive approach to full benefits.

For early retirement, regulation also sets a penalization system linked to age. *Mutualistas* that retire early are subject to a reduction coefficient equivalent to 8 per cent for each year in advance of 65 that he/she retires, so that $\alpha_t^a = 1 - 0.08(65 - r)$ $where\ r >= 60$. The 1997 reform reduced the reduction coefficient to 7 per cent for those with more than 40 contributory years, when claiming the pension. This coefficient should be jointly applied with the one corresponding to contributory years.

The 2002 reform changed the penalization mechanism, so as to make the age coefficient (α_t^a) more linked to the number of contributed years, so that:

$$\alpha_{nt}^a = \begin{cases} 0 & if\ r < 61 \\ 1 - k\,(65 - r), & if\ 61 \le r < 65\ where \\ 1, & if\ r \ge 65 \end{cases} \qquad k \begin{cases} 0.08 & if\ n = 30 \\ 0.075 & if\ 31 \le n \le 34 \\ 0.07 & if\ 35 \le n \le 37 \\ 0.065 & if\ 38 \le n \le 39 \\ 0.06 & if\ n \ge 40 \end{cases}$$

where r is retirement age.

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[48] As social contributions are paid 14 months a year, the effective number of years taken into account to compute the regulatory base is 6.8 up to 1997 and 12.9 since then. The 2006 agreement proposes to rise the effective contributory years to 15, without taking into account the 14 monthly payments.

Table 6

Descriptive Values. Sample of Men Born Between 1936 and 1946, Having Worked in the General Regimen, with a Relation with the Social Security in 2006

	All Period Considered 1996-2006			Before 2002			After 2002		
	Median	**Mean**	***s.d.***	**Median**	**Mean**	***s.d.***	**Median**	**Mean**	***s.d.***
SSW_t (1)	199.30	**222.50**	*96.83*	195.83	**211.84**	*87.02*	201.35	**228.17**	*101.21*
SSA_t (1)	6.89	**6.73**	*12.95*	10.12	**9.79**	*12.20*	4.97	**5.09**	*13.04*
PV_t (1)	12.65	**18.84**	*26.73*	21.68	**26.77**	*28.03*	8.32	**14.63**	*25.01*
RR_t (2)	57.61	**67.36**	*35.50*	50.77	**57.61**	*26.56*	61.93	**72.55**	*38.45*
l_{t-1} (2)		**57.49**			**62.67**			**54.74**	
u_{t-1} (2)		**24.28**			**27.54**			**22.55**	
numrel		**10.770**	*25.866*		**9.547**	*19.763*		**11.420**	*28.565*
meanlenght (3)		**7.237**	*7.243*		**7.763**	*7.436*		**6.957**	*7.122*
time since eligible (3)		**2.677**	*1.565*		**2.275**	*1.390*		**2.892**	*1.609*
univ		**0.106**	*0.307*		**0.101**	*0.302*		**0.108**	*0.310*
serv		**0.364**	*0.481*		**0.356**	*0.479*		**0.367**	*0.482*
disab		**0.126**	*0.332*		**0.024**	*0.152*		**0.181**	*0.385*
otherben		**0.134**	*0.341*		**0.030**	*0.172*		**0.190**	*0.392*
low60		**0.086**	*0.281*		**0.101**	*0.302*		**0.078**	*0.268*
low61		**0.047**	*0.211*		**0.034**	*0.181*		**0.053**	*0.224*
low62		**0.029**	*0.168*		**0.015**	*0.123*		**0.036**	*0.187*
low63		**0.018**	*0.134*		**0.008**	*0.091*		**0.024**	*0.152*
low64		**0.011**	*0.104*		**0.005**	*0.067*		**0.014**	*0.120*
low65		**0.008**	*0.086*		**0.003**	*0.053*		**0.010**	*0.100*
top64		**0.001**	*0.037*		**0.001**	*0.025*		**0.002**	*0.042*
top65		**0.003**	*0.058*		**0.001**	*0.034*		**0.005**	*0.067*
age61		**0.219**	*0.413*		**0.236**	*0.425*		**0.209**	*0.407*
age62		**0.175**	*0.380*		**0.158**	*0.365*		**0.184**	*0.387*
age63		**0.135**	*0.342*		**0.110**	*0.313*		**0.148**	*0.355*
age64		**0.100**	*0.300*		**0.068**	*0.252*		**0.118**	*0.322*
age65		**0.065**	*0.246*		**0.027**	*0.162*		**0.085**	*0.278*
cycle (4)		**3.667**	*0.679*		**4.262**	*0.688*		**3.350**	*0.406*
r2002		**0.653**	*0.476*		**0.000**	*0.000*		**1.000**	*0.000*

(1) In thousands of euros.
(2) In percentage.
(3) In years.
(4) In percentage variation of GDP.

Moreover, it introduced a premium for late retirement, so that the pension was increased by 2 per cent per additional year if the worker credited more than 35 years of contribution:[49]

$$\alpha_n^T = 1 + 0.02(r - 65) \; if \; r > 65 \; and \; n \geq 35$$

[49] The 2006 agreement proposed raising the premium to 3 per cent for those with more than 40 contributory years. The partial retirement regulation introduced with the 2002 reform, established that no correction coefficient for age would be used for those claiming this type of pension. The reform agreed in 2006 aims at rationalizing this type of retirement, requiring six years of seniority in the firm before retiring, 30 contributory years (instead of the current 15), and changing the maximum and minimum labour day reduction to 75 per cent and 25 per cent, respectively from the current 85 per cent to 15 per cent. Full implementation will be in four years' time.

Table 7

Logit Estimates of the Effects of Pension Incentives on Retirement Behaviour between 60 and 65 Years of Age. Males Born between 1936 and 1946, Having Worked in the General Regime with a Relation with the Social Security in 2006*

	MODEL A		MODEL B		MODEL C	
	ACCRUAL	PEAK VALUE	ACCRUAL	PEAK VALUE	ACCRUAL	PEAK VALUE
	LR chi2(45)=38014.62	LR chi2(49)=38187.03	LR chi2(56)=38597.09	LR chi2(45)=38030.83	LR chi2(49)=38213.54	LR chi2(56)=38607.93
	Pseudo R2=0.365	Pseudo R2=0.367	Pseudo R2=0.371	Pseudo R2=0.365	Pseudo R2=0.367	Pseudo R2=0.371
	Log likelihood = –33064.09	Log likelihood = –32977.89	Log likelihood = –32772.86	Log likelihood = –33055.97	Log likelihood = –32964.63	Log likelihood = –32767.44
	115.532 number of observations					
ECONOMIC INCENTIVES AND REGULATION						
SSW_t	2.979 (23.08)***	2.969 (23.31)***	2.462 (11.69)***	2.401 (11.81)***	2.322 (10.78)***	2.289 (10.83)***
SSA_t	–7.993 (–7.07)***		–12.941 (–7.78)***		–10.510 (–5.69)***	
PV_t		-4.284 (–8.11)***		-6.730 (–9.26)***		-5.363 (–6.92)***
RR_t	0.046 (1.2)	0.043 (1.14)	–0.083 (–1.25)	–0.144 (–2.14)*	–0.085 (–1.28)	–0.139 (–2.06)*
SSW_t * r2002			1.109 (4.76)***	1.166 (5.16)***	1.272 (5.48)***	1.252 (5.53)***
SSA_t * r2002			8.821 (4.50)***		4.018 (2.04)*	
PV_t * r2002				4.451 (4.94)***		3.265 (3.61)***
RR_t * r2002			0.232 (3.04)**	0.300 (3.89)***	0.151 (1.97)*	0.252 (3.26)**
r2002			–0.763 (–10.37)***	–0.843 (–11.04)***	–0.689 (–9.31)***	–0.787 (–10.24)***
low60					0.205 (4.45)***	0.224 (5.01)***
low61					–0.035 (–0.46)	–0.001 (–0.01)
low62					–0.587 (–5.68)***	–0.554 (–5.38)***
low63					–0.922 (–6.42)***	–0.878 (–6.14)***
low64					–1.885 (–9.73)***	–1.899 (–9.80)***
top64					–0.546 (–2.26)*	–0.383 (–1.61)
top65					–1.509 (–11.52)***	–1.415 (–11.07)***
WORKING STATUS, SECTOR OF ACTIVITY AND OTHER LABOUR HISTORY RELATED VARIABLES						
l_{t-1}	–1.577 (–39.51)***	–1.577 (–39.52)***	–1.551 (–38.65)***	–1.556 (–38.77)***	–1.575 (–39.05)***	–1.577 (–39.10)***
u_{t-1}	0.942 (25.21)***	0.934 (24.98)***	0.965 (25.72)***	0.952 (25.33)***	0.954 (25.31)***	0.947 (25.09)***
numrel	–0.022 (–11.82)***	–0.022 (–11.74)***	–0.021 (–11.11)***	–0.021 (–11.06)***	–0.023 (–11.74)***	–0.023 (–11.66)***
t x numrel	0.004 (9.03)***	0.004 (8.97)***	0.004 (8.68)***	0.004 (8.65)***	0.004 (9.10)***	0.004 (9.04)***
meanlenght	0.002 (0.75)	0.002 (0.73)	0.003 (0.96)	0.003 (1.01)	0.005 (1.57)	0.005 (1.58)
t x meanlenght	0.003 (3.85)***	0.003 (3.92)***	0.003 (3.43)***	0.003 (3.40)***	0.002 (2.56)*	0.002 (2.61)**
serv	–0.003 (–0.07)	–0.001 (–0.02)	0.020 (0.50)	0.022 (0.54)	0.023 (0.58)	0.024 (0.60)
t x serv	–0.020 (–1.67)	–0.022 (–1.81)*	–0.024 (–2.01)*	–0.026 (–2.13)*	–0.027 (–2.22)*	–0.028 (–2.30)*

(continues)

Table 7 (continued)

Logit Estimates of the Effects of Pension Incentives on Retirement Behaviour between 60 and 65 Years of Age. Males Born between 1936 and 1946, Having Worked in the General Regime with a Relation with the Social Security in 2006*

	MODEL A		MODEL B		MODEL C	
	ACCRUAL	PEAK VALUE	ACCRUAL	PEAK VALUE	ACCRUAL	PEAK VALUE
	LR chi2(45)=38014.62	LR chi2(49)=38187.03	LR chi2(56)=38597.09	LR chi2(45)=38030.83	LR chi2(49)=38213.54	LR chi2(56)=38607.93
	Pseudo R2=0.365	Pseudo R2=0.367	Pseudo R2=0.371	Pseudo R2=0.365	Pseudo R2=0.367	Pseudo R2=0.371
	Log likelihood = –33064.09	Log likelihood = –32977.89	Log likelihood = –32772.86	Log likelihood = –33055.97	Log likelihood = –32964.63	Log likelihood = –32767.44
	115.532 number of observations					
PERSONAL CHARACTERISTICS & OTHERS						
univ	**–0.729** (–10.46)***	**–0.751** (–10.82)***	**–0.706** (–10.10)***	**–0.716** (–10.28)***	**–0.779** (–10.95)***	**–0.794** (–11.18)***
t x univ	**–0.078** (–4.02)***	**–0.068** (–3.57)***	**–0.086** (–4.39)***	**–0.079** (–4.15)***	**–0.038** (–1.89)	**–0.029** (–1.49)
disab	**–1.578** (–8.28)***	**–1.586** (–8.34)***	**–1.468** (–7.64)***	**–1.485** (–7.74)***	**–1.484** (–7.70)***	**–1.498** (–7.78)***
otherben	**–2.981** (–17.55)***	**–2.970** (–17.54)***	**–2.978** (–17.39)***	**–2.972** (–17.41)***	**–3.016** (–17.54)***	**–3.015** (–17.55)***
age61	**–0.015** (–0.06)	**–0.037** (–0.15)	**–0.069** (-0.29)	**–0.095** (-0.40)	**0.098** (0.40)	**0.069** (0.28)
age62	**–1.047** (–3.70)***	**–1.076** (–3.80)***	**–1.055** (–3.70)***	**–1.087** (3.81)***	**–0.767** (–2.48)*	**–0.791** (–2.56)*
age63	**–0.710** (–2.50)*	**–0.739** (–2.59)**	**–0.725** (–2.54)*	**–0.759** (–2.65)**	**–0.098** (–0.32)	**–0.134** (–0.44)
age64	**–0.712** (–2.46)*	**–0.759** (–2.63)**	**–0.686** (–2.36)*	**–0.739** (–2.55)*	**0.247** (0.78)	**0.213** (0.67)
age65	**2.813** (10.94)***	**2.788** (10.84)***	**2.865** (11.09)***	**2.834** (10.96)***	**3.271** (12.34)***	**3.272** (12.33)***
cycle	**0.241** (16.89)***	**0.246** (17.18)***	**0.111** (5.94)***	**0.119** (6.42)***	**0.125** (6.69)***	**0.131** (7.03)***
DURATION VARIABLES						
g1	**–0.514** (–1.96)	**–0.540** (–2.06)*	**–0.591** (–2.24)*	**–0.615** (–2.33)*	**–0.331** (–1.23)	**–0.370** (–1.37)
g2	**–1.703** (–6.76)***	**–1.733** (–6.88)***	**–1.697** (–6.74)***	**–1.723** (–64.85)***	**–1.539** (–6.02)***	**–1.572** (–6.15)***
g3	**–0.522** (–2.06)*	**–0.557** (–2.20)*	**–0.538** (–2.11)*	**–0.567** (–2.22)*	**–0.442** (–1.64)	**–0.483** (–1.79)
g4	**–0.858** (–3.52)***	**–0.904** (–3.72)***	**–0.856** (–3.50)***	**–0.891** (–3.65)***	**–1.094** (–4.32)***	**–1.128** (–4.45)***
g5	**0.054** (0.22)	**0.027** (0.11)	**0.028** (0.12)	**0.016** (0.07)	**–0.494** (–1.95)	**–0.519** (–2.05)*
cons	**–2.328** (–3.82)***	**–2.264** (–3.71)***	**–1.422** (–2.30)*	**–1.306** (–2.12)*	**–1.731** (–2.76)**	**–1.635** (–2,46)**

* Notes:
Dependent variable is 1 if person retires and 0 otherwise, conditioned on not having retired before. Monetary values are in thousands of euros, prices 2006. Z-values are in parenthesis.
Statistical significance: * p<0.05; ** p<0.01; *** p<0.001.
Coefficients of Autonomous Communities not resported. Prob > chi2=0.
Model A represents the basic model. Model B includes Model A and changes in 2002 regulation as control variables. Model C includes Model B and income levels as control variables.

Table 8

Quantitative Effects of Pension Incentives and Other Variables on the Average hazard Rate by Age

	ACCRUAL							PEAK VALUE						
	All ages	**Age 60**	**Age 61**	**Age 62**	**Age 63**	**Age 64**	**Age 65**	**All ages**	**Age 60**	**Age 61**	**Age 62**	**Age 63**	**Age 64**	**Age 65**
Economic Incentives and Regulation														
SSW_t	0.00604	0.00717	0.00377	0.00462	0.00515	0.00878	0.00910	0.00604	0.00716	0.00377	0.00462	0.00514	0.00875	0.00912
	0.0029	*0.0043*	*0.0013*	*0.0019*	*0.0022*	*0.0064*	*0.0089*	*0.0029*	*0.0043*	*0.0013*	*0.0019*	*0.0023*	*0.0064*	*0.0089*
SSA_t	–0.00075	–0.00115	–0.00048	–0.00046	–0.00041	–0.00071	–0.00147							
	–0.0003	*–0.0006*	*–0.0002*	*–0.0002*	*–0.0002*	*–0.0003*	*–0.0011*							
PV_t								–0.00072	–0.00145	–0.00052	–0.00045	–0.00031	–0.00038	–0.00080
								–0.0003	*–0.0007*	*–0.0002*	*–0.0002*	*–0.0001*	*–0.0002*	*–0.0006*
RR_t	0.00026	0.00027	0.00014	0.00018	0.00022	0.00043	0.00055	0.00024	0.00025	0.00013	0.00017	0.00020	0.00039	0.00052
	0.0001	*0.0001*	*0.0000*	*0.0001*	*0.0001*	*0.0003*	*0.0005*	*0.0001*	*0.0001*	*0.0000*	*0.0001*	*0.0001*	*0.0002*	*0.0005*
Individual Characteristics														
numrel	–0.00078	–0.00186	–0.00069	–0.00057	–0.00036	–0.00019	0.00028	–0.00077	–0.00184	–0.00068	–0.00057	–0.00036	–0.00019	0.00027
	–0.0002	*–0.0009*	*–0.0002*	*–0.0002*	*–0.0001*	*–0.0001*	*0.0002*	*–0.0002*	*–0.0008*	*–0.0002*	*–0.0002*	*–0.0001*	*–0.0001*	*0.0002*
l_{t-1}	–0.13012	–0.17677	–0.07608	–0.09285	–0.10215	–0.19861	–0.15740	–0.13028	–0.17694	–0.07612	–0.09294	–0.10232	–0.19897	–0.15764
	–0.1160	*–0.1831*	*–0.0699*	*–0.0870*	*–0.0969*	*–0.2147*	*–0.1470*	*–0.1162*	*–0.1836*	*–0.0697*	*–0.0870*	*–0.0971*	*–0.2151*	*–0.1476*
u_{t-1}	0.07919	0.10601	0.04691	0.05679	0.06200	0.11593	0.10557	0.07862	0.10523	0.04654	0.05634	0.06152	0.11515	0.10498
	0.0594	*0.0885*	*0.0310*	*0.0392*	*0.0440*	*0.1076*	*0.1097*	*0.0589*	*0.0880*	*0.0304*	*0.0388*	*0.0438*	*0.1070*	*0.1092*
uni	–0.05719	–0.07249	–0.03245	–0.03880	–0.04222	–0.07833	–0.10884	–0.05799	–0.07355	–0.03281	–0.03922	–0.04265	–0.07925	–0.11126
	–0.0281	*–0.0390*	*–0.0126*	*–0.0164*	*–0.0187*	*–0.0516*	*–0.1128*	*–0.0285*	*–0.0398*	*–0.0127*	*–0.0166*	*–0.0190*	*–0.0526*	*–0.1173*
serv	–0.00182	–0.00233	–0.00113	–0.00132	–0.00142	–0.00247	–0.00284	–0.00181	–0.00232	–0.00112	–0.00131	–0.00142	–0.00246	–0.00283
	–0.0010	*–0.0014*	*–0.0005*	*–0.0006*	*–0.0007*	*–0.0018*	*–0.0030*	*–0.0010*	*–0.0014*	*–0.0005*	*–0.0006*	*–0.0007*	*–0.0018*	*–0.0030*
disab	–0.09491	–0.11417	–0.04653	–0.05607	–0.06077	–0.12213	–0.26254	–0.09540	–0.11485	–0.04667	–0.05618	–0.06087	–0.12247	–0.26505
	–0.0379	*–0.0526*	*–0.0166*	*–0.0212*	*–0.0240*	*–0.0666*	*–0.3103*	*–0.0379*	*–0.0532*	*–0.0165*	*–0.0213*	*–0.0242*	*–0.0673*	*–0.3141*
otherben	–0.14350	–0.15770	–0.06152	–0.07475	–0.08122	–0.17335	–0.52006	–0.14352	–0.15826	–0.06153	–0.07457	–0.08095	–0.17288	–0.52009
	–0.0542	*–0.0686*	*–0.0224*	*–0.0290*	*–0.0324*	*–0.0886*	*–0.5875*	*–0.0546*	*–0.0696*	*–0.0225*	*–0.0289*	*–0.0324*	*–0.0886*	*–0.5882*

Notes:
Quantitative effects of continuous variables are computed as the discrete differences of the logistic function evaluated at a 10 per cent increase in the variables' values with respect to the logistic function evaluated at the observed variables' values. Results are obtained under Model A in Table A 2. Median values are in italics. The effects are estimated for the period beginning in 2002.

