Early cessation of activity in the labour market: impact of supply and demand factors

Karakaya, Güngör

Université Libre de Bruxelles - DULBEA

2008

EARLY CESSATION OF ACTIVITY IN THE LABOUR MARKET: IMPACT OF SUPPLY AND DEMAND FACTORS

Güngör KARAKAYA[*]

(Université Libre de Bruxelles, SBS-EM, DULBEA)

Abstract

The main objective of this paper is to analyze the problem of population ageing in terms of the cessation of professional activity (and especially premature labour market withdrawals) in order to provide the various public and private administrations active in these fields with some food for thought. Results show that employer-driven obligation to stop working (owing to business closure, redundancy, dismissal, early retirement, etc.), marital status (married/widowed) and health status are the main reasons for the premature cessation of activity common to all four countries studied (Belgium, Finland, the Netherlands and the United Kingdom), while the desire to retire from the labour market or live off private wealth (voluntary cessation) has a significant effect only for Belgium and the Netherlands. However, the impact of this reason on the retirement age is much lower than that of departure enforced by the employer (2 to 3 times lower in these two countries).

Keywords : Early retirement, Retirement, Demographic changes
JEL-Codes : H55, J26, O15

---

[*] E-mail : gungor.karakaya@ulb.ac.be

1. INTRODUCTION

Many European countries, including Belgium, the Netherlands, Finland and the United Kingdom, are faced with an ageing population, and will be more so over the next few years, because of a weakening of their birth rates and a steady lengthening of life expectancy. As a result of these demographic changes, public systems based on the contributory principle face on the one hand a shrinkage of their financing base and on the other hand an increase in their costs. In other words, this affects contributory pension systems (known as "Pay-As-You-Go" transfer schemes), whereby today's workers finance the pensions of today's retirees, which may raise many questions about the evolution of public retirement policies. Moreover, the increasingly late entry of young people into the labour market because of prolonged education, combined with their difficulty in finding a job and the low labour force participation rates of seniors observed in recent decades, strengthen the financing and cost problems affecting pensions. Working life is therefore reduced at both extremities and thus disrupts the financial balance of pension schemes based on the PAYG principle (where current resources coming from contributions paid by both employers and employees or revenue coming from current taxation are not capitalized but used to pay current benefits). It is primarily in this context that pension systems are undergoing constant transformation. Indeed, such a pension scheme can be sustained only by safeguarding its financial balance.

Several authors have raised and analyzed the challenges facing PAYG pension systems. However, the majority of these works examined the labour supply in a unilateral manner, without considering the influence of labour demand behaviour when it comes to analyzing decisions on early withdrawal from the labour market. In the economic literature, early exits by the elderly have been studied almost exclusively as if it were an absolutely free choice made by workers according to a series of "incentives" pushing them to cease working. However, in many cases of recent exits, we notice that it is not really a free choice but rather a

choice under strong constraints (often dismissal). It is for this reason that we have included the labour demand side in this study.

It is not uncommon to read that if a social security system is unable to bear the expected cost increases associated with an ageing population, in this case pension costs, the legal retirement age should be postponed and/or the pension benefits revised downwards (Pestieau and Stijns, 1997, Jousten and Pestieau, 2000). We would note however that such policies result in an impoverishment of the potential pension beneficiaries who will have fully contributed to the pension scheme. A feeling of unfairness towards the latter is also likely to develop and to dissuade the scheme's contributors, who will receive less than expected once they reach the legal age. The uncertainty about the future benefits to be paid to future retirees indubitably explains the increasing recourse to special pension plans usually provided by the financial sector.

In this paper, the focus will be on early exits from the labour market in four European countries (Belgium, the United Kingdom, Finland and the Netherlands). The choice of these Western countries is made according to the type of welfare states regarding pension systems as proposed by Esping-Andersen (1990)[1]. Belgium is characterised by a conservative-corporatist model where pension system is differentiated and segmented into distinct status/occupational-based programmes. Anglo-Saxon countries such as the United Kingdom follow the liberal welfare state model where the public pension programmes just protect against the risk of old-age poverty leaving the responsibility for further protection to private pension schemes. Scandinavian countries such as Finland belong to the social-democratic type of welfare state. In this country, the basic part of pension benefits is universal and

---

[1] Esping-Andersen (1990) describes three main types of welfare states: conservative-corporatist (belonging to the Bismarckian family), liberal (belonging to the Beveridgian family) and social-democratic.
In this paper, this categorisation refers to pension systems at the end of the 1980s.

3

homogeneous (flat-rate benefits) and based on citizenship or residence. The case of the Netherlands should be considered as a mixture of liberal and social-democratic welfare state[2].

An empirical analysis of both the labour supply side and the labour demand side will allow us to take into account the influence of employers, often neglected in the economic literature when it comes to explaining the key factors pushing seniors out of the labour market. To our knowledge, there is no model of labour demand in the literature to vindicate early withdrawals.

The main purpose of this paper consists in testing some theoretical and empirical results, which will be reviewed, using an OLS model. Given the limitations of our database, it is not possible to test singly all the discussed points in the literature review. Basically, we will analyze the relationship between the cessation age and the reasons to stop working (influence of the employer[3]; end of contract/temporary job or sale/closure of own or family business; own illness or disability; need to look after old, sick or disabled persons; desire to retire or live off private means and other reasons not specified[4]), controlling for a series of variables such as sex, marital status, education and age at starting work.

The second section of this study describes the changes likely to disrupt the sustainability of the PAYG pension system. The third section presents the factors helping to explain early exits from the labour market. The following section describes and analyzes the database used in this work. The fifth section enables us to estimate, using an econometric model, the determinants of the age of activity cessation by the elderly. The contribution of this econometric analysis is that it has the advantage of introducing a variable that reflects the

---

[2] More details about pension systems in these four countries are given in appendix.
[3] Age discrimination, low productivity, seniority-based pay systems, difficulties in adapting to technological and institutional developments, depreciation of human capital, strict employment protection legislation.
[4] Marriage, partner's job requiring a move to another place and other unspecified reasons such as synchronized cessation by married couples, wage level, replacement rates, generosity of social security systems, economic situation, etc.

behaviour of labour demand (and therefore the employer) in addition to the classic variables relating to labour supply. Finally, we conclude in the sixth section.

2. DISTURBING TRENDS FOR THE SUSTAINABILITY OF PENSION SYSTEMS?

According to Eurostat projections, population ageing will affect all European Union countries in different proportions. Table 1 shows the trend in the ratio of the population aged 65 or over to the total population and the population aged 15-64.

Table 1: Ratio of the population aged 65 or over to the total population and the population aged 15-64

	1960		1970		1980		1990		2000		2003		2025		2050	
	Total	*15-64*	*Total*	*15-64*	*Total*	*15-64*	*Total*	*15-64*	*Total*	*15-64*	*Total*	*15-64*	*Total*	*15-64*	*Total*	*15-64*
Belgium	12.0	18.5	13.4	21.2	14.3	21.9	14.9	22.1	16.8	25.5	17.1	26.0	22.5	36.5	27.7	48.1
Netherlands	9.0	14.6	10.2	16.2	11.5	17.4	12.8	18.6	13.6	20.0	13.8	20.3	20.6	32.5	23.5	38.6
Finland	7.3	11.6	9.1	13.6	12.0	17.6	13.4	19.8	14.9	22.2	15.6	22.9	24.6	41.4	26.9	46.7
United Kingdom	11.7		12.8	20.5	14.9	23.3	15.6	24.1	15.6	24.3	16.0	24.3	20.9	33.2	26.6	45.3

Source: Eurostat.

Over the past forty years, we notice a constant and continuous increase in the proportion of the population aged 65 or over in all four countries studied, but with a more pronouced trend in Finland. At the beginning of the period, this country had the lowest percentages of people over 65 in the total population or relative to the 15-64 age group, while it is expected that these rates will outdistance those of the other three countries studied by 2025. The projections also show that the share of the population aged over 65 could almost double by the middle of the 21st century.

In other words, public expenditure on pensions and health care, which are the two main components of social security, are expected to grow considerably by 2050.

Many factors help to explain the phenomenon of population ageing. The ageing of the *baby boomers*[5], increased *life expectancy*[6] and lower *fertility rates*[7] are most often cited in the demographic literature.

Table 2: Total fertility rates

	1960	1970	1980	1990	2000	2003	2020-2025	2045-2050
Belgium	2.56	2.25	1.68	1.62	1.61	1.62	1.68	1.75
Netherlands	3.12	2.57	1.60	1.62	1.72	1.75	1.80	1.85
Finland	2.72	1.82	1.63	1.78	1.73	1.76	1.85	1.85
United Kingdom	2.72	2.30	1.90	1.83	1.64	1.71	1.85	1.85

Source: Eurostat and United Nations (2007b).

Table 3: Male and female life expectancy at age 65

Male

	1960	1970	1980	1990	2000	2003	2025-2030	2045-2050
Belgium	12.4	12.1	13.0	14.3	15.5	15.8	18.1	19.4
Netherlands	14.2	13.6	14.0	14.4	15.3	15.8	17.4	18.8
Finland	11.5	11.4	12.5	13.7	15.5	15.8	18.0	19.8
United Kingdom	11.9	12.0	12.6	14.0	15.7	16.1	17.7	19.3

Female

	1960	1970	1980	1990	2000	2003	2025-2030	2045-2050
Belgium	14.8	15.3	16.9	18.5	19.5	19.7	22.2	23.7
Netherlands	15.3	16.1	18.0	18.9	19.2	19.5	21.5	23.0
Finland	13.7	14.4	16.5	17.7	19.3	19.6	22.1	23.9
United Kingdom	15.1	16.0	16.6	17.9	18.9	19.1	21.2	22.6

Source: Eurostat and United Nations (2007a).