Table 9

Quantitative Effects of Pension Incentives and Other Variables on the Average hazard Rate for Ages between 60 and 65

	MODEL B				MODEL C			
	ACCRUAL		PEAK VALUE		ACCRUAL		PEAK VALUE	
	mean	*median*	mean	*median*	mean	*median*	mean	*median*
Economic Incentives and Regulation								
SSW_t	0.00718	*0.0034*	0.00717	*0.0034*	0.00725	*0.0033*	0.00715	*0.0033*
SSA_t	–0.00038	*–0.0002*			–0.00060	*–0.0002*		
PV_t			–0.00038	*–0.0001*			–0.00035	*–0.0001*
RR_t	0.00082	*0.0003*	0.00086	*0.0004*	0.00036	*0.0001*	0.00061	*0.0003*
***r2002* overall change**	–0.02257	*–0.0097*	–0.02225	*–0.0100*	–0.01929	*–0.0086*	–0.01953	*–0.0087*
***r2002* change**								
low60					0.01627	*0.0088*	0.01781	*0.0097*
low61					–0.00268	*–0.0014*	–0.00005	*–0.0000*
low62					–0.04063	*–0.0189*	–0.03861	*–0.0181*
low63					–0.05966	*–0.0262*	–0.05739	*–0.0255*
low64					–0.10067	*–0.0382*	–0.10122	*–0.0385*
top64					–0.03790	*–0.0178*	–0.02744	*–0.0132*
top65					–0.08607	*–0.0345*	–0.08238	*–0.0337*
Individual Characteristics								
numrel	–0.00067	*–0.0001*	–0.00066	*–0.0001*	–0.00071	*–0.0002*	–0.00071	*–0.0001*
l_{t-1}	–0.12357	*–0.1088*	–0.12392	*–0.1088*	–0.12525	*–0.1094*	–0.12556	*–0.1097*
u_{t-1}	0.07886	*0.0588*	0.07767	*0.0577*	0.07751	*0.0566*	0.07698	*0.0561*
uni	–0.05481	*–0.0264*	–0.05498	*–0.0265*	–0.05596	*–0.0268*	–0.05638	*–0.0271*
serv	–0.00035	*–0.0002*	–0.00032	*–0.0002*	–0.00030	*–0.0002*	–0.00032	*–0.0002*
disab	–0.08750	*–0.0345*	–0.08822	*–0.0347*	–0.08763	*–0.0345*	–0.08829	*–0.0348*
otherben	–0.13931	*–0.0509*	–0.13919	*–0.0512*	–0.13911	*–0.0507*	–0.13920	*–0.0509*

Notes:
Quantitative effects of the continuous variables are computed as the discrete differences of the logistic function evaluated at a 10 per cent increase in the variables' values with respect to the logistic function evaluated at the observed variables' values. Results are obtained under Models B and C in Table A2. The effects are estimated for the period beginning in 2002.

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ASSESSING THE SHORT-TERM IMPACT OF PENSION REFORMS ON OLDER WORKERS' PARTICIPATION RATES IN THE EU: A DIFF-IN-DIFF APPROACH

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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. 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. These improvements reflect long-term changes in the socio-economic behaviour such as a different attitude toward female employment and participation, improved health and working conditions which induce to retire at older ages. Yet, 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. 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 across countries and time of their occurrence can be used to conduct a "policy experiment" of the effects of pension reforms on the participation rates of people aged between 50 and 64 years. 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 change has occurred. To control for other determinants not related to specific policy interventions, the findings of before-after comparison are compared with 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] Thus, we analyse the impact of pension reforms on participation rates of different age/sex groups of elderly workers by contrasting changes in participation rates in reforming vs non-refroming countries.

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 the average life

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[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.

expectancy stood at around 75 years to reach 80 in 2006; for few new Member States it hovered around the EU average of 26 years earlier (Table 4).

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 (Figure 1) 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 such as. the participation rates of Belgian and Italian men aged 50-54, rapidly converging to the highest rates. Despite country specific labour force histories, the broad trend of a shrinking labour supply of male aged 50+ remains. Thus, even though men live longer than before, they leave the labour market earlier.

Conversely, women, especially those aged less then 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).

Figure 2 displays the age profile of the exit rate from the labour market for selected countries for the mid-80s, the early 1990s and the first half of 2000s. This rate is calculated as the conditional probability of an age cohort of not staying in the labour market at age h.[2] Spikes can be observed at about the statutory retirement age for all countries and, for some, at the age of early retirement. There is also a clear difference in the exit rates by sex which reflects different statutory retirement ages of men and women. Finally, there are recently 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, (e.g., temporary access to disability and unemployment benefits before being granted retirement benefits, Van Ours, 2006 for the Netherlands). Early- or pre-retirement programmes were commonly used in the ‘70s and ‘80s to deal with industrial restructuring (Brugiavini, 2001), high unemployment of older workers, low employment of young workers, or as a labour cost saving strategies. 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.

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[2] In symbols if $PR(h,t)$ is the participation rate at time t of cohort h, the exit rate is defined as $1\text{-}PR(h,t)/PR(h\text{–}1,t\text{–}1)$.

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 dropped. As the income effect from higher real earnings prevails on the substitution effect, higher real incomes allows more hours for leisure, higher consumption and savings despite falling working time. Thus, the increase in real wages has been the main determinant of the long-term decline in the retirement age in industrialised countries (Bloom, Canning and Moore, 2007).

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. 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, Ljiungqvist (2007) shows that the non-employment effect of taxation do not differ in complete and incomplete markets, with the tax and benefit system affecting non-employment of low and high skilled respectively in complete and incomplete markets.[3] 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. 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). 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.

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 initial level of consumption. In addition, 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

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[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.

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 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, social security benefits imply 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 system such as changes in the coverage rate, in the accrual of retirement wealth attributable to continued work, more than the level of retirement wealth at a given point in time, are found to influence the average retirement age (Samwick, 1998).

According to the simulations of Gruber and Wise (2002), a reform that delays benefit eligibility by three years would likely reduce the proportion of men aged between 56 to 65 out of the labour force between 23 to 36 per cent.

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 per cent 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.

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 1993-97 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

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

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 period[5]

Reaching low levels of 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 (European Commission-EPC 2009 Aging report). The 2001 Stockholm European Council stressed the importance of reforms encouraging higher employment and participation rates, especially among women and the elderly; it emphasised that pension reforms are needed to ensure both the long-term financial sustainability and a certain degree of intergenerational fairness.

In response to pressures stemming from ageing populations and persisting low participation rates, all countries of the EU have reformed their pension systems. These reforms comprise a number of different measures (Table 6 and Table 7) that were meant to keep 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.

A widely accepted distinction is between parametric and systemic reforms. Parametric are those reforms which involve adjustments to the parameters of defined benefit (DB) and pay-as-you-go (PAYG) public pension systems, without changing their financing mechanisms. Systemic reforms move away from the PAYG DB- system and adopt a DC-type personalised accounts system - thus linking more strictly pension contributions to pension benefits.[6]

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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 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

(continues)

The majority of pension reforms adopted in last ten years were parametric, mainly strengthening the links between contributions and benefits (notably by extending the period over which earnings are taken into account for benefits' calculation) and stricter conditions for eligibility to first pillar defined-benefit pension schemes (notably through higher retirement ages). For example, the reference contribution period and wages used for the calculation of old-age pensions were extended in Finland in 2003; the annual pension accrual rates were also modified to discourage early exits from the labour market and to financially reward long working careers; it was also decided that starting from 2009 pensions would begin to reflect changes in average life expectancy.[7] In Finland and Sweden, greater flexibility was given to older workers to decide their retirement age (abolition of the general retirement age at 65). In Austria, the 2003 pension reform raised the retirement age to 65 for men (60 for women) starting from 2017, extended the assessment period for pension calculation gradually from 15 to 40 years and gradually reduced the accrual rate.[8] Finally, the reform of the public old age pension scheme introduced in Portugal in 2000 increased to 40 years the contribution period for a full pension for the private sector.[9] 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.

Almost all countries increased the statutory retirement age, the majority opting for a smooth transition towards higher retirement ages (Table 8). The age of eligibility to a state pension was progressively increased from 65 to 67 in Denmark, Sweden and Germany, in the latter with a very long phasing-in period. 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 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, 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.

Pension reforms involved a systemic change in the financing of the insurance system in few cases only, notably leading to the conversion of pre-existing DB first pillars into notional defined contribution (NDC) public pension schemes (e.g., PL, SE),[10] or to the introduction of statutory

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 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.

[7] Germany, Finland and France introduced part-time work 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 the employees agreeing to switch from full-time to part-time work.

[8] 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.

[9] In 2005, it was extended to employees in the public sector. The benefit formula was again significantly changed in 2007.

[10] In Poland, pre-existing defined-benefit PAYG pension scheme was replaced in 1999 by 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. 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. Similar reforms were passed also in Sweden (1999), Latvia (1996) and Italy (1993, with very long implementation schedule).

funded pension schemes (e.g., HU, EE, LV, SK). Some countries (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.

Systemic reforms were also introduced in countries that established state-supported second and third-pillar voluntary funded pension schemes, supplementing a gradual reduction of first-pillar pension levels (Germany in 2000) or promoted third pillar pension funds based on employees' own savings (France in 2003). Several countries encouraged supplementary pension schemes either through tax incentives or adjusting contribution rates 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.

The changes introduced In several countries were rather incremental building upon previous reforms 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 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), the major reforms in the new Member States were legislated in the 1990s (for instance, Poland, Estonia, Latvia, Lithuania and Slovenia). In some EU10 countries, recent reforms 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 early retirement scheme was abolished in 1995 and re-introduced in 2004 for the long-term unemployed, the Czech Republic, where a new early-retirement programme 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.

To take better account of future demographic changes, a significant number of countries introduced a demographic adjustment 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 (e.g., with the reforms of 2003 and 2004 in France and Germany. Similar provisions have been introduced in DK, FR, AT, FI, LV, LT and, more recently, in PT (2007).

5.1 Discouraging early retirement...

Early retirement benefits, which vary by country and usually by professional group depending on the nature of work, is the main reason for early exits from the labour market. They are often used as an instrument of employment policy, to artificially lower the unemployment rate of the elderly.

Reducing the generosity of early retirement pensions was a key component of all pension reform. To discourage early exits from the labour force, Member States have abolished early retirement schemes, substantially reduced their generosity and introduced bonuses in case of postponement of retirement for those extending their working lives (Table 8).

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.[11] A comprehensive reform of the pre-retirement pension system was approved in France in 2003.[12] 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. The early retirement pension for older long-term unemployed will be abolished in 2009.[13] Some early retirement schemes were suspended and abrogated in Portugal in 2005[14] 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 tightened the access to schemes open to unemployed. In Latvia, the possibility to early retire was abolished in 2008. The early retirement age was gradually raised in Austria in 2003, and the possibilities for early retirement will be phased out by 2017. In Germany (2004), the minimum entry age for early retirement on account of 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), early retired people were allowed to return to work while the tax advantages for early retirement were abolished in the Netherlands.

Working beyond the official retirement age was supported in many countries for instance with higher accrual factors – e.g., CZ, EE, LU, DE, EL, HU, PT, SI – or with 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 workers.[15] 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.

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

The OECD has conducted an extensive research on the impact of policies and institutions on employment and unemployment in the OECD countries.[16] This work showed that high implicit taxes on continued work deter older workers from remaining in the labour market, while high

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

[12] 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.

[13] 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.

[14] 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.

[15] 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.

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

statutory retirement ages have the opposite effect.[17] The characteristics of the old age-age public pension systems (e.g., standard retirement age, accrual rates) and other forms of income support (early retirement schemes) are found as the main determinants of the differences in the 55-64 participation rates across countries and over time (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.[18] 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 parametric reforms that entail a change in the eligibility conditions (e.g., statutory retirement age, years of contributions). These reforms are usually gradually phased in and imply long implementation lags. Second, 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 implying phasing-out of early retirement schemes.

Figure 3 displays the cumulated number of fundamental, non-fundamental pension and early retirement reforms for the period 1990-2006. Three things emerge. First, an increasing number of countries introduced reforms that changed the philosophy of the 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 rare in the 1990s became more frequent in the early 2000s.

This rich variation in policies across countries and over time can be exploited to assess their effect on the older workers' participation rates. Each measure is considered a discrete event which 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 occurred. To control for 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. Consistently with the common belief

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[17] 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.

[18] *LABREF* provides information on reforms enacted in various years by the 27 Member States. It 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).

(Lindbeck and Persson), we assume that the main motivation for governments to undertake a pension reform is to achieve financial sustainability of social security rather than to offset trends in participation rates and in the retirement age.

Our sample covers 27 countries over the period 1990-2006.[19] 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 passed in two consecutive years we treat them as a single event; the average participation rate is taken as 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 also as one event. 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 difference between the participation rates of the two groups should differ from zero.

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. The change in the participation is modelled as follows: $\Delta PR_{i,t} = \alpha I_{i,t} + v_{i,t}$; I_{it} equals 1 if country i enacts a reform in period t and zero otherwise. A similar expression holds for a country j with $j \neq i$. 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:

$$\frac{\sum_{t}^{T}\sum_{i}^{I}\Delta PR_{i,t}}{IT} - \frac{\sum_{s}^{S}\sum_{j}^{J}\Delta PR_{j,s}}{JS} = \alpha$$

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.[20]

For each target group, the first two columns of Table 1 to Table 3 report the average change in the participation rate over reforms and non-reforms years; the statistical significance of their difference appears in column 3.[21] Table 1 suggests that compared to the non-reform years the participation rate of the 50-54 and 60-64 age groups rise significantly in the years near to the reform year. Conversely, no significant change is detected for the participation of those belonging to the 55-59 age group. While fundamental reforms do not have significant effect on the participation rates in the years just following the enactment of the reform, probably because of the gradual phasing-in (Table 2), parametric reforms entail a change in the participation rate of those with age between 55 and 59.

Figure 4 shows the time pattern of the participation rate around the reform event for the three reforms' types and the three age groups. 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 two consecutive periods of reform as a one reform year. The same rule

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

[20] 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.

[21] 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.

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 in these years.

The figure plots the average change in the participation rate compared with the year in which the reform occurred. Hence, each point represents the cumulated change up to and since the enactment of the reform. A successful reform implies a change in the slope in the years that follow. Before the pension reform, all groups have participation rates lower than or as big as the rate observed in the year when it is enacted. Then the participation rate increases, and after 3 years it is on average 5 percentage points higher than at the year of enactment.

Figure 4 shows the cumulated change of the participation rates before and after the enactment of early retirement, fundamental and non-fundamental reforms.[22] The following points are noticeable:

- the increase in the participation rate is mainly due to the female component, with increases dominated by a long-term trend,
- after early retirement reforms, the participation rate of women aged 55-59 slightly accelerates, while the profile of the men rate is more muted,
- the change in the participation rates of the oldest group barely differ by gender,
- the 50-59 male participation rate changes after early retirement reforms,
- non-fundamental reforms modifies the 55-59 participation rate,
- the profile of participation rates does not change when fundamental reforms are enacted, which is consistent with these reforms being usually gradually phased in,
- the profile of female participation rate does not change in response to any type of reform. Yet, we don't consider this an evidence of their ineffectiveness as female participation is dominated by a long-term trend unrelated to reforms of social security.

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, tightening the access 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, those out of the labour force may be induced to starts 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. 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.

Before proceeding with the analysis an important caveat is needed. 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

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[22] 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.

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 contrast, those aged between 50 and 54 are more likely to revise their inter-temporal consumption/leisure allocation. In general, when a reform is announced, agents may respond with "imperfect" foresight when two dimensions of uncertainty, namely the timing and the measures adopted to reform the system, prevail (Butler, 1999). 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).[23] 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.

6.1 Econometric methodology

To capture the effect of reforms we estimate a reduced form regression for the participation rate:

$$\begin{aligned} PR_{it} = {} & \alpha_i + \mu_t + \theta_1 trend_{it} + \theta_2 trend_{it} \cdot SEX_i + \\ & \beta_1 FUN_{it} + \gamma_1 NONFUN_{it} + \delta_1 ER_{it} + \\ & \beta_2 FUN_{it} \cdot SEX_i + \gamma_2 NONFUN_{it} \cdot SEX_i + \delta_2 ER_{it} \cdot SEX_i + \varepsilon_{it} \end{aligned}$$

where PR_{it} is the participation rate for different age groups in country i at time t; α_i and μ_t are fixed effects for countries and years respectively, SEX_i is a dummy equal to 1 for women and 0 for men; ER_{it}, FUN_{it} and $NONFUN_{it}$ 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 of one of the three types and those that didn't. In practice we compare 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 controlling for other (non-reforms factors) that may influence participation. The unemployment rate u_{st} captures the cyclical components of unemployment while long-term changes are represented by country/gender specific trends.[24]

The reference group in the equation is men. Thus α_i represents the average (over time) activity rate of male in country i. 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 differs across age groups and gender. 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).

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[23] 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.

[24] We tried specifications with different combinations of common and country specific trends. In light of the strong institutional characteristics of European labour markets we preferred to include country and gender/ specific trends Results are available from the authors.

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)[25] across groups. We estimate the equation controlling for fixed effects and for fixed and time dummies.[26]

6.2 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 only on the short-term impact of pension reforms, while in many countries these reforms are phased in only gradually.

The results highlight a different response of the participation rate across gender, age and country groupings (Table 9). Columns 1 and 2 show, respectively for the EU27 and the EMU, the estimates of the effects of pension reforms pooling data over the age dimension. The results for the full sample show an increase in the EU27 participation rate following a fundamental reform, though the coefficients are not statistically significant. Similar results are obtained for the male rate when estimates are limited to EMU countries; conversely, the effect on women is negatively signed, though statistically insignificant. In the case of non-fundamental reforms we have similar results for the EU27, *i.e.*, positive but insignificant. In contrast, the estimates for the EMU countries suggest that non-fundamental reforms increase the overall male rate, while the effect on female participation is ambiguous. Finally, reforms tightening the access to early retirement increase female participation, more in the EMU than in the non-EMU countries. Conversely, their effect on male participation is in EMU and non-EMU countries negative or insignificant.

Columns 3 to 7 display the outcome for three age groups. For early retirement reforms, we find a consistent pattern across different age groups of women. Reforms tightening the generosity

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[25] 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).

[26] 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.

of the early retirement schemes tend to increase the female participation rates, with statistically significant coefficients, especially for the ages close to the statutory retirement (55-59).[27] By contrast, the participation rate of men aged 50 to 59 is negatively affected by these reforms. Only in the case of men belonging to the 60-64 age bracket of the EMU sample, participation increases after early retirement reforms. In case of reforms that change the main financing characteristics of the pension system (fundamental reforms), we found a short-term negative impact on female participation rates in particular for the 55-59 and 60-64 age groups. In the case of men, the estimates suggest a positive response, in particular for those belonging to the 55-59 bracket. Those reforms that we have dubbed as non-fundamentals appear to be effective in raising the participation rate of men both in the EMU and non-EMU, though the coefficients are significant only for the EMU sample. On the contrary, women participation seems to fall in the short-term. However, the uncertainty associated to these results is higher probably due to "non-fundamental reforms" category being a residual gathering a range of diverse measures. Thus, the implicit assumption that these different measures have the same impact on the participation rate might not be valid. Finally, the impact of the early retirement reforms on women is in absolute terms always the largest. While for men, fundamental reforms seem to have the largest effect on the participation rate for the central age bracket.

One problem with these estimates is that shocks to the participation rate might also hit the variable used to capture its cyclical component, *i.e.*, the unemployment rate, implying that the coefficients measuring its impact on participation are biased downward – as the correlation between the shock and the unemployment rate is negative – and inconsistent. To correct for this endogeneity, the equation has been re-estimated with instrumental variables using the own lagged values of the unemployment rate as instruments (Table 10 and 11). As expected, the IV estimates of the coefficients of the unemployment rate are lower than the OLS estimates. Different specifications across countries and age groups suggest that the participation rate is broadly more sensitive to the unemployment in non-EMU countries. One exception is the participation rate of the group 50-54, which has a response to the difficulty of finding a job due to the cyclical conditions as big as in the rest of the EU.

Turning to the role of reforms, the IV estimation suggests for both the EU27 and the EMU sample, a statistically significant and positive effect of fundamental reforms on the overall male and female participation rates (col. 1). When the focus is on specific age groups the effect on the male and female participation rates are respectively positive and negative. For the EU27 sample, non-fundamental reforms have usually a positive effect on participation rate, which is, however, precisely estimated only in the case of women. Conversely, for the EMU countries non-fundamental reforms increase the male participation rate but decrease that of women of age between 55 and 59. Finally, reforms of early retirement reduce the participation rate of men, especially those aged between 50 and 54, but increase sizeably that of women.

To account for persistent trends in participation rates unrelated to pension reforms, we include gender and country specific time trends in equation (1). Adding trends usually turns out in a lower impact of reforms, implying that in the specification without trend the impact of reforms is biased upward, as part of these trends get caught in the reform dummies. Moreover, the fact the standard error of the coefficients measuring the impact of reforms remained unchanged suggests that the introduction of specific trends does not introduce multicollinearity that reduces the precision of the estimates.

Thus, when we control for gender and country specific trends, we find that:

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[27] The impact is larger in the EMU sample.

- fundamental reforms increase the participation rate of older men, respectively in the EU and the EMU sample, by about 2/3 of and ½ percentage point within 2 years. For both samples, the response of the male participation rate to fundamental reforms conditioned to age is hump-shaped: low for the youngest and the oldest of the older workers age group and high for those with age at about the average retirement age; participation rates of men aged between 55 and 59 raise by about 2 pp. Conversely, female participation declines in the short-term, more in EMU than in non-EMU countries, offsetting the overall effect of fundamental reforms;
- for the EU sample, non-fundamental increase the overall female participation rate (+0.7 pp in the year of reform), especially of women aged between 50 and 54, while the male rates remain mainly unaffected. The opposite is found when the estimates are restricted to the EU subsample. In this case, the male rate increase – again the 50-54 age group being the more reactive – while the female components remain mainly unchanged with the exception of women of age between 55 and 59 whose participation rate drops by more than 2.5 pp;
- early retirement reforms have a positive effect on the female participation rate, especially for the 55-59 age group of the EMU sample. Conversely, in respectively the EU and the EMU samples, the male participation rate drops or remains mainly unchanged.

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 diff-in-diff 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 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. As long as the pension reform reduces the expected lifetime income, it creates an incentive for those that have accumulated enough financial wealth to retire earlier. Thus, the optimal retirement age is defined as the upper threshold such that is never optimal to retire after that age as lifetime income is downward sloping (Heijdra and Romp, 2007). 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. These findings suggest the risk of a run on pension funds well before the changes take effect. This has been indeed the case following the announcements of restrictions of early retirement in some EU Member States, according to the 2009 Commission working document "Joint Report on Social Protection and Social inclusion".

Conversely, women have more career interruptions than men, especially because of maternity leave and family reasons, and the number of years spent working at the age of retirement is smaller than men. This difference may explain why the female participation rate raises in response to 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. 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.

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 female participation rate, especially of EMU countries.

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 five 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. Finally, in the estimate we do not take into account that for the retirement decision what matters is not the individual income but the family income. There is evidence for the US of a differential response to policy changes of men from one earner vs two earner households (Gustman and Steinmeier, 2008). Extending the analysis to the participation rates of married men and women might provide some hindsight on the different, and sometime puzzling, response of the male and female participation rates to pension that found in our estimates.

TABLES AND FIGURES

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 per cent of confidence when the value of the *z*-test is above 2.

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 per cent of confidence when the value of the *z*-test is above 2.

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 per cent of confidence when the value of the *z*-test is above 2.

Table 4

Life Expectancy at Birth

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

Year	France	Italy	Cyprus	Latvia	Lithuania	Luxembourg	Hungary	Malta	Netherlands
1980	:	75.6	:	:	70.5	74.7 [4]	69.1	70.4	76.5 [6]
1990	77	77.2	:	:	71.5	75.7	69.4	77 [5]	77.1
2006	81	81 [5]	80.6	70.9	71.1	79.4	73.5	79.5	80

Year	Austria	Poland	Portugal	Romania	Slovenia	Slovakia	Finland	Sweden	UK
1980	72.7	:	71.5	69.2	:	70.4	74.5 [7]	75.8	:
1990	75.8	:	74.1	69.9	73.9	71.1	75.1	77.6	:
2006	80.1	75.3	78.9	72.6	78.3	74.4	79.6	81	:

[1] 1986; [2] 1989; [3] 1985; [4] 1986 ; [5] 1994 ; [6] 1985, [7] 1985.
Source: Eurostat.

Table 5

Average Exit Age

Country	1984-90	1991-99	2000-06
Belgium	58.5	59.6	60.2
Denmark	65.6	64.6	65.8
Germany[1]	61.5	60.8	62.7
Greece	62.7	63.4	63.2
Spain	63.2	62.3	63.3
France	59.6	59.3	59.8
Ireland	63.9	64.7	66.3
Italy	60.7	59.8	61.1
Luxembourg	62.3	58.9	60.8
Netherlands	60.3	60.7	63.2
Austria [2]		58.3	61.4
Portugal	65.1	66.2	64.5
Finland [2]		62.5	62.9
Sweden [2]		65.4	65.7
United Kingdom		62.3	64.3
Cyprus			67.9
Czech Republic [3]		59.4	61.2
Estonia [3]		65.8	67.6
Hungary [4]		58.1	61.1
Lithuania [5]		65.2	63.8
Latvia [5]		61.4	67.1
Malta			60.1
Poland [3]		59.6	58.7
Slovakia [5]		57.4	59.1
Slovenia [4]		61.1	62.7
Bulgaria			63.5
Romania [6]		61.5	62.5

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

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: LABREF; FRDB Database.

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)
Belgium				x		x
Denmark	x			x		x
Germany	x			x	x	x
Greece						x
Spain				x	x	x
France	x			x	x	
Ireland				x		
Italy		x		x	x	x
Luxembourg						
Netherlands						x
Austria	x			x		x
Portugal	x			x	x	
Finland	x			x		
Sweden	x	x	x	x		
United Kingdom	x			x		x
Bulgaria	x					x
Cyprus	x					
Czech Republic	x			x		x
Estonia			x			
Hungary	x		x	x		x
Lithuania	x		x			
Latvia		x	x	x		
Malta						x
Poland		x	x	x		
Romania	x					x
Slovenia	x					
Slovakia	x		x	x		x

Source: LABREF; FRDB Database.

Table 8

Current and Proposed Retirement Policies by Country

Country	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	Social Pension: 65 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 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* 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.
GR	*Persons insured before 1.1.1993* : Men: 65 Women: 60 *Persons insured since 1.1.1993* : Men: 65 Women: 65			*Persons insured before 1.1.1993* : Full pension: 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) Reduced pension: 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) *Persons insured since 1.1.1993* : Full pension: 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 Reduced pension: From between 55 and 60 years (men and women) if 35-15 insurance years or 10,500-4,500 days insured

* 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.

Table 8 (continued)

Current and Proposed Retirement Policies by Country

Country	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 *(ARRCO)* and management staff *(AGIRC)* : 65, with possibility to obtain the pension at the age of 60 if the basic pension was accorded at a full rate			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 *(ARRCO)* and management staff *(AGIRC)*
IE	State Pension (Transition): 65 years State Pension (Contributory): 66 years			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 *(pre-pensionamento)* 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			
AT	Men: 65 Women: 60	Progressive increase of retirement age to 65 for women Elimination of early retirement by 2017	Between 2024 and 2033	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 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

Table 8 (continued)

Current and Proposed Retirement Policies by Country

Country	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	Women: 65	2010 to 2020	No early State Pension
BG	*First Pillar:* 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 *Second Pillar:* 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 f5 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

Table 8 (continued)

Current and Proposed Retirement Policies by Country

Country	Standard Retirement Age			Earliest Age to Access Old-age Pension
	Current	New Established by Reform and not yet Fully Implemented	Phasing-in Period	
EE	Men: 63 Women: 60	Women: 63	2016	Early Retirement Pension: *a* vailable up to 3 years before legal retirement age Old-age Pension Under Favourable Conditions: 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 Superannuated Pension: 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 2nd pillar: No early pension before retirement age
HU	1st and 2nd pillar: 62			*1st pillar* : 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). Advanced Pension: from the age of 60 for men and 5 years before the retirement age for women with long service period
LT	Men: 62.5 Women: 60			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
LV	Men: 62 Women: 61 years by 1 July 2007	Women: gradually increasing by 6 months every year until it reaches 62		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)
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			*For persons born before 1st January 1952: No early pension.* *For persons born between 1952 to 1961:* 61 if 35 years of paid/credited weekly social security contributions *For persons born on or after 1st January 1962:* 61 if 40 years of paid/credited weekly social security contributions In all cases, those opting for early pension cannot be employed until 65 of age

Table 8 (continued)

Current and Proposed Retirement Policies by Country

Country	Standard Retirement Age			Earliest Age to Access Old-age Pension
	Current	New Established by Reform and not yet Fully Implemented	Phasing-in Period	
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 1st quarter of 2007 Women: 58 in 1st quarter of 2007	Men: 65 Woman: 60	2014	1) Old-Age Pension with Reduced Standard Retirement Age: 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) Early Retirement Pension: maximum 5 years before standard retirement age to insured persons exceeding the full contribution period by minimum 10 years 3) Partial Early Retirement Pension: 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	*1 st Pillar:* No age limit. Early pension possible if minimum duration of membership (10 years) and minimum amount of benefit reached. *2nd Pillar:* No age limit. Early pension is possible if the early pension of the 1st pillar is received and minimum amount of benefit reached

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.

Table 9

Estimated Change in the Participation Rate of Older Workers Following a Reform (Fixed Effect)

Variable	(I)	(I EMU)	II	(II EMU)	III	(III EMU)	(IV)	(IV EMU)
duf	0.1	0.1	–0.4	–0.0	1.0	1.3	0.2	–0.4
	0.2	0.2	0.2	0.2	0.4	0.5	0.4	0.4
			**		***	***		
L.duf	0.3	0.2	–0.2	0.4	0.7	0.9	0.7	–0.1
	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.6
					***	***		
L2.duf	0.3	0.5	–0.0	0.7	–0.1	0.4	0.9	0.7
	0.3	0.2	0.2	0.3	0.5	0.5	0.6	0.6
		**		***			***	
L3.duf	0.2	0.2	–0.3	0.2	–0.2	–0.1	0.9	0.6
	0.2	0.2	0.2	0.2	0.3	0.4	0.5	0.5
							**	
dunf	0.1	0.4	–0.0	0.4	0.4	0.5	0.1	0.2
	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.3
		**		**				
L.dunf	0.1	0.3	0.1	0.4	0.5	0.7	–0.1	–0.2
	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.3
		***		**		***		
L2.dunf	0.3	0.2	0.2	0.2	0.2	0.3	0.4	–0.1
	0.2	0.2	0.2	0.2	0.4	0.5	0.4	0.3
L3.dunf	0.1	–0.0	–0.3	–0.2	0.3	–0.0	0.4	0.1
	0.2	0.1	0.2	0.2	0.3	0.4	0.3	0.3
			**					
duer	–0.4	0.2	–0.5	–0.0	–0.0	–0.2	–0.7	0.9
	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.3
	**		**				**	***
L.duer	–0.3	0.1	–0.4	–0.2	–0.5	–0.7	0.1	1.2
	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.4
			***		***	***		***
L2.duer	–0.2	0.0	–0.6	–0.4	–0.3	–0.7	0.3	1.2
	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.4
			**			***		***
L3.duer	–0.3	–0.2	–0.6	–0.3	–0.5	–0.9	0.2	0.9
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.4
			**			***		**
duf_Women	0.1	–0.2	0.6	0.5	–1.2	–1.7	–0.9	–0.0
	0.3	0.4	0.3	0.4	0.7	0.8	0.5	0.6
			***			**	***	
L.duf_Women	0.1	–0.4	0.1	–0.3	–0.5	–1.8	–1.4	–0.7
	0.4	0.4	0.4	0.5	0.8	0.9	0.6	0.7
						**	**	
L2.duf_Women	0.4	–0.1	–0.1	–0.4	0.3	–0.5	–1.1	–0.6
	0.4	0.4	0.4	0.4	0.9	0.9	0.7	0.8
L3.duf_Women	0.4	–0.1	0.1	–0.3	0.1	–0.2	–1.2	–0.5
	0.3	0.3	0.3	0.4	0.7	0.7	0.6	0.6
							**	
dunf_Women	0.1	–0.3	0.3	–0.3	–0.4	–0.6	–0.6	0.0
	0.3	0.2	0.3	0.3	0.5	0.5	0.5	0.4
L.dunf_Women	0.1	–0.5	0.4	–0.2	–0.8	–1.6	–0.8	–0.6
	0.3	0.3	0.3	0.3	0.7	0.6	0.6	0.5
		***				**		
L2.dunf_Women	0.2	–0.4	0.5	–0.1	–0.3	–1.1	–0.6	–0.2
	0.4	0.3	0.4	0.4	0.8	0.6	0.6	0.5
						***		
L3.dunf_Women	1.0	0.6	0.9	0.1	0.4	0.2	–0.1	–0.0
	0.3	0.2	0.4	0.3	0.7	0.6	0.5	0.4
	***	***	**					
duer_Women	1.0	0.9	0.5	–0.4	1.3	2.1	1.6	0.4
	0.3	0.3	0.4	0.4	0.5	0.8	0.5	0.4
	***	***			**	***	***	
L.duer_Women	0.2	0.5	0.2	–0.4	0.7	1.5	0.8	0.5
	0.2	0.3	0.3	0.4	0.5	0.8	0.5	0.5
						***	***	
L2.duer_Women	1.4	1.6	1.2	0.2	2.6	3.2	1.4	1.2
	0.3	0.4	0.4	0.4	0.6	0.9	0.5	0.6
	***	***	***		***	***	***	***
L3.duer_Women	1.3	1.5	0.8	–0.6	3.1	2.7	1.0	0.5
	0.4	0.4	0.4	0.4	0.7	1.0	0.5	0.7
	***	***	**		***	***	***	
u	–0.4	–0.2	–0.2	0.0	–0.5	–0.3	–0.4	–0.3
	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1
	***	***	***		***	***	***	***
_cons	50.4	43.5	68.3	59.0	50.7	44.1	27.0	21.7
	0.7	0.8	0.6	0.7	1.4	1.8	1.0	0.9
	***	***	***	***	***	***	***	***
Number of observat.	9379	5929	3756	2376	2504	1584	3119	1969
Number of groups	810	480	324	192	216	128	270	160

Note: Preferred specification takes into account both gender and country trends.
(I) and (I EMU) represent results for all age groups in case of all countries and EMU respectively.
(II) and (II EMU) represent results for age group 50-54 in case of all countries and EMU respectively.
(III) and (III EMU) represent results for age group 55-59 in case of all countries and EMU respectively.
(IV) and (IV EMU) represent results for age group 60-64 in case of all countries and EMU respectively.