Tables 2 and 3 clearly show a decline in fertility (falling birth rate) and a generalized lengthening of life expectancy (technical and medical progress) over the last forty years. A slight rise in fertility is nevertheless observed from the year 2000 (earlier in the Netherlands).

---

[5] People born after the Second World War (an unusual spike in birth rates).
[6] Average lifetime (or average number of years) we can still expect to live.
[7] Average number of children born to fertile women (aged between 15 and 50 years old).

For both men and women, life expectancy at age 65 is growing continuously over the period studied. However, women's life expectancy is clearly higher than that of men. We can also see some convergence in the fertility rates and life expectancy of the four countries studied in early 2000 and at the end of the projection period.

Another phenomenon that could exacerbate the effect of ageing on public expenditure on pensions is the low labour force participation rates among seniors, particularly those aged between 50 and 64.

Figure 1: Participation rates for the population aged 50-64
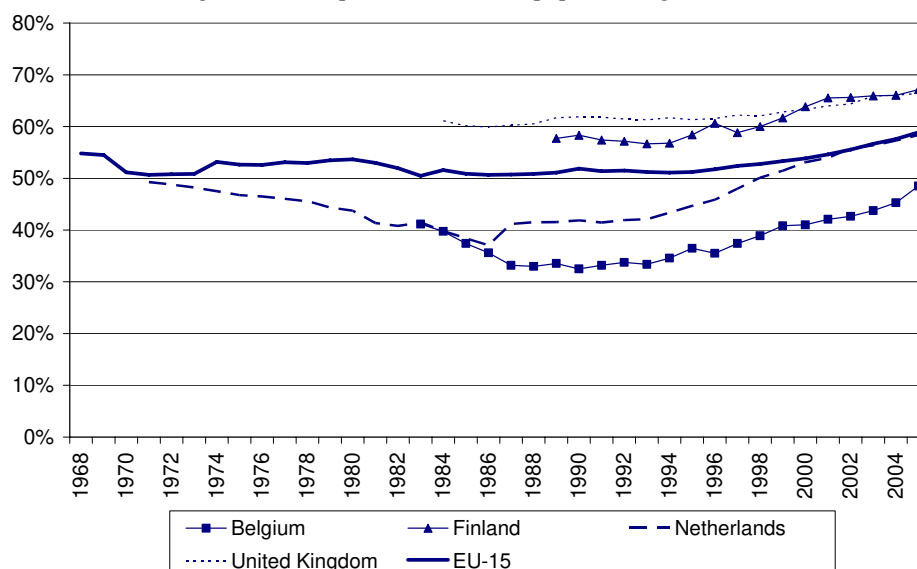
Source: OECD Statistics.

Figure 1 highlights two groups of countries: the Netherlands and Belgium, with participation rates for the population aged 50-64 below the EU-15 average, and Finland and the United Kingdom with higher rates than average. In 2005, almost 70% of people aged between 50 and 64 are active in the United Kingdom and Finland. This percentage is close to the EU-15 average (i.e. 60%) in the Netherlands; in Belgium it is almost 50%. In the early 1970s, both the Dutch and EU-15 rates are very close to 50%. Between the early 1970s and the mid-90s, average activity rates in the EU-15 remain relatively stable, whereas they steadily decrease in the Netherlands and Belgium until the mid-80s. Then, the four countries studied experience a

period (between the mid-80s and mid-90s) where participation rates for older people are constant. It is only from the mid-90s that these countries see an increase in these rates. The strongest increase is observed in countries with the lowest participation rates for older people (namely the Netherlands and Belgium). Belgium and especially the Netherlands even narrow the gap separating them from the EU-15 average. Besides, Table 4 shows that these are also the two countries that have recorded the sharpest rises in their effective average exit age from the labour market.

Table 4: Male and female effective age of retirement

Male

	1960	1995	2001	2005
Belgium	63.3	57.6	57.8	61.6
Netherlands	66	59	61.1	61.6
Finland	65	59	61.5	61.8
United Kingdom	66.2	62.7	63	63.4

Female

	1960	1995	2001	2005
Belgium	60.8	54.1	55.9	59.6
Netherlands	64	55	60.8	61.4
Finland	63	59	61.3	61.7
United Kingdom	62.7	59.7	61	61.9

Source: OECD Statistics.

From 1995, we notice a continuous rise in the age of activity cessation in the four countries studied. During the last ten years, the effective exit age for men rose by 4 years in Belgium, by almost 3 years in the Netherlands and Finland, and by less than one year in the United Kingdom. We would note however that during this period the increase was more pronounced among women than men (women have delayed the cessation age by almost 6 years in Belgium and the Netherlands, by approximately 3 years in Finland and by more than 2 years in the United Kingdom). In 2005, we perceive some convergence in the age of activity cessation among the countries studied.

The same trends as those for the labour force participation rates of people aged 50-64 are observed for the employment rates among this age group (Figure 2).

Figure 2: Employment rates for the population aged 50-64 & 25-49
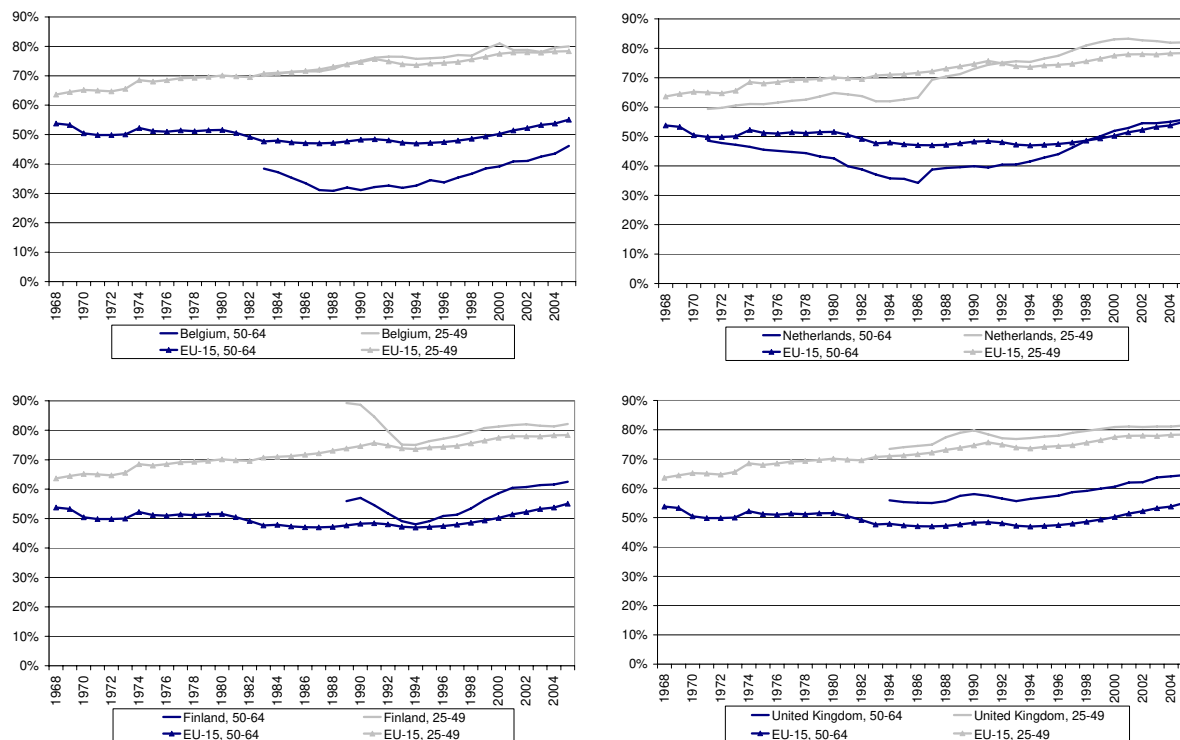
Source: OECD Statistics.

Differences between the employment rates for the age groups 50-64 and 25-49 are lowest in Finland and the United Kingdom, while they are nearly twice as high in the Netherlands and Belgium. The evolution in employment rates for the population aged 25-49 is almost parallel with that aged 50-64. However, all four countries have experienced a more significant increase in the employment rates for people aged 50 to 64 than for the other age group during the last decade.

Although the labour force participation and employment rates for people aged 50 to 64 and the effective age of activity cessation have increased continually since the mid-90s, they are still very low.