Table 10

Estimated Change in the Participation Rate of Older Workers Following a Reform (Unemployment Instrumented by Unemployment *t*–1)

Variable	(I)	(I EMU)	(II)	(II EMU)	(III)	(III EMU)	(IV)	(IV EMU)
duf	0.3	0.1	0.1	0.1	1.1	1.1	0.1	–0.5
	0.2	0.3	0.2	0.3	0.4	0.5	0.4	0.4
					**	**		
L.duf	0.3	0.1	0.1	0.3	0.8	0.9	0.3	–0.5
	0.2	0.3	0.2	0.3	0.5	0.6	0.4	0.4
					*			
L2.duf	0.4	0.5	0.3	0.6	–0.0	0.5	0.7	0.4
	0.2	0.3	0.2	0.3	0.5	0.6	0.4	0.4
		*		**			*	
L3.duf	0.1	0.2	–0.1	0.2	–0.2	–0.0	0.6	0.5
	0.2	0.3	0.2	0.3	0.4	0.5	0.4	0.4
							*	
dunf	0.2	0.4	–0.0	0.5	0.1	0.5	0.2	0.3
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
		*		**				
L.dunf	0.1	0.3	0.0	0.5	0.1	0.7	–0.1	–0.2
	0.2	0.2	0.2	0.3	0.4	0.5	0.3	0.4
				*				
L2.dunf	0.3	0.1	0.2	0.3	–0.2	0.3	0.4	–0.2
	0.2	0.2	0.2	0.3	0.4	0.5	0.3	0.4
L3.dunf	0.0	–0.0	–0.4	–0.1	–0.2	0.0	0.4	0.2
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
			*					
duer	–0.4	0.2	–0.5	–0.0	–0.0	0.1	–0.8	0.8
	0.2	0.2	0.3	0.3	0.5	0.5	0.4	0.4
	*		*				**	**
L.duer	–0.4	–0.0	–0.4	–0.2	–0.5	–0.4	–0.2	0.9
	0.2	0.3	0.3	0.3	0.5	0.5	0.4	0.4
			*					**
L2.duer	–0.3	–0.0	–0.6	–0.4	–0.3	–0.5	0.2	1.2
	0.2	0.3	0.3	0.3	0.5	0.5	0.4	0.4
			**					***
L3.duer	–0.3	–0.2	–0.4	–0.2	–0.4	–0.7	0.0	0.7
	0.3	0.3	0.3	0.3	0.5	0.6	0.4	0.4
								*
duf_Women	–0.3	–0.1	0.0	0.3	–1.0	–1.7	–0.4	0.4
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.5
						**		
L.duf_Women	–0.3	–0.4	–0.0	0.1	–0.3	–1.6	–0.4	0.3
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.6
						**		
L2.duf_Women	–0.2	–0.3	–0.3	–0.3	0.2	–0.9	–0.6	0.0
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.6
L3.duf_Women	–0.0	–0.2	–0.0	–0.2	–0.0	–0.5	–0.7	–0.3
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.5
dunf_Women	0.1	–0.1	0.3	–0.4	0.2	–0.8	–0.6	–0.0
	0.3	0.3	0.3	0.4	0.5	0.6	0.4	0.4
L.dunf_Women	0.1	–0.2	0.6	–0.2	–0.2	–1.7	–0.4	–0.3
	0.3	0.3	0.3	0.4	0.5	0.7	0.4	0.5
			**			**		
L2.dunf_Women	0.3	–0.1	0.6	–0.2	0.6	–1.1	–0.3	–0.0
	0.3	0.3	0.3	0.4	0.6	0.7	0.5	0.5
			**					
L3.dunf_Women	0.7	0.3	1.0	0.0	0.9	–0.0	0.2	0.2
	0.3	0.3	0.3	0.4	0.6	0.7	0.5	0.5
	**		***		*			
duer_Women	0.6	0.2	0.4	–0.3	1.1	1.5	1.5	0.4
	0.3	0.4	0.4	0.4	0.7	0.8	0.5	0.6
	**				*	*	***	
L.duer_Women	0.3	0.3	0.3	–0.1	0.7	1.7	1.0	0.8
	0.3	0.4	0.4	0.4	0.7	0.8	0.5	0.6
						**	*	
L2.duer_Women	0.7	0.5	0.7	0.1	1.7	2.7	1.2	0.9
	0.3	0.4	0.4	0.5	0.7	0.8	0.6	0.6
	**		*		**	***	**	
L3.duer_Women	0.4	0.1	0.1	–0.6	1.6	2.3	1.0	0.6
	0.4	0.4	0.4	0.5	0.7	0.8	0.6	0.6
					**	***		
u	–0.3	0.0	–0.2	0.0	–0.5	–0.4	–0.4	–0.2
	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
	***		***		***	***	***	***
_cons	47.8	41.0	67.6	59.1	48.1	44.9	25.8	20.8
	0.5	0.5	0.4	0.6	0.9	1.1	0.7	0.7
	***	***	***	***	***	***	***	***
Number of observat.	8992	5782	3600	2316	2400	1544	2992	1922
Number of groups	810	480	324	192	216	128	270	160

Note: Preferred specification takes into account both gender and country trends.
(I) and (I EMU) represent results for all age groups in case of all countries and EMU respectively.
(II) and (II EMU) represent results for age group 50-54 in case of all countries and EMU respectively.
(III) and (III EMU) represent results for age group 55-59 in case of all countries and EMU respectively.
(IV) and (IV EMU) represent results for age group 60-64 in case of all countries and EMU respectively.

Table 11

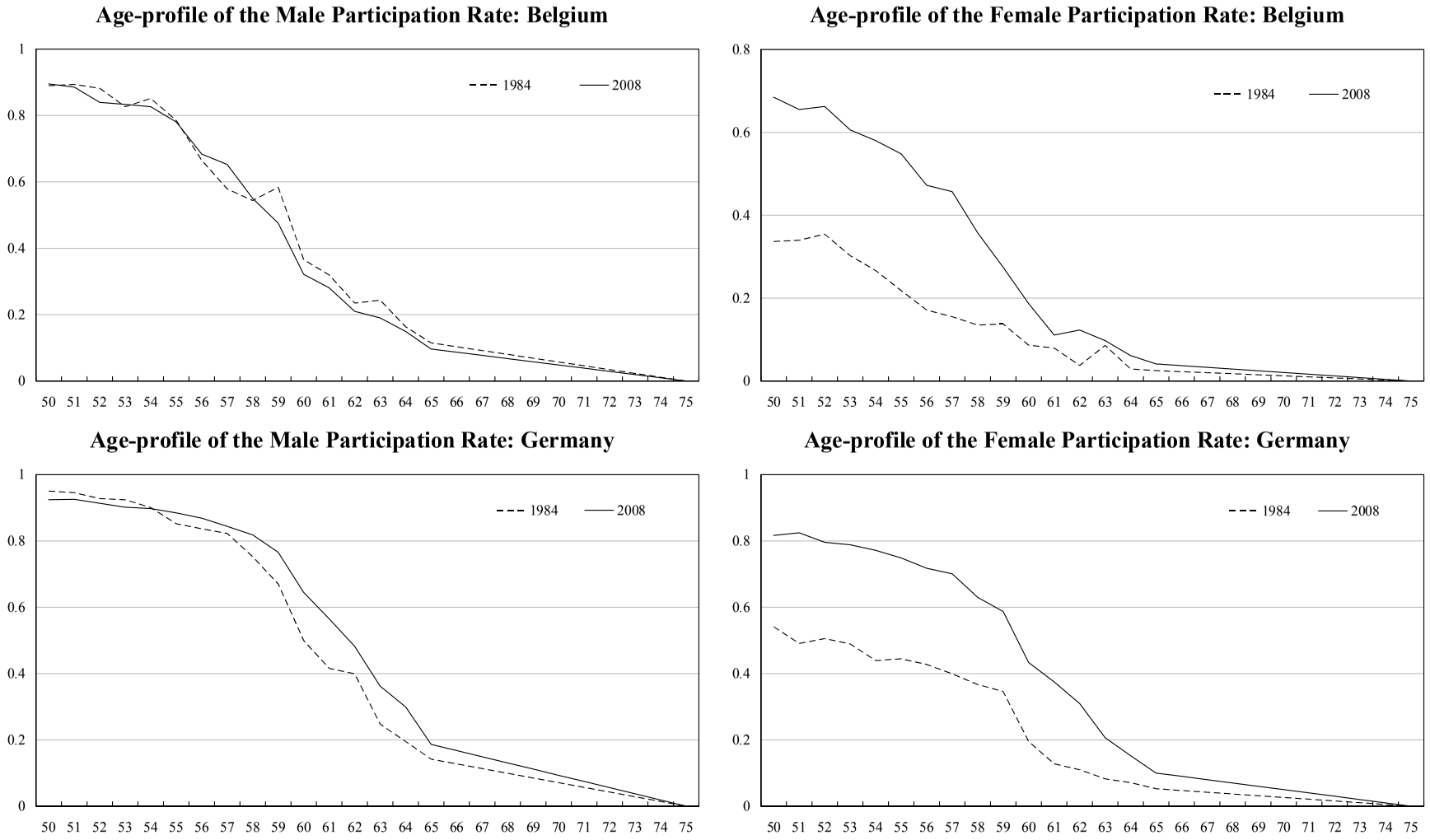
Estimated Change in the Participation Rate of Older Workers Following a Reform (Unemployment Instrumented by Unemployment (*t*–1 and *t*–2)

Variable	(I)	(I EMU)	(II)	(II EMU)	(III)	(III EMU)	(IV)	(IV EMU)
duf	0.4	0.2	0.0	–0.0	1.2	1.1	0.2	–0.2
	0.2	0.2	0.2	0.3	0.5	0.5	0.4	0.4
					***	**		
L.duf	0.6	0.3	0.5	0.4	1.0	0.9	0.4	–0.4
	0.2	0.3	0.2	0.3	0.5	0.6	0.4	0.4
	***		*		**			
L2.duf	0.4	0.4	0.2	0.3	–0.0	0.5	0.8	0.6
	0.2	0.3	0.2	0.3	0.5	0.6	0.4	0.4
	*	*					**	
L3.duf	0.2	0.2	0.0	–0.0	–0.3	–0.0	0.7	0.6
	0.2	0.2	0.2	0.3	0.4	0.5	0.4	0.4
							**	*
dunf	0.2	0.4	0.1	0.4	0.2	0.5	0.3	0.4
	0.2	0.2	0.2	0.2	0.4	0.4	0.3	0.3
		*						
L.dunf	0.2	0.3	0.1	0.4	0.3	0.7	0.1	–0.1
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
				*				
L2.dunf	0.3	0.1	0.2	0.2	–0.2	0.3	0.5	–0.1
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
L3.dunf	0.1	–0.1	–0.3	–0.2	–0.2	0.1	0.4	0.1
	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.3
duer	–0.4	0.1	–0.6	–0.3	0.0	0.1	–0.7	0.8
	0.2	0.2	0.3	0.3	0.5	0.5	0.4	0.4
	*		**				*	**
L.duer	–0.4	–0.2	–0.7	–0.6	–0.5	–0.4	–0.2	0.9
	0.2	0.3	0.3	0.3	0.5	0.5	0.4	0.4
	**		***	*				**
L2.duer	–0.3	–0.3	–0.7	–0.6	–0.3	–0.4	–0.1	0.9
	0.2	0.3	0.3	0.3	0.5	0.5	0.4	0.4
			**	*				**
L3.duer	–0.3	–0.3	–0.5	–0.2	–0.4	–0.6	–0.0	0.7
	0.3	0.3	0.3	0.3	0.5	0.6	0.4	0.4
			*					*
duf_Women	–0.1	0.1	0.1	0.6	–1.4	–1.8	–0.5	0.1
	0.3	0.3	0.4	0.4	0.6	0.7	0.5	0.5
					**	**		
L.duf_Women	–0.1	–0.2	–0.3	–0.0	–0.5	–1.8	–0.6	0.1
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.5
						**		
L2.duf_Women	0.5	0.6	0.2	0.5	0.7	–0.1	–0.2	0.3
	0.3	0.4	0.4	0.4	0.6	0.8	0.5	0.6
	*	*						
L3.duf_Women	0.4	0.2	0.0	0.1	0.3	–0.4	–0.8	–0.3
	0.3	0.3	0.3	0.4	0.6	0.7	0.5	0.5
dunf_Women	–0.2	–0.1	0.3	–0.2	0.1	–0.8	–0.6	–0.2
	0.3	0.3	0.3	0.3	0.5	0.6	0.4	0.4
L.dunf_Women	–0.2	–0.3	0.6	–0.1	–0.2	–1.6	–0.5	–0.4
	0.3	0.3	0.3	0.4	0.6	0.7	0.4	0.5
			**			**		
L2.dunf_Women	0.2	–0.0	0.8	0.0	0.8	–0.9	–0.2	0.0
	0.3	0.3	0.3	0.4	0.6	0.7	0.4	0.5
			**					
L3.dunf_Women	0.8	0.3	1.0	0.2	1.1	–0.1	0.3	0.3
	0.3	0.3	0.3	0.4	0.6	0.6	0.4	0.4
	***		***		*			
duer_Women	1.1	0.6	0.5	0.1	1.5	1.9	1.5	0.6
	0.3	0.3	0.4	0.4	0.6	0.7	0.5	0.5
	***	*			**	***	***	
L.duer_Women	0.8	0.7	0.5	0.4	1.0	2.1	1.1	0.9
	0.3	0.4	0.4	0.4	0.7	0.8	0.5	0.5
	**	**				***	**	
L2.duer_Women	1.8	1.1	1.0	0.7	2.5	3.6	1.7	1.6
	0.3	0.4	0.4	0.5	0.7	0.8	0.6	0.6
	***	***	***		***	***	***	***
L3.duer_Women	1.3	0.2	0.2	–0.5	1.7	2.4	1.0	0.6
	0.4	0.4	0.4	0.5	0.7	0.8	0.6	0.6
	***				**	***	*	
u	–0.3	0.0	–0.2	0.0	–0.4	–0.5	–0.3	–0.2
	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
	***		***		***	***	***	***
_cons	48.7	40.2	67.6	60.0	47.2	45.7	24.9	20.4
	0.4	0.6	0.5	0.6	0.9	1.1	0.7	0.7
	***	***	***	***	***	***	***	***
Number of observat.	8603	5633	3444	2256	2296	1504	2863	1873
Number of groups	810	480	324	192	216	128	270	160

Note: Preferred specification takes into account both gender and country trends.
(I) and (I EMU) represent results for all age groups in case of all countries and EMU respectively.
(II) and (II EMU) represent results for age group 50-54 in case of all countries and EMU respectively.
(III) and (III EMU) represent results for age group 55-59 in case of all countries and EMU respectively.
(IV) and (IV EMU) represent results for age group 60-64 in case of all countries and EMU respectively.

Figure 1

Male and Female Age Profiles for Selected Countries

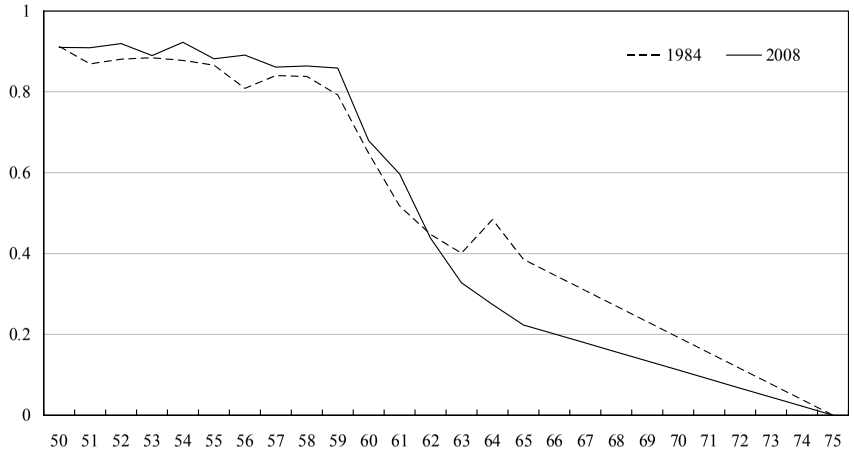


Source: LFS.

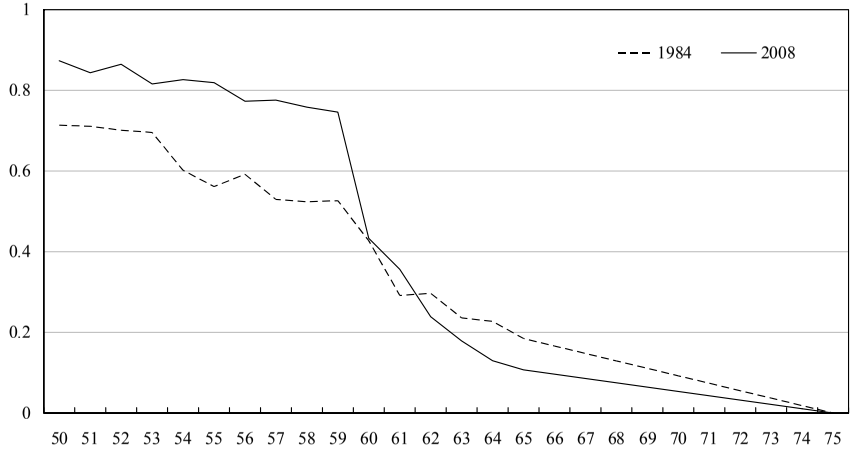
Figure 1 (continued)

Male and Female Age Profiles for Selected Countries

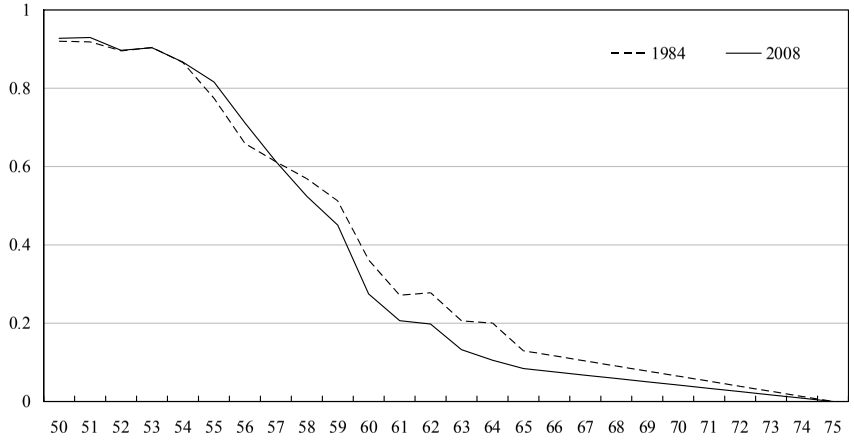
Age-profile of the Male Participation Rate: Denmark



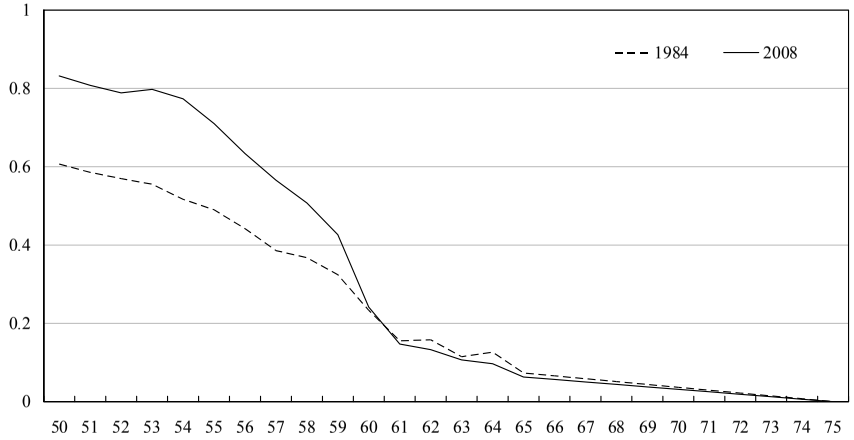
Age-profile of the Female Participation Rate: Denmark



Age-profile of the Male Participation Rate: France



Age-profile of the Female Participation Rate: France

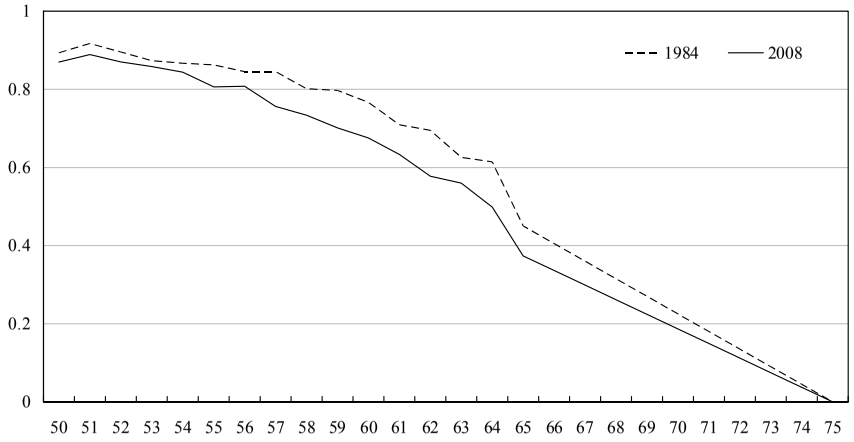


Source: LFS.