Figure 3: Population ageing and labour market effects
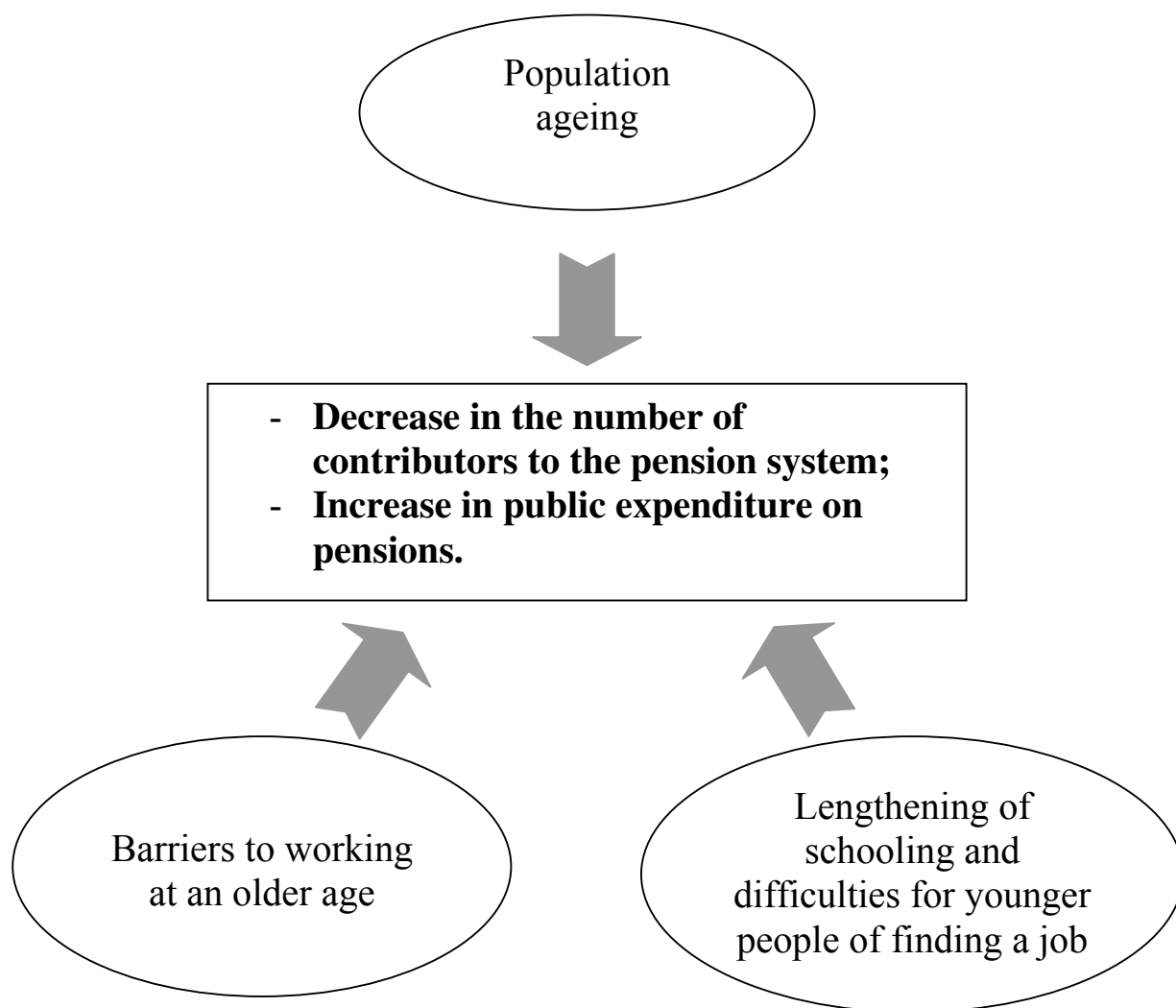
In summary, we can say that population ageing combined with the low levels of activity and employment of the elderly, a low effective age of activity cessation, prolonged education and the difficulties for younger people of finding a job are factors likely to reduce the number of participants in the financing of PAYG pension systems and to increase public expenditure on pensions (Figure 3).

In this work, we will focus on barriers that prevent seniors from working and are therefore liable to influence the premature cessation of activity.

3. BARRIERS TO WORKING AT AN OLDER AGE

To motivate our approach, it is important to present a review of the literature relating to the phenomenon of early exits as broad as possible while highlighting the role of various actors, namely employees (labour supply), employers (labour demand) and social protection institutions. Nevertheless, all the theoretical and empirical points discussed in this section can not be tested by our econometric model given the limitations of our database. Most existing studies on early withdrawals from the labour market focus on arguments based solely on labour supply and/or social protection systems. It is rare to find studies analyzing labour demand to explain precocious exits by the elderly. To our knowledge, there is no model of labour demand in the literature to explain early withdrawals.

While it is true that many early exits from the labour market are caused by employers' behaviour, we cannot deny that activity cessation around 55 years of age is sometimes regarded as the norm, or even as desirable, by part of the population. The first part of this section reviews supply-side barriers to working at an older age. In the first place, we present different models often used to explain premature exits, as well as their limitations, and then some empirical evidence on the decision to retire early or not. These models will not be tested as such in our work, but it is nevertheless important to present them since they are references when it comes to explain the activity cessation through the labour supply. However, some empirical evidences can be directly tested, while others will be indirectly tested or at least will help to clarify some points in section 5 of this study. The second part deals with demand-side barriers. Attention is mainly focused on the role of labour market rigidities (the relationship between wages and productivity by age, employers' negative perception of seniors' capacities, the relatively high costs of adjustment and protection for the elderly) in employers' decisions to dismiss or not to hire older workers. Like the labour supply-side, we can not test each of the factors contributing to the explanation of premature exits through the labour

11

demand. Basically, we will test the role of the employer's behaviour resulting from the combined effect of several factors on early exits given the nature of our database. Finally, we describe some social protection systems which may lead to many routes towards premature exit. The absence of institutional variables in our data will not allow us to test their influence on early withdrawal. Nevertheless, to be aware that other factors (than the labour supply and the labour demand) also contribute to explain the early retirement, one should clarify their role in the literature review.

3.1. Supply-side barriers

In this section, we briefly describe and formalize elements relating to the labour supply which may help to explain early withdrawals. Often, these exits from the labour market are analyzed using microeconomic models, whereby everyone makes an individual choice to maximize his/her utility under intertemporal budget constraint or approaches based on financial incentives that encourage older workers to retire (Boskin, 1977, Fields and Mitchell, 1984, Rust, 1989, Quinn *et al.*, 1990, Stock and Wise, 1990, Börsch-Supan, 1992, Meghir and Whitehouse, 1992, Burtless, 1986, 1999, Diamond and Gruber, 1997, Pestieau and Stijns, 1997, Gruber and Wise, 1999, 2004, Burniaux *et al.*, 2003, Cremer and Pestieau, 2003, Duval, 2003, Cremer *et al.*, 2004, Schils, 2005). One of the main weaknesses of these models is they are based solely on the labour supply side. However, the attitudes of employers have no doubt played a role in accounting for early exits from the labour market. In its dossier on the promotion of seniors' participation (SZW, 2000), the Dutch Government recognizes that employers have played a role in the process of premature exit. According to the U.K. Cabinet Office report (2000) on the ageing population of the United Kingdom, only one third of retirees aged over 50 and having not yet reached the legal retirement age retire voluntarily. In other words, other factors appear to compel older workers to leave the labour market sooner. We present below different labour supply models used in the economic literature on the age

of early activity cessations, as well as their limitations (Bommier *et al.*, 2001). Then we review a set of empirical evidence that may affect the choice as to whether or not to retire early.

3.1.1. Microeconomic models of utility maximization

Microeconomic models of utility maximization under intertemporal budget constraint owe their existence to the life cycle works of Modigliani and Brumberg (1954) and Ando and Modigliani (1963). Some improvements and adaptations have followed, so as to use these models to identify workers' behaviour in terms of decision-making about the age to retire (Burtless and Moffitt, 1984, Gustman and Steinmeier, 1985, 1986, Rust, 1989, Burtless, 1986, 1999, Stock and Wise, 1990, Rust and Phelan, 1997 and others).

The basic idea of these models is that every consumer or worker makes their choices regarding consumption, savings and labour supply by maximizing their utility function (or welfare) under an intertemporal budget constraint where the maximum amount of consumption possible cannot exceed total income (Burtless, 1986, 1999). Consumers then choose the age to retire according to the additional income for an additional year of work and the number of years they expect to spend in retirement. An additional year of work being synonymous with an increase in intertemporal wealth (and therefore in intertemporal consumption) and a decrease in retirement or leisure years, workers make a trade-off between leisure (or retirement) and additional consumption according to their individual preferences. The principle is therefore to evaluate the net marginal gain for staying on the labour market. According to these theoretical maximization models under constraint, workers will thus choose to stop working once their marginal income will be equal to the marginal cost or when the net marginal gain will be zero. Costa (1998) finds that the late 20th century worker can afford to leave the labour market sooner but is also willing to opt for this decision because of the decline in the relative price of leisure. In addition, a worker's health status at the legal

retirement age should also be anticipated in order to assess their healthy life period once they have left the labour market (i.e. the period during which pension benefits will be received). Workers expecting a deterioration in their health (i.e. a decrease in life expectancy) will prefer to leave the labour market early (Burtless, 1999). Rust and Phelan (1997) corroborate this relationship for the United States since they find a positive correlation between poor health and premature cessation of activity. It should be noted that health status cannot represent the main factor explaining the trend towards early retirement. Indeed, in recent decades, the drop in labour force participation rates for the elderly and the decrease in the average age of retirees have been accompanied by an increase in healthy life expectancy (Renterghem, 2001).