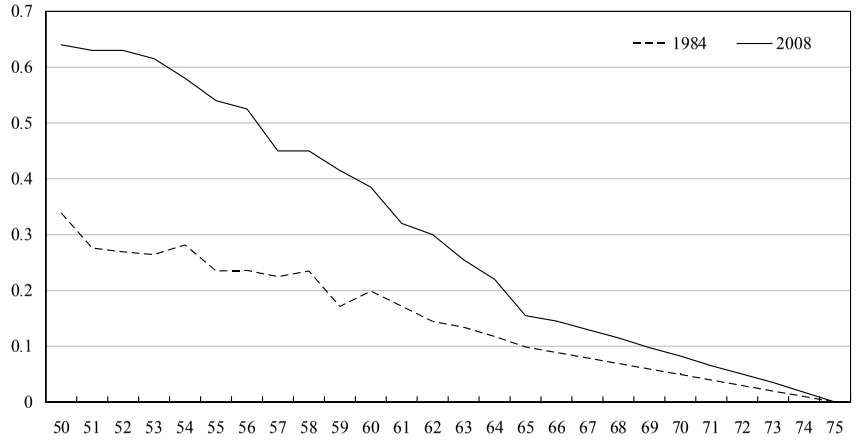
Figure 1 (continued)

Male and Female Age Profiles for Selected Countries

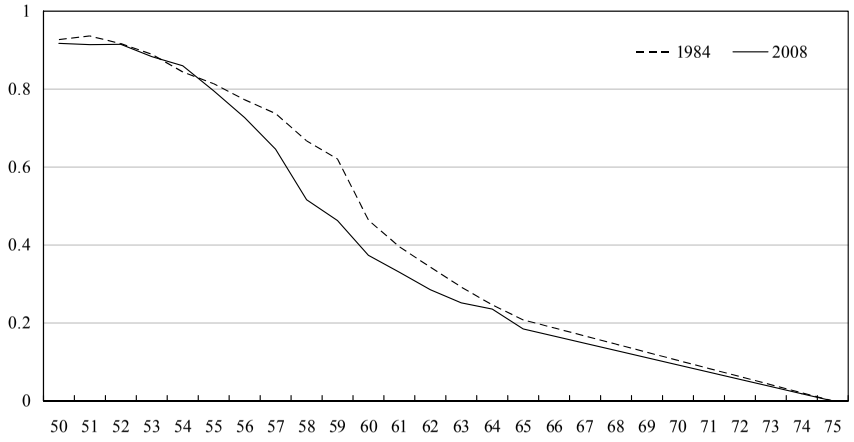
Age-profile of the Male Participation Rate: Ireland



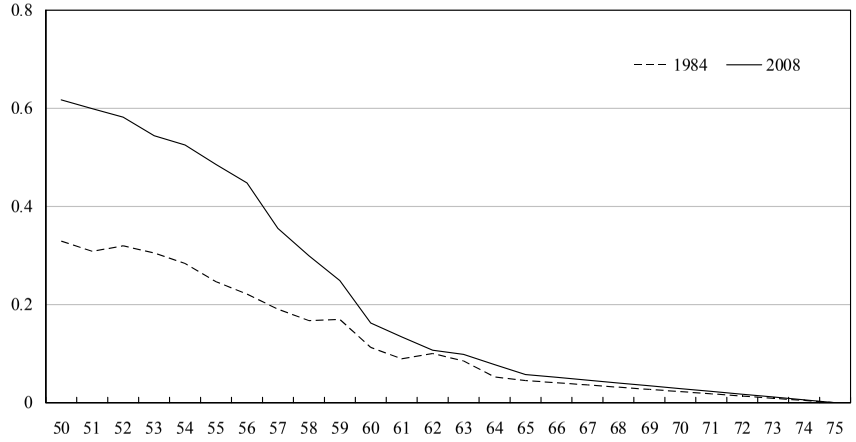
Age-profile of the Female Participation Rate: Ireland



Age-profile of the Male Participation Rate: Italy



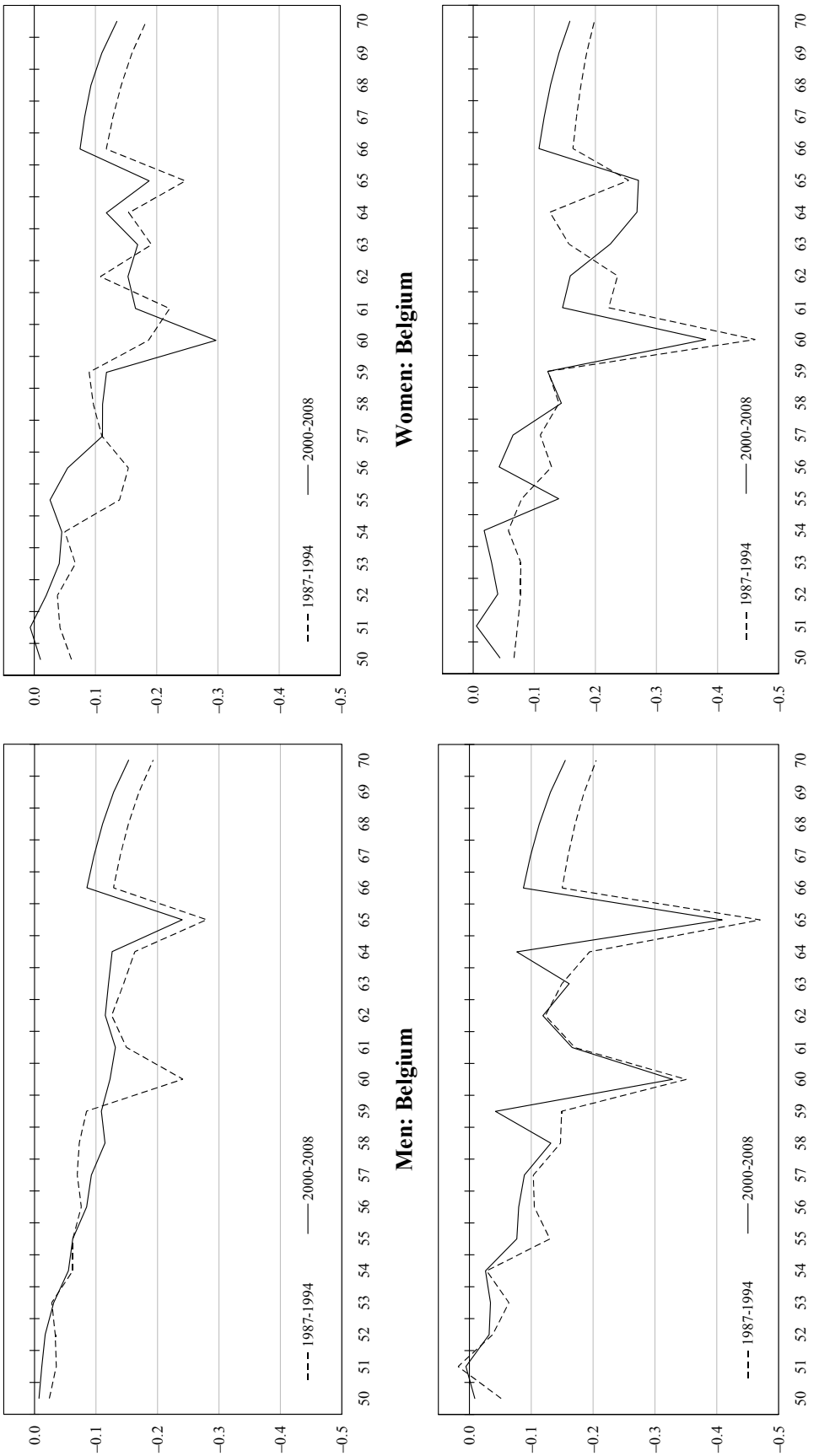
Age-profile of the Female Participation Rate: Italy



Source: LFS.

Figure 2

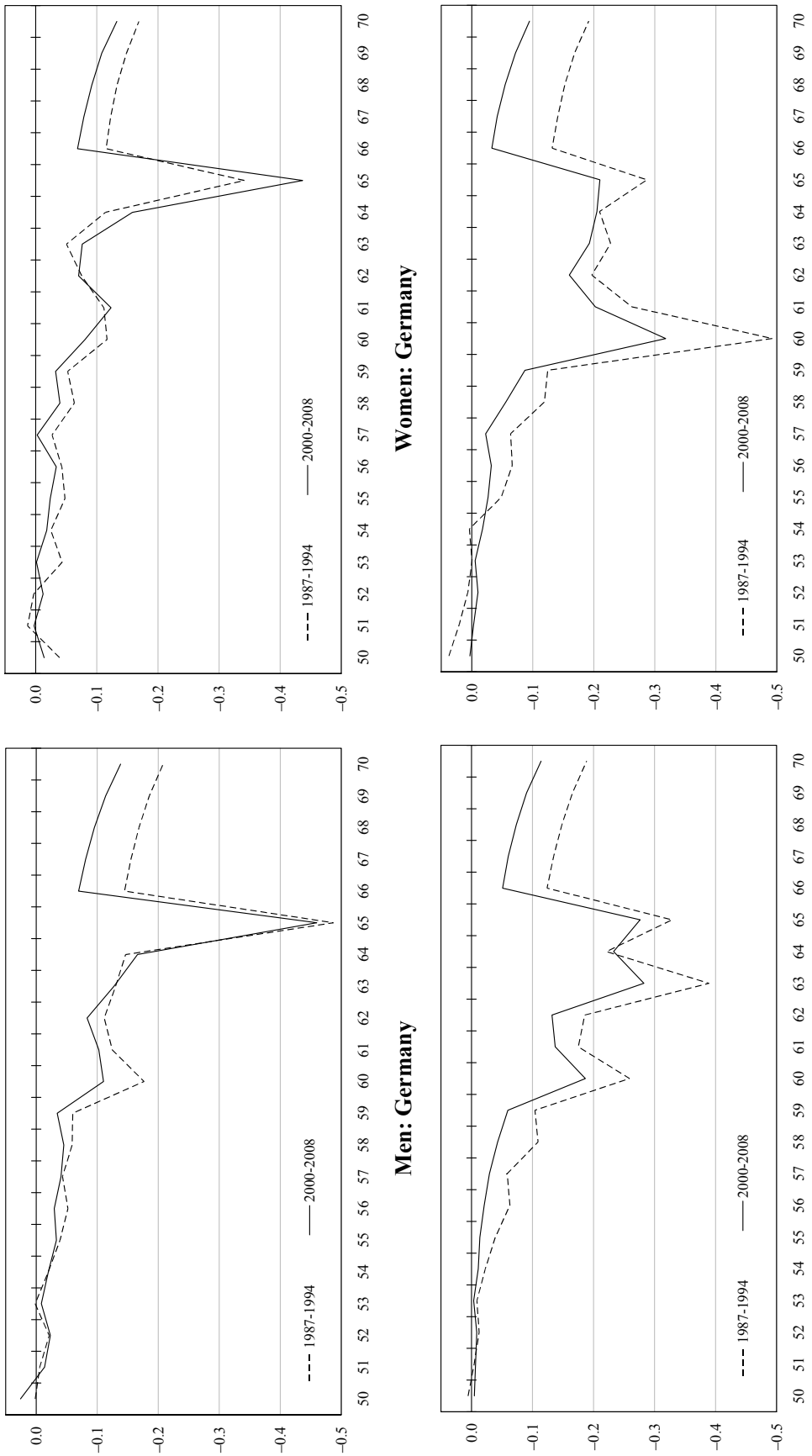
Probabilities of Exiting in Selected Countries



Source: LFS.

Figure 2 (continued)

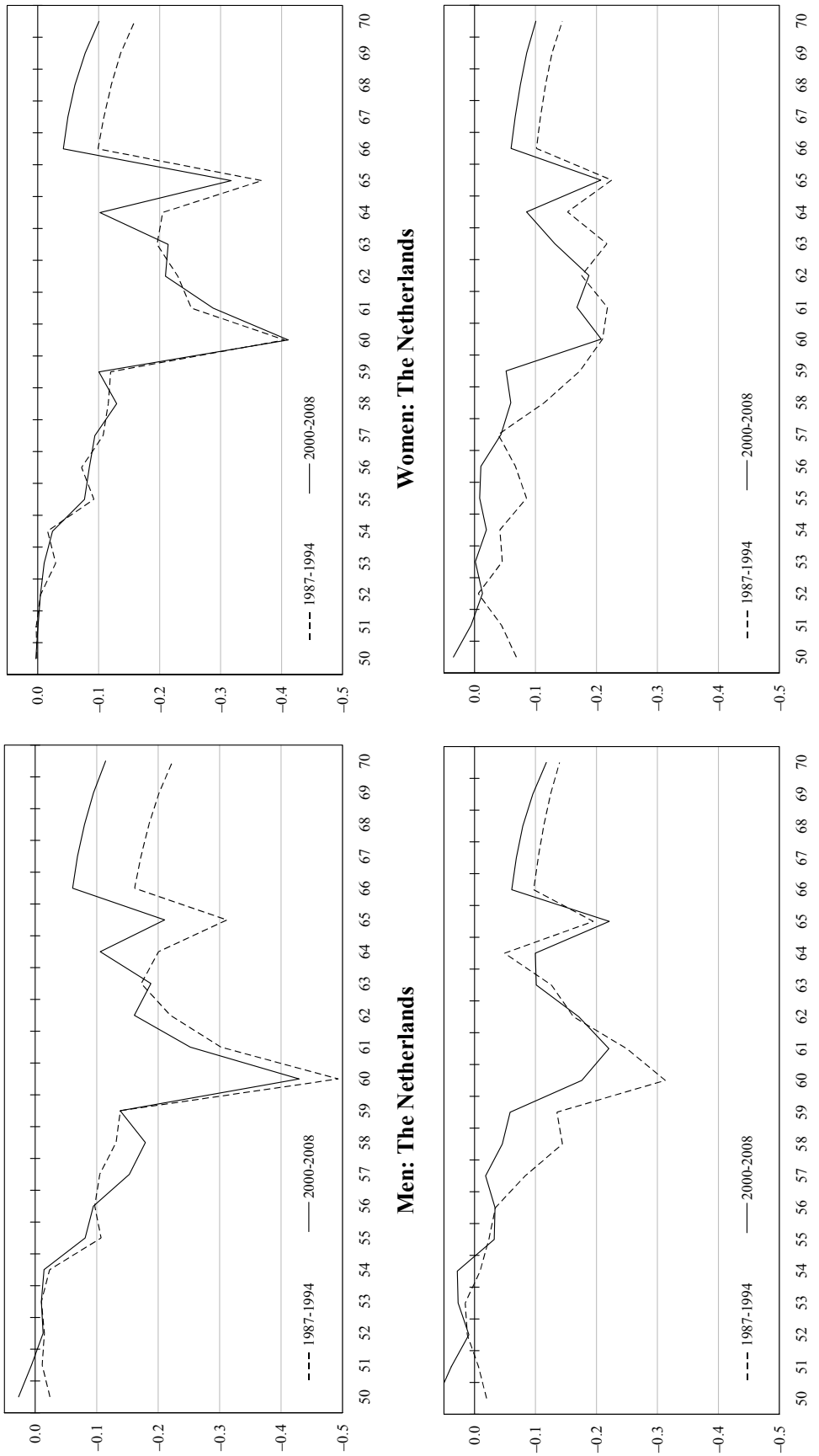
Probabilities of Exiting in Selected Countries



Source: LFS.

Figure 2 (continued)

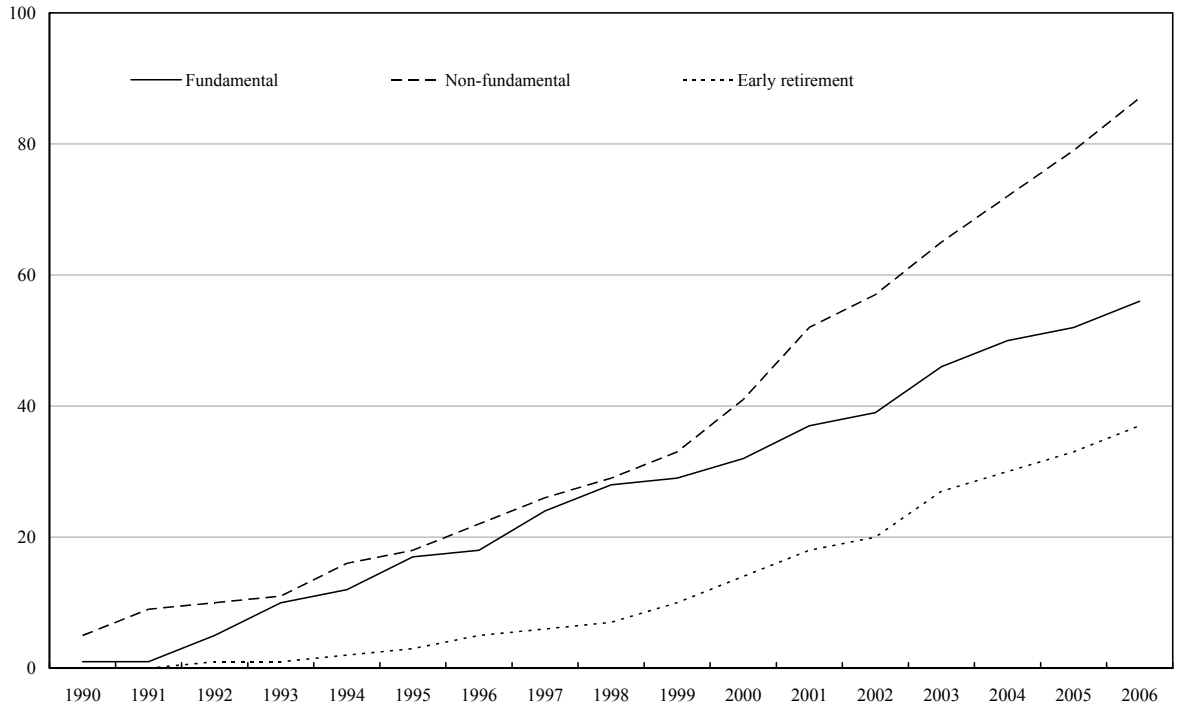
Probabilities of Exiting in Selected Countries



Source: LFS.

Figure 3

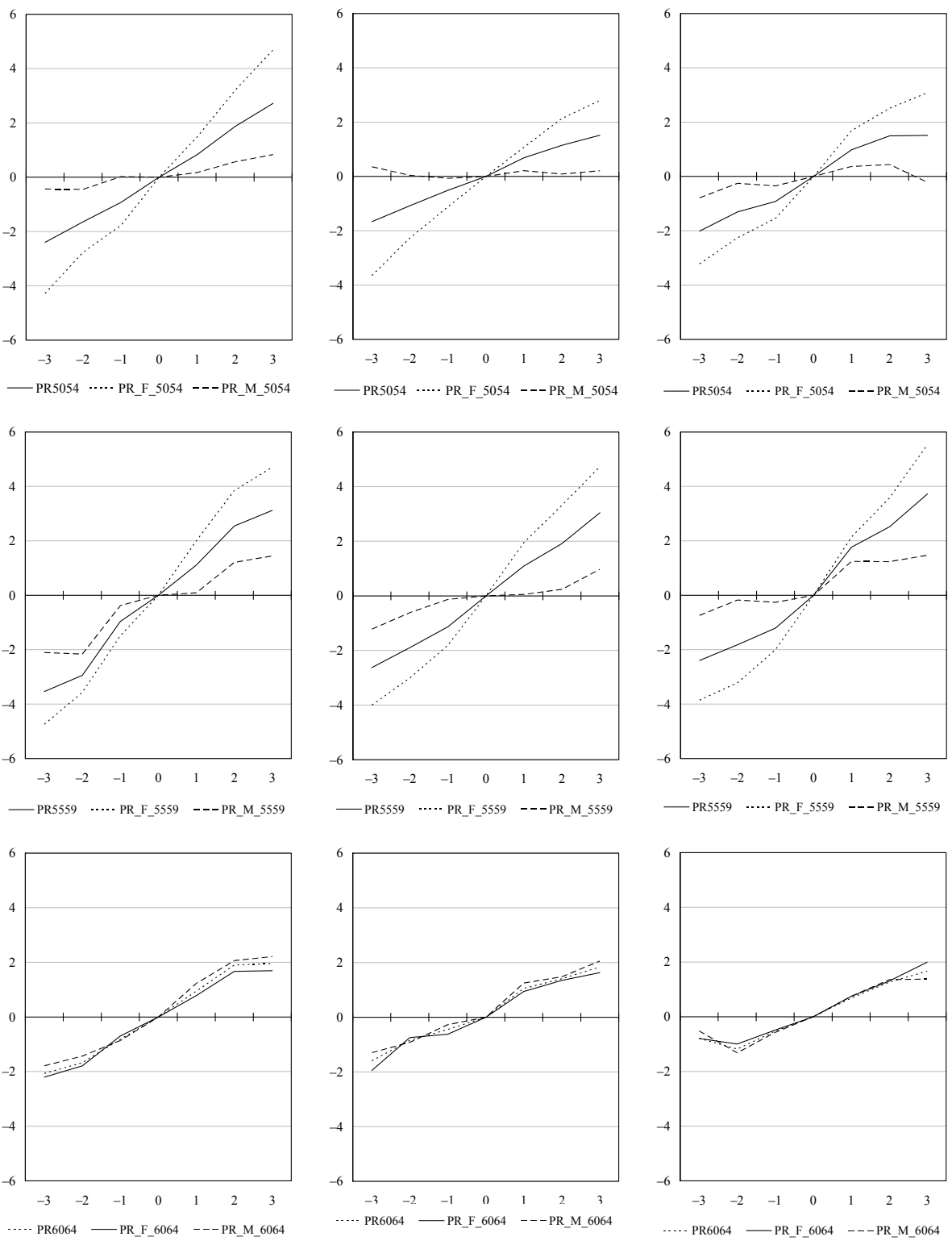
Count of Member States Doing Pension Reforms



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

Figure 4

Participation Rate Before and After Reforms of Early Retirement: EMU Countries



Source: Commission Services.

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VALUATION OF THE HUNGARIAN PENSION SYSTEM

Erzsébet Kovács[*]

This paper takes a look at certain results of the modelling side of the Hungarian pension reform. Preparations are underway to implement actuarial modelling of pension liabilities for the government. The objective is to understand how the state might face challenges of the present pay-as-you-go pension system. Flat-rate pension, point system and notional defined contribution (NDC) as possible suggestions are reviewed in order to stop increase of public debt in the course of this century. Based on the investigations done in the last two years the sharpest problems for Hungary are the low activity ratios and the short working period.

1 Introduction

The Hungarian pension system underwent a structural reform in 1997, at present according to the World Bank terminology it has three pillars:

- Pillar I is the mandatory public pension system,[1] which is financed from the contributions paid by the employer and the employee;
- Pillar II is mandatory consisting of mutual private pension funds; and
- Pillar III covers voluntary mutual benefit funds.

Pillar I is a publicly managed, pay-as-you-go financed, defined-benefit, social security pension scheme. It provides earnings-related old-age, disability and survivors benefits. Pillar II of the compulsory pension system is operated by fully-funded, defined contribution, private pension funds. The funds accumulate and invest contributions paid by their members onto their individual accounts. At retirement the accumulated sum increased by investment yield is converted into a life annuity,[2] which can be provided by either the fund itself or a life insurance company.

Persons entering the labour market for the first time are automatically enrolled into the two-pillar system. Those who had already acquired pension rights before 1998 could voluntarily opt for the new system at the time of its inception.

Pension and Old-age Round Table (POART) was set up in 2007 to analyse the future changes of the Hungarian pension system. Based on the projection results of POART's report several important questions will be analysed. Besides the transformation of the pension system, and quantitative presentation of future contributions and benefits, impacts on labour supply in planned to be examined.

2 Why don't we comply with the rules of the pension system

Qualifying conditions for a person to become eligible for the old-age pension in Hungary are as follows:

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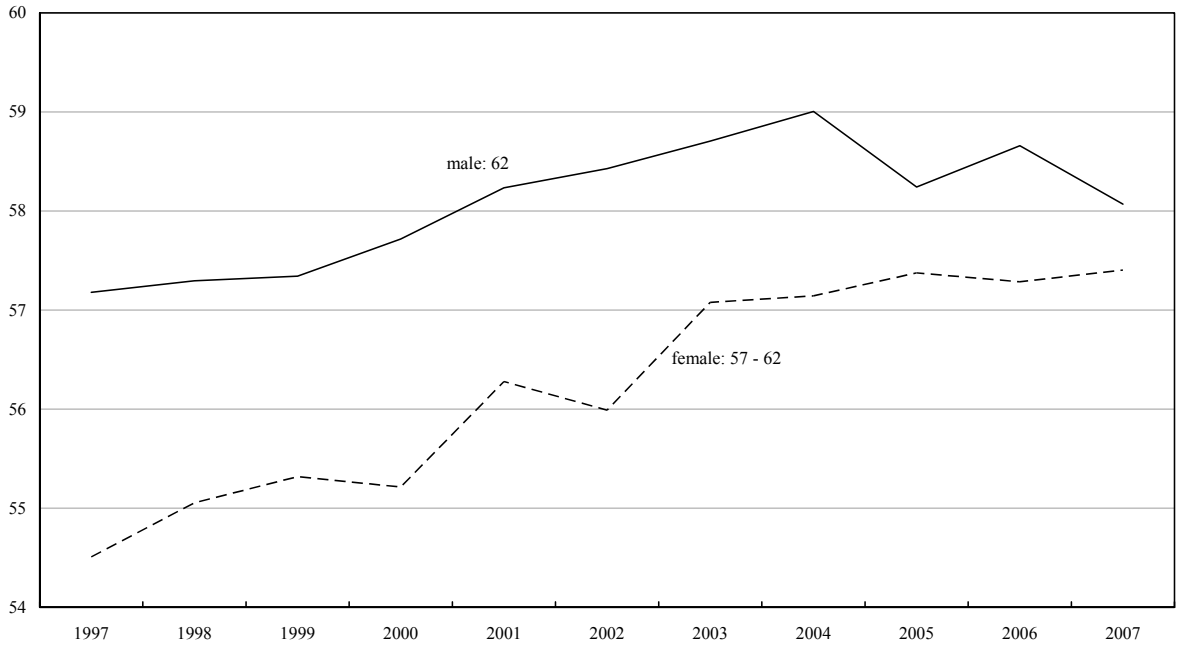
The author is member of the Hungarian Pension and Old Age Round Table. The views expressed here are mine.

[1] Our present social security system was introduced after the Second World War. The original version of the public pension was introduced in 1928.

[2] Pillar I is intended to give ¾ and Pillar II is planned to cover ¼ of the old age pension.

Figure 1

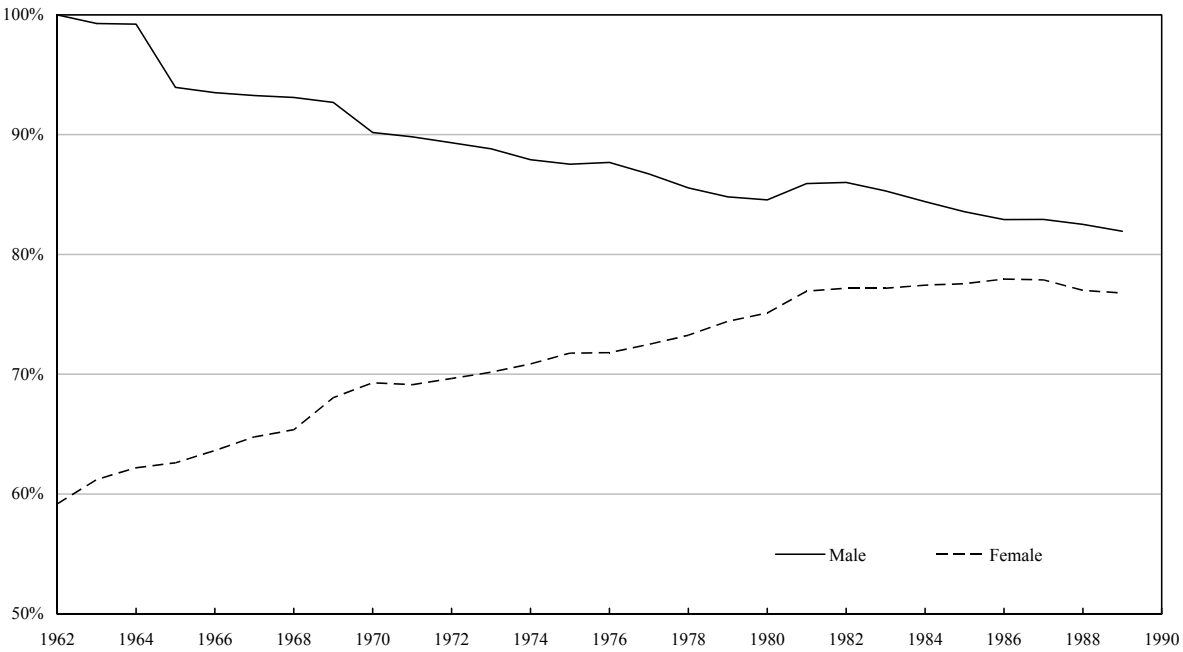
Effective and Legal Retirement Ages



Source: Author's calculations based on Pension Statistics.

Figure 2

Ratio of Employed People before 1990



Source: Deloitte Report based on data of the Hungarian Central Statistical Office.

- Reaching statutory retirement age 62 years for both males and females in 2009; and/or
- Completing the required number of years of service, 40 years for total pension amount;
- Completing at least 37 years of service until the age 60 to get reduced pension amount.

In spite of the clear rules the effective retirement ages of both genders are significantly lower than the official retirement age. Figure 1 presents the age of newly retired old-age pensioners according to the calendar years. The discrepancy of numbers between legal and effective retirement ages is mainly the consequence of the political and economic transition after 1989.

The best-known rule of our socialist system ended in 1989 was the full employment, which was associated with the so called in-door unemployment in the early 1960s. Figure 2 presents these artificially high rates of employment.

As a result of these high ratios the average service period was higher than 40 years for men, and 36 years for women. Based on the long contribution period, the pay-as-you-go scheme worked smoothly until the late 1980s.

After the political transition, the labour market shrank as a consequence of the privatisation of the Hungarian economy. Several companies were closed down or reorganised, and the agricultural cooperatives fell into individuals. The low demand for unskilled blue-collar workers caused serious difficulties. From 1990 to 1997 the unemployment rate increased suddenly. Early retirement and disability pension were the sidetracks for them because of their missing skills and low flexibility/mobility.

To sum up the changes, by the late 1990s participation rate of active population decreased by 20 per cent. The current level of employment is lower than it has been earlier.[3] Role of the informal sector is not analysed here because of the unpaid pension contribution. The maximum density of women's employment (83 per cent) was measured in 2005 for those who were born in 1974. The parallel maximum numbers of men's employment (71 per cent) was measured in 2005 for those who were born in 1974 and 1975. For more details see Figure 3 and Figure 4.

In order to exit from the labour market around the age of 50, persons applied for disability pension. This process was supported by policymakers to avoid the further increase of the unemployment rate. As a result of this process total number of disability pensioners reaches 22 per cent of pensioners in 2009. Number of disability pensioners below retirement age limit is around 10 per cent of the active population. These numbers are extremely high compared to he EU ratios, and are not underpinned by the health conditions of Hungarian people.

3 What does the future hold for us?

Theoretical arguments for strict retirement rules are reinforced by concerns about the implicit debt of the pension system.

The implicit debt is defined as a difference between present value of benefits disbursed to pensioners and active members (*i.e.* future pensioners) and contributions paid by active members. It shows obligations of the state pension system at a given point of time towards the current members[4] (those who have already entered the system).

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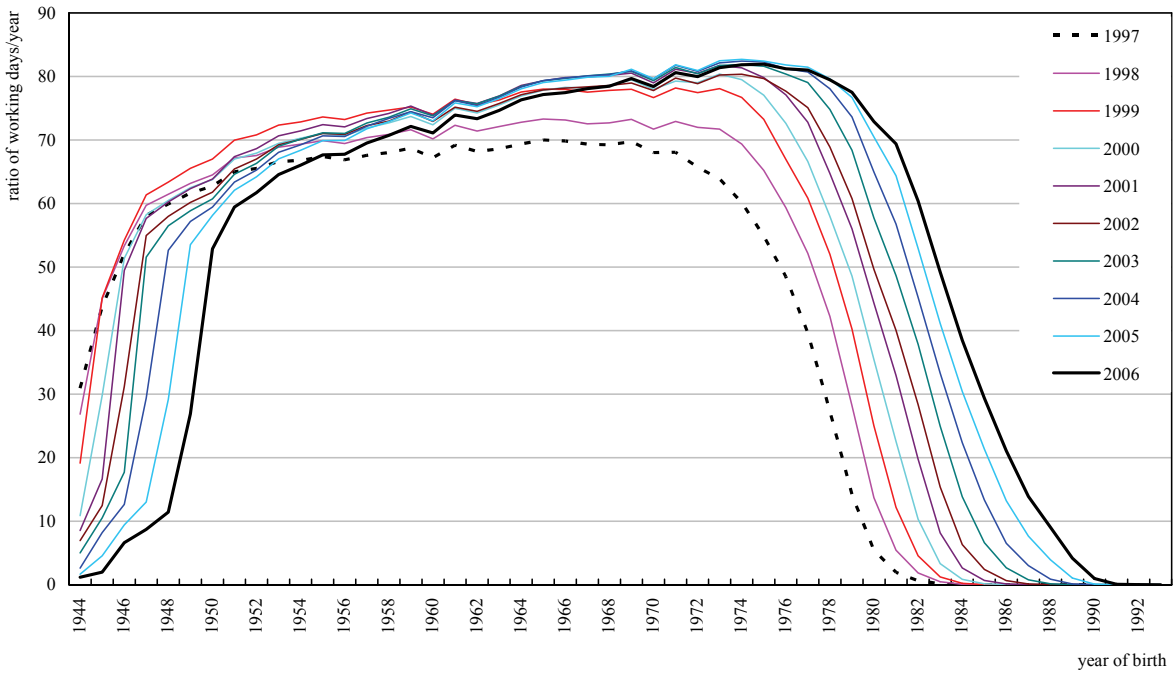
[3] According to the OECD Statistics change of the total labour force in 2004 compared to 1994 was –1.2 per cent for Hungary. The OECD average for this period equals to +9.6 per cent. Source: OECD in Figures, 2005.

[4] Benefits from the second pillar will be paid from 2013.