These maximization models require several strong assumptions: perfect credit markets (unrestricted borrowing), rational anticipations (predictions using all available information about past and present events and whose margin of error is the lowest possible) and an absence of altruism (wealth used in its totality at the end of a person's lifetime - no bequest possible). These assumptions severely limit the use of utility maximization models under intertemporal budget constraint to explain premature withdrawals from the labour market.

Stock and Wise (1990) formalize workers' behaviour with an option value model. This model assumes that workers take their decision whether or not to retire early by comparing the different utilities for every possible retirement age. The optimization problem, in year t, is to choose the retirement age (or the retirement year r) maximizing the sum of utilities ($V_t(r)$) derived from future labour income (while working) and pension benefits received until the end of life (while retired) and weighted by the rate of time preference β.

Formally, we have:

$$V_t(r) = \sum_{s=t}^{r-1} \beta^{s-t} U_w(Y_s) + \sum_{s=r}^{S} \beta^{s-t} U_r(B_s(r))$$

With: β the rate of time preference;

r the retirement year;

$U_w(Y_s)$ the utility derived from future labour income in year s ($t \leq s < r$);

$U_r(B_s(r))$ the utility derived from future pension benefits in year s ($s \geq r$).

In year t, the expected gain from postponing retirement to year r is given by:

$$G_t(r) = E_t V_t(r) - E_t V_t(t)$$

In other words, workers will leave the labour market if there is nothing to gain from continuing to work, thus if $G_t(r) \leq 0$. With $G_t(r) > 0$, they will delay the retirement age.

The optimization problem for workers is to find the optimal retirement age (where $r^* > t$) that maximizes the expected value of $V_t(r)$ and is written:

$$\underset{r}{Max} \quad E_t V_t(r)$$

With r^* as $G_t(r^*) = E_t V_t(r^*) - E_t V_t(t) \leq 0$ workers retire because there is no expected gain from continuing to work, whereas if r^* involves $G_t(r^*) > 0$ they postpone retirement.

The model by Stock and Wise (1990) shows that it is not just the level of pension benefits (depending on the generosity of the pension system) or the increase in wealth from working an additional year that is important, but rather the absolute evolution of future wealth from working more. From data on a sample of firms with pension plans, they find that the absolute evolution of future wealth from working more influences current retirement decisions. Samwick (1998) reaches the same conclusion by using some utility parameters estimated by Stock and Wise.

The option value model assumes that workers are able to anticipate the future value of labour income and pension benefits and to incorporate all new information into their decision to retire early or not (assumption of rational anticipations), which is a strong assumption on the same level as the microeconomic models presented above.

Rust (1989) proposes a model which is much more complex but quite similar to that of Stock and Wise (1990). He modelled a dynamic programming problem that optimizes, as in the case

15

of the option value model, the intertemporal utility of workers or consumers jointly through retirement age and consumption. The assumption of rational anticipations is also present in the maximization model of Rust (1989).

3.1.2. Simulation models of social security incentives on the decision to cease activity

Besides the microeconomic models of utility optimization, theoretically easy to wield in order to investigate workers' behaviour as regards their choice of retirement age but unfortunately not incorporating the labour demand aspect, we find that microsimulation models have been widely used in the economic literature during recent years. These models have mainly been used in order to reveal how social security incentives impact on the decision to stop working before the official retirement age (Fields and Mitchell, 1984, Hausman and Wise, 1985, Sueyoshi, 1989, Diamond and Gruber, 1997, Pestieau and Stijns 1997, Cremer and Pestieau, 2003, Cremer *et al.*, 2004).

A type of simulation model used as a reference in the economic literature on pensions is that of Diamond and Gruber (1997). They were interested in analyzing the incentives of social security systems (particularly the pension system) in the United States. Pestieau and Stijns (1997) adopt the methodology of Diamond and Gruber (1997) on data related to Belgium. They simulate the replacement rates[8], the expected net social security wealth (SSW)[9], the variation in the SSW for an additional year of work and the tax rates (or, if negative, the subsidy rates)[10] for every possible age of activity cessation (54 to 69 years) on the basis of a series of assumptions, including macroeconomic assumptions (price and wage growth). A high positive tax rate represents a high cost for an additional year of work and implies a major

---

[8] The replacement rate is the rate at which social security allowances replace the net earnings from continuing to work or the ratio between the two.

[9] The expected net social security wealth is calculated by projecting all future benefits and net earnings (at their present value) that the individual would receive from a certain age and until death, deducting income tax on the additional years of work.

[10] The tax or subsidy rate represents the ratio between the opposite of the annual SSW variation and the net earnings that would be paid for one additional year of work (or staying on the labour market for one more year).

incentive to retire rather than delay the decision. Conversely, a negative tax rate corresponds to a subsidy likely to encourage the postponement of retirement until a later age. Pestieau and Stijns (1997) base themselves on different kinds of household to assess the incentives to retire from the labour market at an early age. First of all, they consider the basic case: the standard retiree born in 1930, with a wife who is three years younger than him and has never worked and with no dependent children any more. He begins to work at the age of 20 and is entitled to social security benefits only once he reaches the age of 60. Their simulations show that the replacement rates increase with age for people retiring at between 60 and 69, attributable to career completion (45 years) and the replacement of low-earning years by higher-earning years[11]. They also calculate the probable social security wealth at the various possible retirement ages. The variation of wealth by age can be explained using Table 5 outlining the five effects of an additional year of work on SSW:

(a) payment of taxes on earnings (i.e. payroll taxes);

(b) as long as the career is not complete (< 45 years), pension benefits grow by $1/60$ ($= 0.75 \times 1/45$) for a household with a single retiree;

(c) replacement of a low-earning year by a higher-earning year;

(d) work beyond the age of 60 (i.e. the required age to receive benefits) implies fewer years over which benefits can be received;

(e) the growing probability that the worker or his wife will die.

The negative (resp. positive) effects on SSW are obviously *a*, d and *e* (resp. *b* and *c*).

Table 5: Effects of an additional year of work on SSW

Age	(a)	(b)	(c)	(d)	(e)	Total
55 – 59	-	+	0	0	0	+
60 – 64	-	+	0	-	-	-
> 65	-	0	+	-	-	-

Source: Pestieau and Stijns (1997).

---

[11] More details about pension schemes (in particular about the factors influencing pension benefits) are given in appendix.

For a cessation of activity between 55 and 59 years of age, Pestieau and Stijns (1997) observe an increase in social security wealth for every additional year of work, which indicates that the positive effect (*b*) is greater than the negative effect (*a*). The significant decrease in SSW between the ages of 60 and 64 is explained by the negative effects (*a*), (*d*) and (*e*) widely dominating the only positive effect (*b*). Above 65, SSW still decreases because of the magnitude of the negative effects (*a*), (*d*) and (*e*) which are higher than the only positive effect (*c*). Therefore, people ceasing to work at between 55 and 59 profit from increasing subsidies for that age group, while those aged 60 and over face significant taxes (varying around 50%). In other words, they have an incentive to retire by the age of 59 at the latest because beyond that age the loss of wealth (SSW) will be considerable. Krueger and Pischke (1992), Gruber and Wise (1999) and Coile and Gruber (2000) also found that variations in SSW have a significant effect on the decision to retire.

After introducing the case of the standard retiree, Pestieau and Stijns (1997) turn to two other cases, namely that of a single worker and that of a worker who begins work at the age of 25 (late labour market entry).

In the first case, the expected social security benefits (SSW) and the replacement rates are lower than those for the standard retired couple. Indeed, the theoretical replacement rates are 0.75 for married couples with a single retiree and 0.60 for a single worker. Moreover, since the life expectancy of a wife three years younger is higher than that of her husband, the expected SSW of the couple is greater. For a cessation of activity between the ages of 55 and 59, the positive effect (*b*) slightly outweighs the negative effect (*a*), which can be translated as a slight subsidy granted for the additional work of the single worker. Beyond 60, Pestieau and Stijns (1997) find that positive tax rates are consistently higher than for a standard retiree.

In the second case, the subsidies for additional work (between the ages of 55 and 59) are slightly higher than for a standard retiree, while above the age of 60 the taxes on additional work are lower than for a standard retiree.

Pestieau and Stijns (1997) also show that when older workers who are dismissed (involuntarily), and who are very unlikely to find a new job, are entitled to unemployment benefits, only simulations relating to people ceasing to work at between 55 and 59 change. Indeed, once pension benefits become available (i.e. at age 60), workers stopping work are supposed to choose the latter rather than unemployment benefits. This path of transition to retirement is very common in Belgium (it even takes place, under certain conditions, before the age of 60)[12]. In addition, the taxes on additional work for workers under 60 are very high, which can be translated into a heavy penalty if they do not leave the labour market. In other words, workers who are dismissed are discouraged from returning to work in the labour market. This seems to be a consequence of the policies intended to promote youth employment by forcing older workers to leave the labour market early (even before the legal retirement age).

The latter case shows implicitly the influence of social protection systems on early exit through the various routes of transition to retirement (unemployment, disability, and early retirement schemes). In their model, Pestieau and Stijns (1997) stress above all the financial incentives of social security impacting directly on labour supply without emphasizing the influence of labour demand (employers) and social protection systems, which nowadays seems to play more and more of a role in premature exit from the labour market.

---

[12] Section 3.3.1. provides more details on this subject.

To summarize, a major weakness of microsimulations models (as models of utility optimization under constraint) is that they explain phenomena or mechanisms involving early exit from the labour market only in terms of labour supply, considering that social protection systems and labour demand play a passive role. However, social protection systems, in this case pension systems, have had to adapt to the changing labour market, characterized by a less stable and less enduring relationship between employer and employee, and have been increasingly used as instruments of regulation for this market. In recent decades, other social security sectors have played an active role in the end of working life process and therefore in precocious exits. It also inevitably raises the question of taking into account the heterogeneity of the decision-makers (i.e. workers) in these models based on a representative agent.

3.1.3. Some empirical evidence on the decision to retire early

In this section, we review some empirical evidence that may play a role in the retirement age and is regularly referred in the literature.

A) Effect of wealth

It seems reasonable to assume that individual wealth (assets and financial assets, real estate, supplementary pension, etc.) could have an effect on the decision to retire. Indeed, as individuals' lifetimes are limited in time, they may prefer to withdraw earlier from the labour market if they believe they own enough wealth. In this instance, they will be willing to substitute leisure years for working years. Wealth here is seen as financial security, reducing dependency on income from labour. Nevertheless, since the perception of wealth differs from one individual to another, altruistic behaviour towards heirs and the desire to maintain a decent standard of living (income effects) may also delay the retirement age. Holtz-Eakin *et al.* (1999) obtain low income effects for the United States and stress that only substantial changes in social security benefits are likely to considerably influence retirement decisions. Other studies on the United States find a negative correlation between the possession of

wealth and retirement age (Boskin, 1977, Burkhauser, 1980 and Burtless and Quinn, 2001), with a higher impact for women than for men (Hanoch and Honig, 1983). According to Costa (1998), the downward trend observed in elderly people's labour force participation rates stems mainly from increases in the private wealth they possess (such as real estate). Moreover, he asserts that the rise in female labour force participation rates increases household wealth and could consequently augment early retirement in men. Holtz-Eakin *et al.* (1993, 1999), Joulfaian and Wilhelm (1994) and Imbens *et al.* (2001) note that a significant and unforeseen increase of wealth (inheritance, lottery winnings, etc.) reduces the labour supply. Cheng and French (2000) and Coronado and Perozek (2003) notice that the stock market boom of 1990 caused a decline in elderly people's labour force participation rates and early retirement by capital holders just before the bull market.

B) Effect of income/wage

In the theoretical models described above, we have seen that income from labour plays a role in the decision-making of employees. The higher the wages they expect, the higher the cost of leisure and therefore the greater the desire to delay retirement (Costa, 1998, Kim and Feldman, 1998, Heyma, 2001). As in the case of wealth, the rise in female labour force participation rates increases the probable level of household pension benefits and thus may encourage early retirement (Costa, 1998). Many studies show that this impact is greater for women than for men (Burkhauser *et al.*, 1996 and Fronstin, 1999).

Heyma (2001) affirms that significant investment in education requires much time and money, which results in late entry into the labour market and thus less experience in this market. But on the other hand it raises hopes of higher wages (Karakaya *et al.*, 2005). Heyma stresses that these elements may well encourage employees to continue in work rather than to leave the labour market early.

C) Effect of replacement rates

A large majority of studies analyzing the impact of a change in the generosity of social security systems (in this case measured by the replacement rate) on retirement age finds a negative correlation between these two variables. Many authors suggest that a significant tax on seniors' labour income encourages them to bring forward their planned retirement date (Pestieau and Stijns 1997, Gruber and Wise, 1999). Based on historical data for 13 industrialized countries, Johnson (2000) concludes that the increase in pension scheme generosity, observed since 1920, explains nearly 11% of the decline in labour force participation rates for people aged 60 to 64, the remainder probably being due to the increase in private wealth. Blöndahl and Scarpetta (1998), however, find no clear correlation between a high replacement rate and early retirement. The absence of unanimity about this relationship may be partly explained by the different application, from one country to another, of disadvantageous actuarial adjustments in the event of premature retirement. Herbertsson (2001) affirms, in this regard, that weak incentives to continue to work (such as high replacement rates) may well be a political response to labour demand shocks. This author therefore expresses the view that it is highly likely that other factors and economic agents, such as firms (labour demand) and social protection institutions, compel employees to leave the labour market early (*pull effect*).

In many studies, financial factors (A, B and C) are considered to have the most important influence on the decision to leave working life (Taylor *et al.*, 1995, Disney *et al.*, 1997).

D) Effect of human capital depreciation

Many studies, including those of the OECD[13], show that seniors may suffer depreciation of their human capital or have difficulties in adapting to technological and institutional developments. In addition, the motivation to follow training courses, available to help them

---

[13] OECD (2006).

overcome these problems, is generally very low because of the short period in which investment in older people's training may be profitable. The depreciation in human capital, having a negative effect on productivity, may dissuade employers from retaining workers until the legal retirement age or hiring seniors. It would be worth investigating whether there really is depreciation of human capital among older workers, or whether this is merely a stereotype.

E) Effect of health

Most research acknowledges the influence of health status on the retirement age (Burtless and Moffitt, 1984, Rust and Phelan, 1997, Burtless, 1999, Pienta, 1999, Heyma, 2001, French, 2005, OECD, 2006 and others). As we have seen from the introduction of microeconomic models of utility maximization under budget constraint, a worker's expected health status at the legal retirement age plays a particularly important role in his/her decision-making. If he/she predicts a deterioration in health or a decline in life expectancy, then he/she will prefer to leave the labour market sooner, as the period during which pension benefits will be received is likely to be shorter (Rust and Phelan 1997, Burtless, 1999). Moreover, the years spent as a retiree (or at leisure) are all the more appreciated when health is good (Heyma, 2001). The inability to work due to a severe deterioration in mental or physical health or functional limitations resulting from a chronic disease inevitably imposes an absolute constraint on the supply of labour. In recent decades, the decline in elderly people's labour force participation rates and in retirees' average age, accompanied by a rise in life expectancy and healthy life expectancy, reveals that health may not constitute the main factor explaining early retirement (Renterghem, 2001).

F) Effect of gender and marital status

Costa (1998) and Kim and Moen (2001) note that the gradual entry of women into the labour market could lead men to alter their behaviour in terms of retirement. Indeed, the presence of

women increases household wealth and could consequently reinforce men's decisions to stop work early. According to the wealth effect (see above), married workers should thus retire earlier than singles. O' Rand *et al.* (1992) show, on this subject, that the retirement age is influenced by whether or not the spouse has engaged in paid activity, albeit temporary, at any stage in the past. Other empirical evidence suggests that couples tend to synchronize their retirement (Blau, 1998, Kim and Feldman, 1998, Blau and Riphahn, 1999, Jimenez-Martin *et al.*, 1999, Sédillot and Walraet, 2002, An *et al.*, 2004 and Gustman and Steinmeier, 2004). The study by Lilja (1996), based on Finnish data, shows that when one spouse is inactive, then the other partner is encouraged to exit the labour market earlier. Blau (1998) obtains the same results for the United States. Szinovacz and De Viney (2000) emphasize that women continue less frequently than men to work once their spouse is in retirement. Given that women often marry men older than themselves, retirement coordination means that they tend to leave the labour market at a younger age than their husband. On the other hand, the presence of children at an older age causes a postponement of the retirement age (Peracchi and Welch, 1994, Alba-Ramirez, 1997 and Reitzes *et al.*, 1998).

The gender wage inequalities suffered by women and interruptions in their careers, especially for family reasons, may compel them to delay their retirement (Szinovacz and De Viney, 2000 and Dahl *et al.*, 2002). On the other hand, since women are often more involved than men in the family and social tasks, the completion of these tasks should affect their decision to retire more significantly than for men (Szinovacz and De Viney, 2000). In general, the empirical evidence suggests that women leave the labour market earlier than men.

G) Effect of the economic situation

Herbertsson (2001) argues that in an economic recession, characterized by the high risk of becoming unemployed (redundancy/dismissal), people close to the official retirement age are more inclined to leave the labour market through early pension schemes offered to them. This

situation allows firms to dispense with older and less productive workers (thereby saving on high wage grades)[14] and to avoid having to pay dismissal costs, even if they disburse attractive *incentive* pay-outs (Disney, 1999). As for potential retirees, they can enjoy advantageous financial conditions if they agree to terms proposed by firms. The influence of firms' behaviour (labour demand) and trade union organizations, with which early retirement schemes are most often negotiated, cannot under any circumstances be ignored. The downward trend in the labour force participation rates for older workers and in the average age of retirees thus seems to be a logical outcome of proposals put to older workers (*pull effect*).

In contrast to a large number of studies, our study does not explain the determinants of early retirement in terms of labour supply alone but also introduces factors related to the demand for labour.

3.2. Demand-side barriers

Most explanations put forward in the economic literature for premature exit revolve around workers' voluntary or planned decisions to cease activity. Nevertheless, early exits may also result from the behaviour of labour demand and may well be a means of involuntary withdrawal from the labour market (Disney, 1999). In many European Union countries, if not all, the actual conditions for a definitive cessation of activity are set first and foremost within companies, regardless of the official retirement age and/or the contribution period to the pension system laid down by the public authorities. Despite this evidence, it is surprising to find a multitude of studies analyzing early retirement solely from the point of view of labour supply and/or social protection systems, leaving aside the labour demand side that undoubtedly plays a fundamental role in premature cessations.