Figure 3

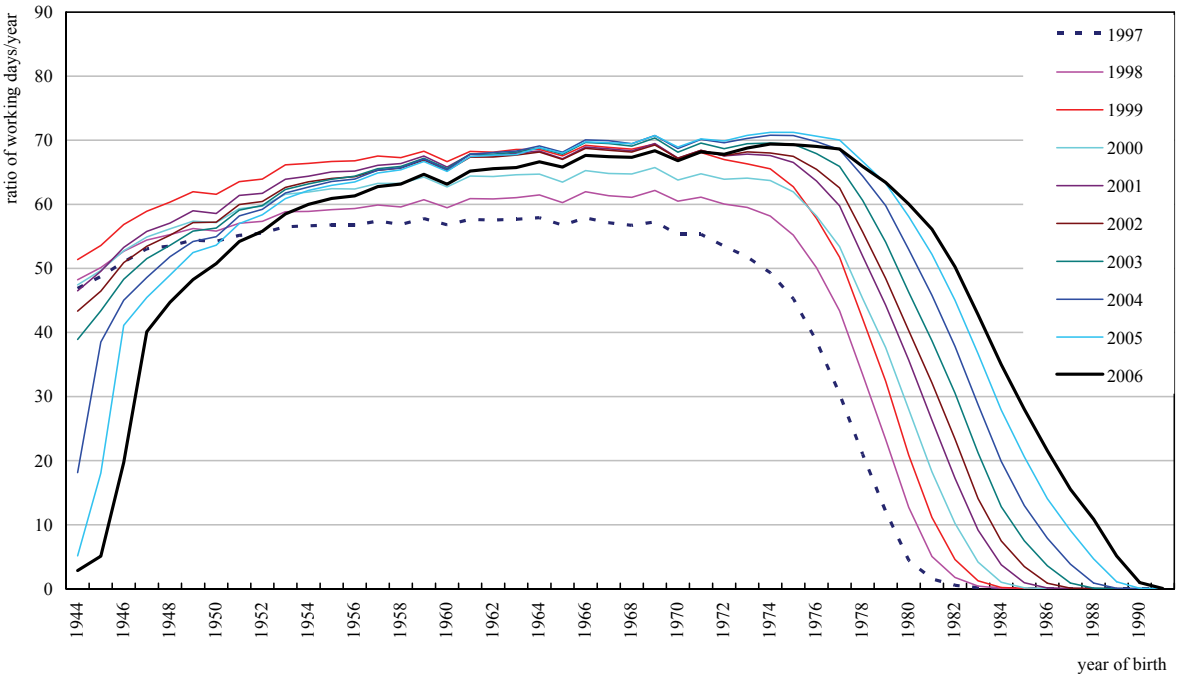
Density of Women's Employment in the Female Population



Source: Author's calculation based on Pension Statistics.

Figure 4

Density of Men's Employment in the Male Population



Source: Author's calculation based on Pension Statistics.

The implicit debt is measured in percent of GDP. Projected amounts of implicit debt per active members in the given calendar years were discounted to 2007 values in order to be comparable and expressed in currency units of the same year. 5 per cent discount rate was applied per annum, which corresponds to the risk free rate.

The government's possible decisions on changing the pension parameters (such as contribution rate, age limit and indexation) are expected to reduce the implicit debt in the next 15-20 years. The best scenario can be seen in Figure 5. The estimated minimum (2.45 per cent) will be reached in 2026.

This wave in Figure 5 is a consequence of the special shape of the Hungarian demographic tree[5] (see in Figure 6). The baby boom generation will retire around 2016, but the second boom, children of this generation are expected to be active on the labour market until 2040. The Hungarian pension system is strongly influenced by the special shape of the demographic tree.

Aging itself is not the most serious burden for the Hungarian pension system as it is for other highly developed countries. Life expectancy is expected to increase by 2 months per year.

The old version is projected by lower (1.3) fertility ratio, the young version is assumed with higher (1.8) fertility ratio. Both fertility values are below the reproduction level, so we do not calculate with a stationary population. Based on this projection, there are political intentions to increase the pension age to 65 year gradually in the next decade.

4 Increasing the contribution period

Our focus is on a small open economy in which the pay-as-you-go pension system is characterized by:

- the size of the labour market (L), and wages per worker (w),
- the number of retired persons (P),
- the average pension (p), and
- the contribution rate (r).

The balanced budget for this system can easily be calculated by multiplying the above quantities for a given year (t):

$$L(t)\, r(t)\, w(t) = P(t)\, p(t)$$

While these factors (wage, pension and contribution rate) can be influenced by the government relatively easily, the labour force adapts to the changes rather slowly.

One obvious way of increasing the contribution seems to be raising the legal retirement age. However there are objections to this strategy: as significant number of people chose the early retirement, the actual mean retirement age is lower by several years than the legal retirement age (As it was seen in Figure 1).

PORT is analysing chances of paying contribution according to age and sex. Dividing the active population into six categories, we can calculate the pension contribution density for a given year.

Employment statuses are mentioned[6] as follows:

- Person A works during the whole year,

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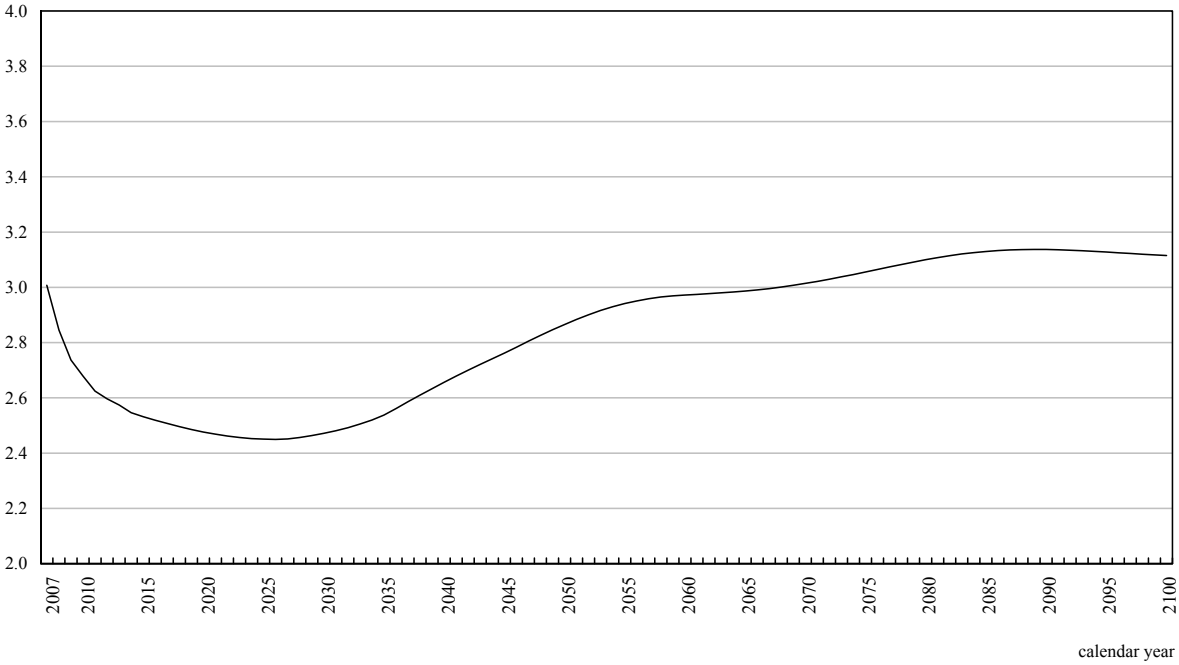
5 Data are for 2001. Projections were made by Laszlo Hablicsek in 2007.

6 M. Augusztinovics introduced these names for the statuses in her paper.

Figure 5

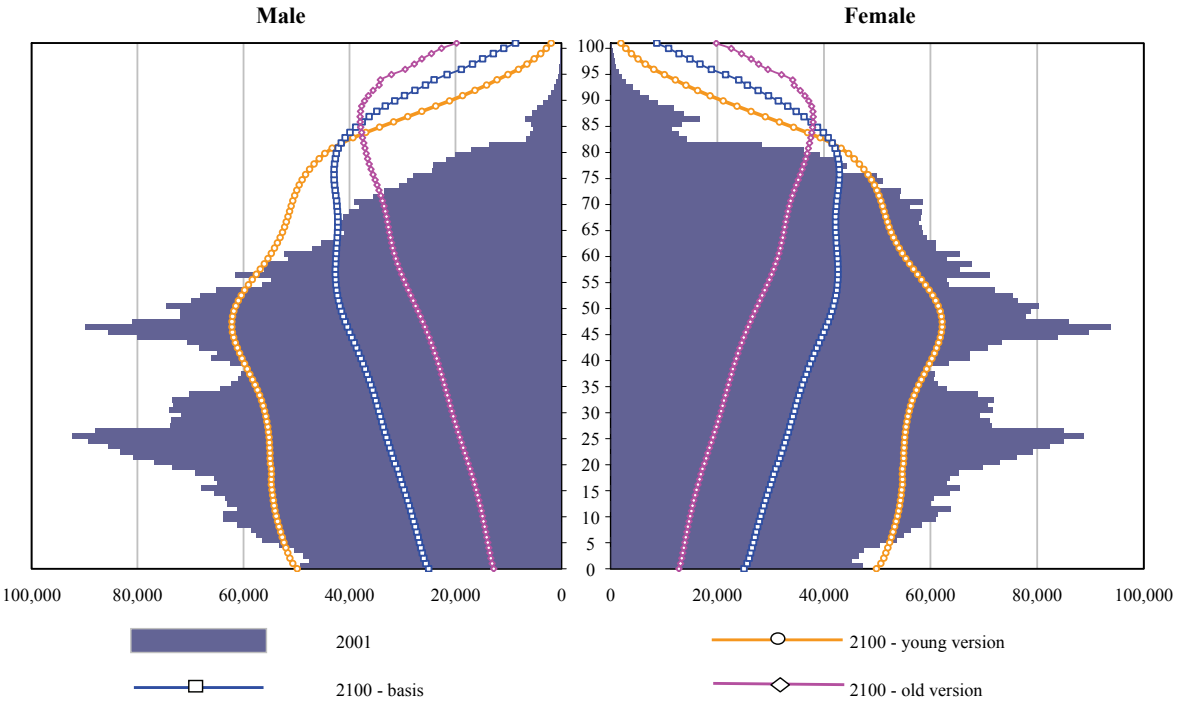
Implicit debt of the Hungarian State Pension System
(percent of GDP)



Source: Deloitte projection (2008).

Figure 6

Hungarian Demographic Tree



Source: Hablicsek's demographic projection (2007).

Table 1

Transition Matrix, Male 30-43

	A	B1	B2	B3	B4	G	Disabled	Old-age	Dead
A	86.8%	8.6%	1.4%	0.9%	0.6%	1.3%	0.2%	0.2%	0.1%
B1	44.5%	31.3%	8.7%	6.1%	4.6%	4.2%	0.3%	0.2%	0.2%
B2	27.2%	20.2%	14.2%	11.5%	10.8%	15.6%	0.4%	0.0%	0.2%
B3	19.1%	14.1%	13.3%	13.7%	14.3%	24.8%	0.4%	0.0%	0.3%
B4	9.8%	9.1%	9.9%	12.0%	21.0%	37.3%	0.5%	0.1%	0.4%
G	2.4%	3.4%	4.3%	5.2%	8.6%	74.9%	0.4%	0.4%	0.5%
Disabled	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	95.5%	0.0%	4.5%
Old-age	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.6%	0.4%
Total	**55.0%**	**10.5%**	**4.0%**	**3.6%**	**4.3%**	**19.1%**	**2.8%**	**0.4%**	**0.3%**
Density	100.0%	87.5%	62.5%	37.5%	12.5%	0.0%			

Source: Author's calculations based on Pension Statistics.

- Person B1 works at least ¾ year,
- Person B2 works at least ½ year,
- Person B3 works only ¼- ½ part of the year,
- Person B4 works less than ¼ part of the year,
- Person G does not work in the given year at all.

Looking at the transition matrix of men (aged 30-43, the most active members of the society) from 2004 to 2005 a straightforward conclusion is that further reduction of participation density should be prevented. Table 1 covers 960 thousand people 77 per cent of whom contributed to the PAYG system. 55 per cent of them were full workers, 22.4 per cent contributed in a certain part of the year, 19 per cent did not pay contribution in 2005. Based on the special early retirement conditions for certain professions 0.4 per cent of this young cohort retired.

Weighing the total ratios by the contribution densities,[7] the overall contribution density (OCD) equals to 68.6 per cent. A bit less than 1/3 of the year remains uncovered by pension contribution. Analysing different age groups the ODC ratios remain lower. The females' overall contribution ratios are a bit higher than the appropriate males' results.

Further research is needed to analyse the following possibilities:

a) How can we increase overall contribution density within a given service period for different age groups and for both genders?
b) What kinds of incentives are encouraging people to extend service period without increasing legal retirement age?
c) How can we effectively increase statutory retirement age with or without increasing employment rates.

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[7] Overall contribution density: 55*1+10.5*0.875+4*0.625+3.6*0.375+4.3*0.125=68.6.

5 Conclusions

Finding practical solutions and implementing them should be the first step on the path towards the pension reform in Hungary. We now live in a society where significantly more emphasis is being placed on personal provision for retirement. People are encouraged to save individually in Pillar II by taxation. On the other hand state provision is not out of favour. The aim of social insurance is twofold: to alleviate poverty in old age, and provide a big pooling of risk not only for old age pensioners, who contributed to the pension system during their working period, but for disabled persons and survivors as well.

Attitude of people to pension system and savings for retirement period should be changed before introducing new pension reform. Neither the NDC nor the point system can solve our problems originated in short contribution period and early retirement.

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COMMENTS ON SESSION 1
PENSION REFORM AND THE LABOUR MARKET

Johannes Clemens[*]

As agreed previously, I will focus my comments on the papers by Najat El-Mekkaoui De Freitas and Joaquim Oliveira Martins: "Consumption Structure, Welfare Goods and Retirement Income: Linking the Ageing Puzzles", and by Paul Rodway: "Public Pensions and the Labour Market in New Zealand". I found both papers very stimulating and well founded.

1 Discussion of "Consumption Structure, Welfare Goods and Retirement Income: Linking the Ageing Puzzles" by Najat El-Mekkaoui De Freitas and Joaquim Oliveira Martins[1]

The paper by El-Mekkaoui De Freitas and Oliveira Martins is very ambitious, as it deals with no less than four pension puzzles. These are correlations economists would not usually expect because of their belief in the lifecycle theory:

i) People are not perfect consumption smoothers. Instead, they tend to consume less in old age;

ii) People are net savers even in old age. In a lifecycle world they should rather dissave;

iii) Countries with more pension fund assets have lower private household saving rates. If PAYG contributions are regarded as substitutes for private savings, the opposite result could be expected;

iv) Rising longevity seems to be correlated with lower savings, although a longer life needs more private provision for retirement.

Puzzles (i) and (ii) can be illustrated by hump-shaped consumption age profiles. Consumption smoothing in reality obviously does not mean perfect equalisation of consumption potentials in all phases of our lives. It rather means consumption planning, and thereby taking into account all income sources as well as consumption necessities in old age. If rational consumers save in old age, this should be driven by bequest motives. Another explanation might be special purpose savings or consumption smoothing within the retirement period. The fear of needing (not fully subsidised) long-term care at the end of one's life might drive the observed savings.

The OLG model is very insightful. However, the longevity puzzle does not really seem to be solved. Perfect consumption smoothing might lead to higher consumption during the working years if the expected income in old age rises. But if it rises only in sum because of a longer retirement phase, it is very hard to follow the author's argumentation. The saving-longevity puzzle remains striking. Maybe people not only take into account their increased longevity but also the necessity to work longer (hopefully in good health). Perhaps they have to adapt their bequest plans because they live longer and dissave more than envisaged during retirement.

It remains difficult to explain the saving-capitalisation puzzle. There were very numerous attempts to find empirical evidence for the Feldstein thesis of a wealth substitution effect when introducing a PAYG pension scheme. Even Feldstein himself mentioned the countervailing retirement effect. According to this effect, people retire earlier purely because of the existence of a pension scheme. As a result, however, they have to save more and consume less. The

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[*] Deutsche Bundesbank.

[1] The discussion refers to the original version of the paper which has been revised in the aftermath.

Barro-Feldstein controversy is well known. But all the empirical cross-section, time-series and cross-country studies have not yet brought absolute clarity to the saving-capitalisation debate.

Finally, there is some good news in the findings; due to the hump-shaped consumption age profile, demographic ageing would be consistent with lower per capita growth rates, which is nevertheless to be expected because of the shrinking working force. If the elderly do not want/need to consume as much as younger people, less production is needed to keep the welfare status constant. Indeed, it might be misleading to place too much emphasis on the expected decrease in the per capita growth rates.

2 Discussion of "Public Pensions and the Labour Market in New Zealand" by Paul Rodway

The paper by Paul Rodway deals with the interaction of the New Zealand statutory pension scheme, called NZ Superannuation (NZS), and the labour market participation of the elderly. It is well known that the demographic change will put public finances under pressure. The post-war baby boom will (temporarily) cause strong increases in the number of pensioners. The more or less linear rise in further life expectancy will continuously worsen the ratio of tax payers to pensioners. And finally, the tax base will erode due to insufficient birth rates to stabilise the population.

According to the brief but enlightening characterisation of the pension system, the NZS offers a flat pension at the age of 65 to every New Zealander, notwithstanding whether he/she is in paid employment. In contrast to Bismarckian pension schemes in central Europe, the NZS includes a substantial element of explicit income redistribution. On the one hand, this makes the system successful in fighting old age poverty. 66 per cent of the net average wage for a couple implies a 100 per cent or more replacement rate for a household receiving less than two-thirds of the average gross wage. On the other, due to the absence of any equivalence between contributions and benefits, the taxes levied to finance the NZS cause distortions and lead to inefficiencies.

Paul Rodway is right to emphasise that there is no implicit tax to be taken into account by a pensioner considering whether to participate in the labour force. He/she receives the pension at the age of 65 regardless of whether he/she remains in employment. However, it should be mentioned that the explicit tax on the optional additional labour income is partly used to finance the pension scheme without giving rise to any additional pension claim. This disincentive to labour supply is the result of income redistribution within the NZS. The tax burden is the same for every cohort, but only those aged 65 or more can avoid it by leaving the labour force.

The figures on labour force participation are very instructive. They give us a hint of the importance of the retirement or, more precisely, the eligibility age. Obviously, the rise from 60 to 65 by 2001 caused a significant increase in the participation rates of those aged 55 to 64. In Germany, there was a comparable development from 1997 onwards. Here, actuarial deductions were introduced in stages in the event of early retirement (especially after unemployment or old age part-time work). Since 2005, there has generally been no opportunity to retire early (*i.e.*, before reaching the age of 65) without these deductions. The result (together with major labour market reforms) is a relatively strong increase in the labour force participation rate of the elderly in Germany (see Figure 2).

Unsurprisingly, the willingness to work after 65 diminishes. Theoretically, the positive income effect in the form of the NZS pension must lead to a lower labour supply if the demand for leisure is characterised by a positive income elasticity. This matches with the finding of a sudden cut in full-time work at 65 and – for men – a steady increase in part-time work with advancing age.

The deeper analysis of special factors that influence retirement behaviour is very interesting. According to the findings presented by Paul Rodway, the probability for remaining in work rises if a person does not have a non-working spouse. This might be interpreted as good news because secular trends moving from families to single households indicate some fiscal relief. Regarding the findings on health status, which is stated here to be rather irrelevant to decisions on whether to work, I would be cautious. Disabled persons are, by definition, no longer able to work. If they are included in the sample, one should expect some influence from health status. Persons who are not disabled but less healthy probably do not have a choice on whether to leave the labour force – unless they can count on the support of a spouse. And finally, the general trend moving from physically demanding jobs (in the production sector) to mentally demanding jobs (in the service sector) might make it easier to stay in work even with a worsened health status.