---

[14] A more detailed explanation is given in the analysis of labour demand.

3.2.1. Labour demand analysis

A brief analysis of labour demand would seem useful to facilitate the economic reasoning lying behind early exit from the labour market.

We know that labour demand emanates from companies which require labour to produce goods and services that can then be sold to generate revenue for them. As we shall see below, companies will benefit from hiring additional labour (or an extra worker) as long as the revenue yielded is expected to be higher than or equal to the cost. Therefore, the demand for labour depends on the cost of the production factor "labour" (i.e. the wages and social security contributions incurred by employers), but also on the elements that will determine the revenue, such as the selling price of goods and services and work efficiency. The selling price of goods and services depends on product quality, consumers' preferences and the structure of the product market. Efficiency or labour productivity is a function of the available technology, the quantities of other factors of production used by companies such as capital or energy, the qualities of each employee, their motivation and skill, their professional experience, etc.

In order to better understand companies' behaviour, let us suppose they aim to choose the level of production that maximizes their profit using two factors of production, namely labour and capital.

By assuming that, in a competitive market, their profit associated with a production level Y is given by:

$$\pi = \text{revenues - costs}$$
$$= \{f(K,T) \cdot p\} - (w \cdot T + R \cdot K) \tag{1}$$
$$= (Y \cdot p) - C(w,R,Y)$$

where:

- π represents the company's profit associated with a production level Y;
- K is the amount of capital;
- T is the amount of labour;

- f (K,T) is the amount of goods or services produced, which is dependent on the amount of capital and labour;
- p represents the market price of goods/services or its marginal cost (i.e. the price that is set by the competitive market whatever the quantity of products supplied in this market, it is said that the company is a "*price taker*");
- w represents wages or the labour unit cost that is determined by the market;
- R is the capital unit cost;
- Y is the level of production;
- C (w,R,Y) represents the company's cost function.

Therefore, employers will choose an amount of labour and capital (known as "unconditional demand") that will maximize their own profit:

Max $\pi = (Y . p) - C (w,R,Y)$

By annulling the first derivative of this expression with respect to Y (first order condition), we obtain:

$\partial\pi/\partial Y = 0 \quad \Rightarrow \quad p - C_Y (w,R,Y) = 0$

The optimal level of production is then given by:

$p = C_Y (w,R,Y)$ (2)

Similarly, but this time by annulling the first derivative of expression (1) with respect to each factor, the optimal amount of each factor of production is given by:

$\partial\pi/\partial T = 0 \quad \Rightarrow \quad f_T (K,T) . p - w = 0$
$\quad\quad\quad\quad\quad \Rightarrow \quad f_T (K,T) . p = w$
$\quad\quad\quad\quad\quad \Rightarrow \quad f_T (K,T) = w/p$

$\partial\pi/\partial K = 0 \quad \Rightarrow \quad f_K (K,T) . p - R = 0$
$\quad\quad\quad\quad\quad \Rightarrow \quad f_K (K,T) . p = R$
$\quad\quad\quad\quad\quad \Rightarrow \quad f_K (K,T) = R/p$

At the optimum, we find that in perfect competition the market price of goods sold by the company is equal to its marginal cost C_Y (because of the competitive market), the marginal

product of labour f_T (K,T) is equal to the real wage w/p and the marginal product of capital f_K (K,T) is equal to its real cost R/p.

In other words, in an effort to maximize its own profit, the company's behaviour consists in remunerating each factor of production in proportion to its real cost. However, we would note that the assumption of a perfectly competitive market does not match the reality of how the labour market functions. Indeed, the natural adjustments that we should see in the labour market are hampered by a multitude of factors reducing its flexibility, particularly the phenomena of moral hazard and informational asymmetry, as well as the institutional factors causing downward wage rigidity (implicit contracts, efficiency wages, opposition between insiders and outsiders, power of trade unions and collective bargaining). They may thus force the company to offer higher wages than those customary on the labour market (which correspond to the worker's productivity). Seniority-based forms of pay clearly show that employees are not necessarily paid according to their productivity. These imperfections in the labour market play a crucial role in explaining early retirement from labour demand.

Table 6 presents some employer-side obstacles in the recruitment and retention of seniors (OECD, 2006).

Table 6: Employer barriers regarding hiring and retention in employment of seniors

Country	Age discrimination and negative attitudes	Seniority-based pay systems and mandatory retirement	Strict employment protection legislation (EPL)
Belgium	Negative employer attitudes. Few workers hired after 45.	Seniority wages common for non-manual workers.	Long notice periods and high severance pay for white-collar workers may have encouraged substantial use of early retirement schemes.
Finland	Evidence of age discrimination despite information campaigns.	Non-wage costs rise with age, *e.g.* for disability insurance.	Notice periods for laying-off workers rise with tenure.
Netherlands	Negative employer attitudes.		Strict EPL is seen by employers as a key barrier to hiring.
United Kingdom	Negative employer attitudes despite age-diversity guidelines. Slow adoption of age-discrimination legislation.	Mandatory retirement permitted after age 65 and in all cases where objectively justified.	

Source: OECD (2006).

3.2.2. Seniority/age, wages and productivity

Lazear (1979) uses an implicit contracts model in an attempt to explain why companies choose not to pay workers according to their productivity. The author shows that in the presence of moral hazard in the labour market where companies fail (or find it difficult) to observe the effort expended by workers, the adoption of a deferred remuneration system increasing with seniority may be beneficial for them. The principle is to pay young workers below their productivity and older workers more than their productivity in order to minimize slackening behaviour on the part of workers. Lazear characterizes the optimal date of retirement as the one that equalizes the sum of wages received throughout the worker's career to the sum of wages that he/she would receive if paid at every moment exactly according to productivity. This mode of deferred payment, as well as the retirement age, is set by the contract signed by the employer and the worker. This remuneration mechanism encourages employees to expend a significant level of effort in the early stage of their careers to be rewarded later with a wage higher than their productivity, whereas slackening behaviour observed by the employer involves dismissal and therefore the loss of future wage surpluses. As the wage of older workers is higher than their productivity, companies also have a vested interest in setting the retirement age at the time of contract negotiations to avoid the lengthening of high wage payments favourable to older workers. The factor that has played an important role in terms of labour demand is undoubtedly directly related to the maximization of firms' profits. Lazear (1979) states that if companies pay workers according to their seniority and/or by age rather than on their productivity, then they should push older workers to leave the labour market earlier or even lay them off before younger workers. Indeed, in this instance older workers receive higher wages even for a level of productivity equal to or lower than that of young people. According to Lazear's argument, the wage differential between old and young people is greater than the productivity differential. This causes some form of

discrimination against older workers because they cost the company relatively more (Disney, 1999).

The OECD's studies (2006) show that, all things being equal, the recruitment and retention probability of older male workers in employment is higher in countries where wages rise less sharply with age/seniority (e.g. in the United Kingdom and Finland) than in countries where they increase more sharply (e.g. in Belgium and the Netherlands)[15]. Hirsch *et al.* (2000) and Aubert (2005) find a significant and negative correlation between the employment share of older workers and their wages relative to younger workers.

Lazear's model enables us to better understand why it is in the interest of employers but also trade unions to participate in the negotiation of early retirement programmes, especially in the case of sectors in economic crisis. The opposition of employers and trade unions to the French government's wish to introduce a reform to increase the eligibility age for early retirement plans may justify (at least partly) the relevance of this model.

According to Behaghel (2003), seniority at the median ages is a factor protecting insiders and thus giving to them some power over the company. Ilmakunnas *et al.* (1999) show that the productivity of a Finnish company declines, all other things being equal, when the average age of the labour force exceeds 40 years (median age). Aubert and Crépon (2004) obtain similar results for France since they find that productivity grows with age up to 40 years, then stabilizes up to 55 years and finally decreases from that age. Hellerstein and Neumark (2004) also find that the productivity of American workers drops after the age of 55. According to Ilmakunnas *et al.* (1999) and Aubert and Crépon (2004), companies would do well to maintain the average age of their labour force around 40 years (the average age considered to be the most productive). Skirbekk (2003) provides an overview of the vast literature on the

---

[15] OECD (2006) presents only the statistics about the relationship between wage profiles by age and employment outcomes for men.

relationship between age and individual productivity and notes that not all studies agree, although a range of evidence confirms the results of Ilmakunnas *et al.* (1999) and Aubert and Crépon (2004). This author also points out that a weakening in several aspects of physical and mental abilities is generally observed from around the age of 50 (numerical capacities, reasoning, speed and dexterity of fingers). However, this decline in physical and mental abilities can be partly offset by professional experience. Behaghel and Greenan (2005), Aubert and Crépon (2004) and Salthouse (1984) stress that studies on the relationship between age and productivity are not exempt from skew. In fact, as older workers tend to be less mobile than younger workers, they may end up concentrated in old and less productive companies. They represent a category of labour that adjusts more slowly to organisational and technical changes and thus to productivity shocks. Moreover, these types of studies are subject to a selection bias since they cover only workers in employment and not those who have left the workforce. In fact, the former may be more productive than the latter.

3.2.3. Cost of dismissing

Herbertsson (2001) suggests that it is more complicated to dismiss an older worker than a young one, in particular because of severance protection growing steadily with seniority and age. This high level cost of firing older workers, to be incurred by employers, may reduce the hiring rate of such workers or lead to a substitution of workers by age. Moreover, companies may prefer to resort to early retirement given the high cost of dismissing older workers. This approach has the effect of ending up with lower participation rates for the elderly.

3.2.4. Enterprise restructuring or economic shock

Wanner *et al.* (2003) stress that early retirement has often resulted from the behaviour of employers with many workers unoccupied during restructuring periods (i.e. redundant workers) and desirous of dispensing with the surplus workers. In other words, it is a way of

dismissing unnecessary workers (i.e. redundant workers) to minimize production costs and maximize profits. Indeed, the wage pressure between older workers (expensive) and the youngest ones gives the latter the advantage when it comes to resorting to redundancies (*push effect*). In addition, Herbertsson (2001) stresses that any transitory and negative economic shock is likely to lead the firm to first rid itself of older workers through early retirement plans or other exit routes[16], given the short period they are expected to stay in the labour market. The greater the share of older workers in the labour force, the more likely this is.

Gautié (2004) focuses on the internal market adaptation of large French companies (mainly establishments in the finance and energy sectors). This author states that if these establishments are faced with overcapacity problems, they respond by avoiding hiring and concentrating on firing older workers (usually through early retirement plans for workers aged over 55). This reaction on the part of large firms is somehow a way to protect other workers, known as insiders (usually younger).

Orszag and Snower (2002) specify that due to the non-internalization of the costs of early retirement dictated by companies (external costs to the State), more workers leave the labour market early, whereas if these costs were to be borne by companies the situation would be quite different. It appears once again here that labour demand plays a fundamental role when it comes to explaining early retirement.

3.2.5. Generalized shortage of jobs

On the other hand, in the presence of a generalized shortage of jobs, older unemployed workers face competition from younger jobseekers (with a higher level of education). The negative perception of older workers' abilities combined with competition from younger ones reduces the opportunities for seniors to find jobs and thus increases their probability of

---

[16] Section 3.3.1. provides more details on this subject.

staying out of the labour market until the legal retirement age. At an older age, the elderly are even permitted not to look for a job, which does not improve their situation on the labour market.

3.2.6. Difficult working conditions: trade unions' policy

Another explanation for early retirement arises from the trade unions' policy which requires early exit into retirement for some categories of activity, especially those where working conditions are physically harshest, given the lower life expectancy for occupants of these types of jobs (mainly blue-collar workers). As noted by Moore and Hayward (1990) and Marmot *et al.* (1997), occupations that involve high physical exertion increase the risk of mortality. The goal of trade unions is to prevent inequality, in terms of life expectancy favourable to white-collar workers, from leading to a discrimination of life expectancy in retirement against other categories of workers (mainly blue-collar workers).

3.3. Social protection system-side barriers

With rising unemployment, particularly among young people, and to avoid collective redundancies, vigorous policies intended to encourage early cessation of activity emerged in most industrialized countries from the 1970s[17]. As noted by Jacobs, Kholi and Rein (1991), Blau (1994), Lindeboom (1996), Blöndal and Scarpetta (1998), Casey *et al.* (2003) and OECD (2006), disability benefits (sickness and occupational disability), unemployment benefits and early retirement schemes are the three major early exit routes from the labour market. Formerly, the reasons given for the establishment of such programmes favourable to premature withdrawal from the labour market had undoubtedly helped to convince public authorities, social partners and employers. This social compromise, welcomed by employers, workers and their representatives, was seen as an economically and socially efficient reaction

---

[17] A period characterized by a serious global economic crisis and high unemployment.

in the face of a large-scale economic crisis. Nowadays, opinions about the sustainability of such policies diverge in particular because of the low elderly participation rates[18] and the likely increase in their number. A good understanding of the functioning of the various pension systems (see appendix for the labour market exit schemes existing in the Netherlands, Belgium, Finland and the United Kingdom) is needed to analyze the different pathways into early retirement (more particularly early retirement schemes, the unemployment pathway and the sickness and occupational disability route).

This section briefly describes the early exit pathways.

3.3.1. Pathways into early retirement

Some social protection programmes are available before the official retirement age (which is generally 65). Early retirement programmes (i.e. pre-pensions) usually derive from collective agreements between the social partners. They cover people who have not yet reached the official retirement age and in this way provide them with an income between the early retirement age and the legal retirement age. Other premature exit routes (disability/sickness and unemployment insurance), as part of social protection programmes, are institutionalized with the mutual agreement of trade unions, employers and public authorities. Table 7 shows the various types of transitional programmes into inactivity in the labour market.

---

[18] Since the 1970s, all OECD countries (except Japan) have experienced a downward trend in the labour force participation of over 55 year-olds, with more pronounced falls in France, Belgium and Germany. This decrease mainly stems from the development of premature retirement schemes or other non-formal early exit alternatives.

Table 7: Transitional programmes in the labour market

	Social protection programmes or collective agreements
From official retirement age	- Old age pensions (*first pillar*) - Occupational/private pensions (*second pillar*)
Before official retirement age	- Disability/sickness insurance - Unemployment insurance - Early retirement pensions (prepensions)

3.3.1.1. Early retirement pensions (pre-pension plans)

Despite the non-payment of pension benefits before the official age, many people leave the labour market before reaching it. These early exits observed from the 1970s were basically explained by the introduction of conventional early retirement plans. In many European countries, tighter policies on the conditions for accessing these pre-pension plans have subsequently emerged from the 1990s onwards and led to other non-formal early exit alternatives (such as unemployment and disability/sickness insurance).

Early retirement plans, mostly offered by employers, pay pension benefits before the age of 65. These programmes were originally well accepted by public authorities, social partners, employers and employees since they should free up jobs for young unemployed people and adjust the size of the old age labour force in firms[19]. Often, these programmes are negotiated with trade unions and are specific to one sector or company. They are mainly financed through contributions paid by employers and employees. In most cases, the requirements to be entitled to pre-pension benefits are related to the number of years worked and the employee's age, although each pre-pension plan has its own access conditions[20]. The benefits

---

[19] See above in the text for further details about the reasons for the establishment of early retirement schemes.
[20] For more details about premature retirement programmes in the four countries surveyed, as well as their evolution, see Table A.3 in the appendix.

paid by these plans generally represent a percentage of the gross salary received at the end of a person's career and they are paid until the legal retirement age.

In Belgium, the ease of access to pre-pension schemes is well-known ("*Canada Dry*" arrangements, agreement-based pre-pension scheme, part-time pre-pension scheme, pre-pension scheme combined with a paid activity). However, in the early 1990s, access to the agreement-based pre-pension scheme, allowing people aged at least 50 to benefit from this arrangement for example, has been made more difficult with the introduction of a special early retirement contribution for employers and the codification of an obligation to hire a job seeker in exchange for every worker moved into early retirement.

Nonetheless, the expected effects of such early retirement schemes have not materialisied in any country. On the contrary, they have caused another problem which is nothing other than a worsening of labour force participation rates among seniors. This evolution is all the more worrying as the number of elderly people is expected to grow in coming years. It is certainly in order to tackle these challenges that most countries (including those studied in this paper) have recently restricted or closed access to pre-pension schemes. However, other early exit pathways (such as disability/sickness and unemployment insurance), as well as the perception of pre-pension as a vested right, have constituted major obstacles to the struggle against the low labour force participation rates of seniors.

3.3.1.2. Other pathways into early retirement: disability/sickness and unemployment insurance

Even where recourse to formal early retirement schemes is not possible, because of unfulfilled conditions for example, we witness early exits from the labour market (through other non-formal early withdrawal alternatives). The main routes into premature retirement differ, however, from country to country. In Belgium and Finland, unemployment benefits have been used as a substitute for agreement-based pre-pension benefits, while in the Netherlands and

the United Kingdom it is basically disability/sickness benefits that have been used as an alternative to pre-pension benefits (OECD, 2006, Lindeboom, 1996 and Heyma, 2001). We can say that the choice of the substitute exit pathway will depend on the ease/difficulty of accessing that path. In all countries, early withdrawal from the labour market is generally synonymous with a permanent cessation of activity for workers aged between 50 and 64 (OECD, 2006). Indeed, less than 5% of them find a job after one year of inactivity (OECD, 2006).

Table 8: Exemptions from looking for work for older unemployed workers

Country	Exemptions
Belgium	- *1985*: unemployed people from the age of 55 (50 for those with reduced ability) who had been unemployed for at least 2 years; - *1996*: unemployed people from the age of 50 who had been unemployed for at least 1 year; - *2002*: the exemption is gradually being phased out for all new entrants aged 50 to 57; - *2004*: unemployed people from the age of 58, unless those concerned can testify to 38 years as wage-earners.
Finland	- unemployed people from the age of 55 (through the "unemployment tunnel": between 55 and 60, payment of unemployment benefits; at age 60, long-term unemployed older workers receive the "unemployment pension" until the official pension age of 65 or the "individual early retirement pension" for those with reduced ability); - *between 2009 and 2014*: the unemployment pension will be phased out and replaced with ordinary unemployment benefits; - *2005*: unemployed people from the age of 57 (unemployment tunnel).
Netherlands	- unemployed people from the age of 57.5; - 2004: the government wants to phase out the exemption to look for work for the older unemployed workers, but municipalities have the discretion to waive this phasing out for the older unemployed whose chances to finding a regular job are very low.
United Kingdom	- unemployed people from the age of 60 receiving either means-tested unemployment benefit or Pension Credit.