What could be done to ensure fiscal sustainability in the next 30 years and beyond? Weakening the indexation means lower replacement rates. This might be politically difficult to sell. Fortunately, however, New Zealand has a highly redistributive pension scheme. Therefore, smaller pensions would be less of a problem to low income groups than, for example, in the German pension scheme, with its high degree of equivalence of contributions and benefits. On the other hand, pension cuts would be less effective from a fiscal perspective, because there are no "big" pensioners, who would lose more than those at the lower end of the income distribution.

The first choice, therefore, would seem to be an increase in the eligibility age, preferably automatically indexed to rising life expectancy. For example, it should be possible to argue that there is an obvious necessity to stabilise the ratio of time spent in retirement to the time spent in work. Longer working time – as Paul Rodway points out very clearly – is the key to dampening the fall in potential output growth and, consequently, to strengthening the economic basis of government finances and, not least, the social security system.

Some doubts arise regarding the idea of diverting the NZS pensions to a capital funded private scheme (KiwiSaver account) while staying in work. Letting the KiwiSaver account run above the age of 65 and allowing people to put money aside on a voluntarily basis would be a good idea. However, if subsidies are involved in these private savings accounts, it should be kept in mind that extra expenditures are not consistent with fiscal sustainability. This is a general caveat of government sponsored private savings accounts because it contradicts the goal of fairer intergenerational burden-sharing.

COMMENTS ON SESSION 1
PENSION REFORM AND THE LABOUR MARKET

Tomasz Jędrzejowicz[*]

I would like to thank Daniele Franco and Banca d'Italia for the opportunity to participate and discuss two inspiring papers of this session. The first one, by R. Vegas *et al.*, is an empirical study, dealing with retirement decisions in Spain, conducted using detailed data on labour and pension histories. The second one, by A. Ahuja and R. Paserman, is an overview paper, focused on pension policies in European Union countries from a macro perspective, which draws on policy exchange and coordination between EU Member States in the area of pensions and social protection conducted in the context of the Open Method of Coordination. The two papers are therefore quite different, but both deal with the key issue of determinants of retirement decisions, in particular in case of early retirement.

Pension wealth is generally found in studies to be one of the key drivers of retirement decisions. This result is confirmed by the Vegas *et al.* paper, where social security wealth turns out to play a greater role in the retirement decision than variables representing the increase in pension an individual could obtain by working longer, which also turn out to be significant. A higher replacement rate in principle also encourages early retirement, but in practice OECD studies show it to be less relevant and Vegas *et al.* obtain a similar result, with the replacement rate turning out to be insignificant. Other public income support programmes available prior to pensionable age, such as disability, unemployment and special early retirement schemes, also play a role, as do the levels of health, education and income.

An issue related to retirement decisions, which recently has been receiving some attention in the literature is that of involuntary retirement. The issue is potentially relevant for both papers. In case of the paper by Vegas *et al.*, involuntary retirement may not be captured directly, because of the nature of the dataset used. The issue is to some extent addressed indirectly, as the authors use a GDP growth variable to proxy the macroeconomic environment, but the results obtained are counterintuitive. Perhaps it would be useful to explore different variables representing the overall labour market environment, such as the level of unemployment or the number of jobs lost in a given period.

Another potentially important issue in the context of retirement decisions is the minimum pension guarantee which would generally promote early retirement among low-income workers. The significance of this effect is likely to increase with reforms lowering average replacement rates, less intra- and inter-generational redistribution and more common temporary employment. The level of minimum pension is susceptible to political pressures and therefore subject to frequent ad hoc adjustments, which lead to uncertainty about its future level.

For the case of Spain, Vegas *et al.* find that the minimum pension guarantee increases the probability of retirement at 60, but the effect appears to be relatively small and is reversed for workers aged 61 to 65. Though not directly comparable, these results seem to be qualitatively different from those of Jiménez-Martín and Sánchez (2006), according to whom the minimum pension guarantee in Spain increases retirement at age of first entitlement and early retirement in general by almost 50 per cent. The importance of the minimum pension guarantee in the Spanish pension system is also referred to in Boldrin *et al.* (2008), as well as OECD reports.

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[*] Narodowy Bank Polski.

The paper by Ahuja and Paserman states that indeed, most EU Member States perceive minimum income benefits as benefits as providing negative incentives towards longer working lives, a conclusion generally consistent with empirical literature. However, while looking through the publications produced in the framework of the Open Method of Coordination, I have found an earlier one devoted specifically to the issue of minimum income provisions for older people (SPC, 2006), which gives a rather different message, stating that there is "no real evidence to prove or disprove labour market or savings behaviour impacts of minimum income benefits for older people".

Another important and much debated issue raised by the Commission authors is that of a move to funded pension schemes. The paper points out that such a move was usually motivated by the desire to pre-fund the future pension burden, as well as obtain higher returns on contributions in the private pension pillar. While the second argument has been questioned in the literature, the first one is fully viable, especially as it also entails other advantages of a political nature. Firstly, a move to an individual defined contribution pension scheme implies making the implicit future cost of ageing of the populations explicit, thus supporting the recognition and acceptance of the need for pre-funding of the pension burden. Secondly, once a defined contribution system with individual pension accounts is set up, a reversal of the reform would entail very significant political costs. These would most likely be higher than in case when the government were to abort pre-funding conducted at the government level, via debt reduction or building government reserve funds.

But as the authors rightly point out, the move to funding also entails some risks which may need to be addressed. Firstly, one needs to note the shifting of the pension risk from provider to the beneficiary. This may be viewed as an opportunity to get participants more involved in pension planning, but in order to make this happen, costs will have to be incurred in reach them.

In addition, the current financial market turmoil has shown that pension accounts may be at risk due to financial market volatility. While swings in asset prices are normal, although "normal" depends on the magnitude of these swings, it is important to ensure that funds of persons close to retirement are invested in low-risk assets.

Speaking of the current downturn, the Commission authors point to a number of challenges arising in connection with the financial turmoil and global economic downturn. These include first of all rising unemployment, resulting in delayed establishment of younger workers on the labour market and, consequently, lower accumulation of contributions in defined contribution pension schemes, both funded and notional. Older workers will also suffer by becoming more susceptible to layoffs, with increased take-up of early retirement being the likely consequence. Some Member States are also delaying pension reforms or the activation of automatic mechanism which in the current climate would otherwise lead to lower pension benefits. Funded pension schemes are facing increasing challenges with the recent fall in asset value and increased risk of pension adequacy problems. In addition, one general challenge, which is already evident, is related to the massive increase in deficit and debt levels in connection with the current downturn. This will have significant implications for the size of fiscal adjustment required to cope with the ageing challenges.

Finally I would like to conclude by devoting some attention to Poland, which may serve as an example for many issues raised in the paper by Commission authors. Before the pension reform in 1999, Poland had a fairly generous defined benefit pension system, with a relatively flat pension levels, thanks to which the elderly were a group less prone to poverty than the remainder of the population. The system also featured very generous profession-specific early retirement provisions, which in many cases were not justified by medical considerations. In addition, during the early years of economic transformation, the social insurance system had been used to cushion the social cost of restructuring and layoffs, in particular through the use of early retirement, disability benefits

and special pre-retirement benefits. All in all, this provided for a very costly system with strong disincentives to long careers and low participation rates. In 1999 a comprehensive pension reform was introducing a notional defined contribution pillar, as well as a mandatory funded pillar and elimination of the vast majority of early retirement provisions (finally completed in 2008). As a result, according to EPC Ageing Working Group projections, Poland is in a very good position to cope with the ageing pressures. Nevertheless, a number of problems and risks remain. Women's retirement age remains at a low level of 60 years, resulting in low future pensions from defined contributions pension schemes. The shift of responsibility and risk of pension provision to beneficiaries may also be problematic in the longer run, as they are not well equipped to deal with this risk. This is evidenced by the rush of workers to register as self-employed, which means paying lower social contributions, but ultimately will result in lower benefit levels. The minimum pension will also gain significance as under the new system many low-income workers, especially those with sizeable breaks in their careers, will likely not accumulate sufficient funds in their individual pension accounts and will therefore draw on the minimum pension. Given the risk of discretionary adjustments of the minimum pension as a results of political pressures, this may undermine the idea of the reform.

COMMENTS ON SESSION 1
PENSION REFORM AND THE LABOUR MARKET

Walpurga Köhler-Töglhofer[*]

1 Introduction

OECD countries, in particular the European countries within the OECD, will face major demographic challenges in the not-too-distant future: Age-related public expenditures will increase dramatically due to (a) the strong inflow into retirement when the large baby-boom cohorts reach pension age, (b) the steadily growing life expectancy, and (c) the well-documented decline in the age at which people exit from the labour force. Together with the observed trend towards delayed entry into the labour market, this implies a sharp decline in the length of working life and in its duration relative to the retirement period. Together with declining and now comparatively low fertility rates,[1] this leads to a shrinking active labour population (in absolute terms as well as relative to the number of retirees) which cannot be fully compensated by migration.

The process of population ageing per se is the result of a great progress in human history – the so-called demographic transition. "Before the start of the demographic transition life was short, births were many, growth was slow and the population was young. During the transition, first mortality and then fertility declined, causing population growth rates first to accelerate and then to slow again, moving toward low fertility, long life and old population" (Lee, 2003). People not only live longer these days, they also stay in relatively good health until later in their lives. However, the combination of declining fertility rates, longer life expectancies, low effective retirement ages and the large inflows into retirement of the large baby-boom cohorts transforms the benefits of demographic transition for individuals into a challenge both for the sustainability of public finances and for labour market policy. In many countries, the numbers of workers retiring each year will increase sharply and will eventually exceed the number of new labour market entrants. Without changes in the participation patterns and in productivity, this will result in declining GDP-per-capita growth and thus in lower living standards.

According to the most recent report of the Ageing Working Group of the European Commission's Economic Policy Committee, the reduction in the population aged 15-64 and the increase in persons aged 65+ will cause the old-age dependency ratio in the EU to almost double from 28 to 53 per cent over the next 50 years; at the same time, the total dependency ratio will increase on average by 30 percentage points to nearly 80 per cent.[2] According to the OECD (2006), the ratio of older inactive persons per worker in the OECD area will almost double from around 38 per cent at the beginning of this decade to just over 70 per cent in 2050, if work and retirement patterns remain unchanged.[3]

Given these prospects, raising labour force participation will be one of the most critical measures, since changes in the ratio of retirees will be driven both by changes in the size of older relative to younger groups and by the proportion of older people who participate in the labour market. Thus, increasing participation and employment rates of older workers or – more generally – extending working life is essential for ensuring sustainable public pay-as-you-go pension systems

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[*] Österreichische Nationalbank.

The views expressed in this comment are those of the author and not necessarily those of the OeNB.

[1] Fertility rates have decreased over the last decades and remain substantially below the demographic reproduction rate of 2.1. See Stiglbauer (2006).

[2] See European Commission (2009).

[3] In Europe, this ratio could rise to almost one older inactive person for every worker over the same period. See OECD, 2006, p. 9.

and for safeguarding high living standards. Moreover, this would also be a logical step in the light of increasing life expectancy. As part of the Lisbon Agenda, the European Union aims at increasing the employment rate of older workers to 50 per cent by 2010 ("Stockholm target"). A complementary target is raising the average exit age into retirement by five years ("Barcelona target").[4]

Over the last decade, Europe in fact already witnessed a significant rise in the overall participation and employment rates, with women and older workers being the most dynamic components.[5] However, labour force statistics show that there are significant cross-country differences in the labour force participation of older workers that range from about 30 per cent to more than 70 per cent. Hungary, for example, to which one paper of this session was devoted, exhibits a comparatively low participation rate of about 35 per cent and rather problematic prospects with respect to the development of the old age dependency ratio (an increase of 34 percentage points compared to 28 percentage points for the EU-27) and the total dependency ratio (an increase of 35 percentage points to 80 per cent).

A higher labour force participation of older workers would mean a better mobilisation of the labour supply of older people; this would yield a triple dividend (OECD, 2006). Firstly, it would boost labour force growth and help offset the negative impact of population ageing on economic growth; secondly, it would improve public finances (comparatively fewer expenditures but more contributions) and finally it would help employers by smoothing the pace at which they have to replace retiring workers with new entrants.

2 Decline in the labour force participation of older workers was mirrored by a steady reduction of average retirement age

Labour force withdrawal of older workers was one of the most dramatic demographic trends in the post-war period. In the early 1960s, the participation rate of people aged 60+ was above 70 per cent in most European countries, in some it was around 80 per cent. By the mid-1990s, this rate had fallen to below 20 per cent in many countries, such as BE, IT, NL, FR or AT; in addition, cross-national differences in participation had widened. The downward trend in the labour force participation of older workers lasted until the mid-1990s, when it was eventually reversed in many countries. Despite this trend reversal, the labour force participation of males aged 55+ is still lower now than it was just a few decades ago. Female labour participation has been on the rise in general, as has been the participation of the group aged 55+; however, their respective participation levels are still much lower than those of men.

The trend of falling labour participation of older workers was mirrored by a decrease in the average effective retirement age of workers. In the 1960s and early 1970s, men retired from the labour market when they reached the age of 65. Since then, the average age of retirement has declined dramatically. The average age of female retirement, while historically lower than that of men, has followed a similar pattern from the 1960s.

Gruber and Wise (2002) point out that, to understand these trends, we have to consider the social security systems and their evolution over time, among other things. Pension policies are an important determinant of labour force participation. The extent to which social security systems

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[4] Over and above these goals, it is reasonable to think of ways to shorten education periods and years of study, since otherwise rising numbers of labour markets entrants with tertiary education (which are another explicit goal of economic policy) will tend to shorten working lives further.

[5] Between 2000 and 2008, the employment rates of female and older workers increased by about 5.5 and 9 percentage points respectively.

affect the pattern of labour force participation depends on the generosity of the system, such as replacement and coverage ratios. These two ratios were on the rise in European countries until the mid-1990s.

However, economic incentives built into the social security system were not the only reason why more and more people retired early. Above all, this development was caused by deliberate policy measures to reduce labour supply. Especially at the end of the 1970s and in the mid-1980s, governments, firms and trade unions often created "incentive schemes" for older workers to leave the labour market. Economic policymakers took action to "relieve" the labour market in times of low demand (recessions) or high supply (immigration) or in the face of structural unemployment problems caused by declining sectors – also in Austria. Various "soft landing" plans were implemented to reduce the labour supply (early retirement schemes, specific long-term unemployment benefits for older workers in declining sectors or a generous handling of invalidity pensions); these measures were characterised by less stringent eligibility rules. which were later even extended to all employees. Such bridging pensions were introduced also in FI, IT, DE and NL.[6] Most of these soft landing plans have become permanent institutions which have come to shape people's attitude towards retirement and thus to influence individual retirement decisions.

When investigating, inter alia, the reasons for cross-country differences in the labour force participation of older workers, Börsch-Supan *et al.* (2008) find, not surprisingly, that early retirement regulations in particular are an important determinant of labour force participation decisions in older age. In addition, they find that over and above the general institutional or other differences specific to a country, it is the generosity of the pension systems itself that matters a great deal in making individuals retire or keep on working.

Apart from the retirement rules and the monetary incentives built into the social security systems, also other aspects determine the labour force participation of older people, such as the trend of increasing real earnings, the existence of non-pension alternatives for old age (availability of different sources of income in old age), health-related factors, within-household decision-making (retirement decisions of couples) and care responsibilities, labour demand factors and social norms and traditions.[7]

3 Reversing the falling labour participation trend – an important target of pension reforms…

Labour force participation as well as employment rates of older workers have been raised significantly in several European countries in recent years. Pension reforms introduced since the 1990s primarily aimed at improving the sustainability of the public pay-as-you-go pension systems; they did so inter alia with the help of measures that intended to increase the labour force participation of older workers and to delay their exit from the labour market. The paper by Arpaia, Dybczak and Pierini, which was presented in this session, focuses on whether pension reforms enacted in the EU-27 over the past two decades have been successful in raising the labour force participation of those aged 50+ in the short term. It points to a difference in the short-term impact of pension reforms on the participation rate of men and women. The policy conclusion that can be

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[6] The political intention behind these measures was to replace ageing high-wage workers by young low-wage workers or to encourage older workers to retire in order to give their jobs to younger, possibly unemployed, workers. However, this hypothesis could not be verified empirically for the past decades. Still, in the face of the strong rise in unemployment of young male workers in the wake of the global economic crisis, this argument has again become politically attractive.

[7] The importance of the latter should not be underestimated, in particular in those countries where people tend to retire at the first opportunity offered, even if their pensions are low and would be higher if they delayed retirement. Longer retirement becomes an acceptable, even a highly desired part of a typical worker's life.

drawn from their study is that at least reforms of early-retirement options seem to have had a significant positive impact on the labour force participation of older women.[8] However, we have to bear in mind that this reform category, as defined in the study, includes very heterogeneous reform measures. Thus, from a policy perspective it would be of greater interest to check for the labour supply impact of specific measures or elements. The authors do not find any clear-cut short-term impact from fundamental or non-fundamental reforms. However, people make plans and do not change them quickly when a system changes – and this is particularly true for older people. Therefore, asking about the short-term impact of different pension reforms may just not be the most relevant question. With respect to reforms aimed at enhancing the long-term sustainability of the pension systems, the medium- to long-term effects on participation are probably more important. Above all fundamental reforms – but also early-retirement reforms – may have long phasing-in periods. For instance, Austrian's early-retirement schemes will be phased out slowly until 2017. Moreover, the breakdown of reforms into "early retirement", "fundamental" and "non-fundamental" reforms does not allow any statement or inference about the time horizon, *i.e.* whether the political intentions were geared primarily towards the long term or also to the short term. Finally, as labour supply and labour force participation of older workers are not independent from the cycle, adequately controlling for the economic conditions is indispensable.

4 … but efforts to increase labour force participation have to be transformed into successful structural reforms

If the labour supply of older workers could be more fully mobilised, this would reduce economic dependency ratios and would improve public finances as well as increase potential growth (both in the short and long term). However, in order to transform pension reform-related efforts to increase labour force participation into successful structural reforms, they will have to be complemented with measures improving the employability of older workers in the future; the latter is far from assured. Increasing the employment rates of older workers has to be part of a more comprehensive strategy to cope with population ageing. This requires a broader reform perspective: Attention needs to be given to strengthening the skills and improving the training of individuals to reduce the gap between marginal productivity and total compensation of older people; to combating discrimination against older workers and people with disabilities; and to fostering changes in employer behaviour that inhibits employment of older workers (and people with family and care responsibilities). Moreover, the very low hiring rates of older workers have to be increased.

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[8] As mentioned by the authors, the increase in female labour force participation following pension reforms might be related to the fact that women tend to have shorter working lives due to career interruptions (maternity leaves and other family reasons).

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