Source: OECD (2006).

By definition, the right to unemployment benefits is mainly intended for workers who are involuntarily unemployed and actively seeking a job. However, at a certain age the elderly unemployed are sometimes exempted from job search requirements and benefit from unemployment allowances until the official retirement age as long as they do not hold down a job. This situation inescapably helps to explain the low labour force participation of seniors, who already find it difficult to stay active in the labour market until the legal retirement age.

Table 8 shows the required conditions, and their adaptation, to benefit from the exemption from seeking a job.

Disability benefits are commonly offered by the social security system (and also sometimes by employers) and aim to provide replacement incomes to replace the wages of workers unable to work because of mental or physical problems. These allowances represent either a percentage of the last salary and depend on the disability level (the Netherlands, Belgium and Finland) or a flat-rate benefit that differs according to the beneficiary's age or the spouse's age and the disability level (the United Kingdom). Often, the period during which the beneficiary is entitled to these disability benefits increases with the age at which he/she was recognized as disabled (Sterdyniak, 2004) and the medical requirements for being eligible for a disability allowance are often eased beyond a certain age. The right to these benefits ends at the official retirement age or upon an improvement in the health status/ability to work. This exit pathway has been mainly taken in the Netherlands and the United Kingdom. In fact, the tightening of policies on the conditions of access to unemployment benefits (in particular in the United Kingdom and the Netherlands from the 1990s), pursued in conjunction with the narrowing of access to pre-pension schemes undoubtedly explains the prevalence of exit routes through disability benefits in these countries. In Belgium, however, the disability system is based on more rigorous admission controls (Jousten, 2002), which indubitably explains the preference for unemployment insurance as the main exit pathway in this country[21]. In 1996, the Netherlands transferred the management (and financial costs) of disability insurance to employers, mainly in order to phase out the use of this early withdrawal route. Like the Netherlands, Finland transferred part of the financing of unemployment and disability pensions to employers in 1997 (Morel *et al.*, 2004). While reducing access to formal premature retirement schemes, the Netherlands and Finland have

---

[21] The disability status is recognized only after a period of 12 months spent in primary incapacity (*incapacité primaire*) where regular checks are carried out.

thus enhanced the liability of employers in alternative early exit pathways. In the dossier on the promotion of seniors' participation (SZW, 2000), the Dutch government acknowledges that employers have played an important role in the premature exit process.

Orszag and Snower (2002) are also in favour of internalization by employers of the costs of enforced early retirements in order to reduce premature exits from the labour market.

The rapid progress achieved in the late 1990s, in terms of improvements in the labour force participation rates of seniors and in the effective age of exit from the labour market, seems to confirm the merits of action taken in the Netherlands and Finland (and also in Belgium a few years later). The United Kingdom, which already has labour force participation rates and an effective exit age higher than the other three countries studied, is also seeing an improvement but it is less pronounced than in the other three countries[22].

4. DATA

The database used in this study is based on 8 waves of the *European Community Household Panel (ECHP)* running from 1994 to 2001 for Belgium, the Netherlands and the United Kingdom and from 1996 to 2001 for Finland. The *ECHP* is a harmonized cross-national longitudinal survey in which information on the same set of persons is gathered to study changes over time at the micro level[23]. It provides information on the individual characteristics of interviewees (e.g. marital status, health, education, age, sex) and variables related to the labour market (e.g. age at starting work, reasons to stop working). A person interviewed several times will be included only once in our database.

This work focuses only on individuals aged 50 years and older who have engaged in professional activity as employee and have ceased it. Data from the ECHP are limited to labour market withdrawals which took place between 1980 and 2001. The final sample

---

[22] See Figures 1 and 2 and Table 4.
[23] New persons may also be interviewed and therefore added to this survey.

contains 842 observations for Belgium, 1395 observations for the Netherlands, 1661 observations for the United Kingdom and 1174 observations for Finland. Table 9 presents a descriptive analysis of the data used in this work. Men account for about 70% of the data used for Belgium and the Netherlands and nearly 50% for Finland and the United Kingdom. Among the four countries studied, samples related to the United Kingdom and, to a lesser extent, the Netherlands are characterized by a relatively elderly population (65 years and older). The United Kingdom has only 22% of individuals aged 60 to 64 years, while in the other three countries almost one third of people fall into this age group. Again according to the data used, Finland and Belgium have the highest rates for individuals aged 55 to 59 (nearly 20% for these countries but less than 15% for the other two countries). In the four countries surveyed, approximately 80% of individuals in our sample are married.

Regarding educational levels, the United Kingdom and Finland data mainly comprise poorly educated persons (69% in the UK and 52% in Finland)[24]. More than half of the data used for Belgium and the Netherlands represent averagely or well educated people (51% for the Netherlands and 52% for Belgium).

---

[24] By persons with a poor educational level, we mean people who have no degree or just a degree in primary school or lower secondary school. The level of education will be average if he/she holds an upper secondary certificate and high if he/she holds a higher non-university or university or postgraduate degree.

Table 9: Means of selected variables (standard deviations)

	Netherlands	Belgium	Finland	United Kingdom
Age (years)	64.63 (5.91)	63.19 (6.40)	63.41 (5.82)	65.76 (7.37)
Age (%)[*]				
- 50-54	2.08 [12.40]	7.36 [21.73]	3.49 [16.01]	7.22 [17.52]
- 55-59	15.48 [36.85]	20.43 [38.56]	23.51 [42.33]	13.00 [24.68]
- 60-64	36.06 [40.86]	33.61 [32.35]	34.24 [34.58]	22.34 [34.08]
- 65-69	24.66 [8.75]	21.26 [5.86]	23.42 [6.13]	25.05 [18.78]
- 70 or over	21.72 [1.15]	17.34 [1.49]	15.33 [0.95]	32.39 [4.94]
Age at starting work (years)	17.40 (7.31)	18.25 (6.82)	18.13 (6.44)	16.06 (6.56)
Female (%)	28.32	32.42	51.02	54.43
Marital status (%)				
- Married	81.00	78.24	78.88	76.28
- Divorced	6.81	8.56	7.92	6.56
- Widowed	5.66	6.30	6.05	10.30
- Never married	6.52	6.90	7.16	6.86
Reasons to stop working (%)				
- Retired at normal age	29.68	44.61	33.45	56.59
- Obliged to stop by employer	6.88	28.00	21.84	11.78
- End of contract/temporary job/ sale or closure of own business	3.73	1.86	8.79	2.46
- Own illness or disability	19.00	11.03	27.56	5.89
- Looking after old, sick or disabled person	0.36	/	/	17.14
- Wanted to retire or live off private means	21.08	6.69	6.14	/
- Other	19.28	7.81	2.22	6.14
Education (%)				
- No degree, primary or lower secondary	48.98	47.27	52.09	69.41
- Upper secondary	35.56	28.24	27.11	8.09
- Higher non-university, university or postgraduate	15.46	24.48	20.80	22.50
Number of observations	1,395	842	1,174	1,661

Source: European Community Household Panel, 1994-2001 (1996-2001 for Finland).

[*] The numbers outside the brackets concern the age when interviewed and those situated inside the brackets concern the exit age from the labour market.

Table 9 also shows that, according to the country, 29 to 56% of interviewees have stopped working because they have reached the official retirement age. Stopping work owing to the employer (business closure, redundancy, dismissal, early retirement, etc.)[25] represents between 6% (for the Netherlands) and 28% (for Belgium) of the reasons given by interviewees. A person's own illness or disability is a significant reason for the cessation of activity. Indeed, 19% of Dutch and 27% of Finnish interviewees justify their exit on these grounds. The cessation of activity for family reasons (the need to look after old, sick or disabled persons) affects 17% of British and only 1% of Dutch people. It is worth noting that this reason for cessation is not explicitly included in the Belgian and Finnish survey questionnaires. In fact, it is combined with the reason "*other reasons*" that also includes labour market exit due to the partner's job requiring a move to another place, marriage, synchronized cessation by married couples, wage level, replacement rates, generosity of social security systems, economic situation, etc. The reason "*other reasons*" accounts for 19% of Dutch interviewees, whereas it is less than 8% in the other three countries. The cessation of activity due to the end of a contract/temporary job or the sale/closure of their own or a family business affects less than 10% of interviewees. Among the people questioned, 21% of the Dutch say they have ceased their activity because they wanted to retire or live off private means. However, that rate is relatively low in the case of Belgium and Finland (6%). This motive for cessation is not explicitly included in the British survey questionnaire. It is combined with the reason "*other reasons*".

The following section is based on the data described in this section to investigate the impact of some individual, family and occupational factors on the retirement age.

---

[25] Which can result from the employer's negative attitude towards elderly (age discrimination, low productivity, seniority-based pay systems, difficulties in adapting to technological and institutional developments, depreciation of human capital, strict employment protection legislation).

5. ECONOMETRIC ANALYSIS

5.1. Model

In this study, we use an OLS model to analyze the relationship between the cessation age and the reasons to stop working, while controlling for a series of variables such as sex, marital status, education and age at starting work. Regressions have been estimated with White (1980) heteroscedasticity-consistent standard errors and some statistics or tests verifying the normality assumption (e.g. Skewness, Kurtosis and Shapiro-Wilk)[26].

The model has the following form:

$$AgeCessation_i = \alpha + \beta_1 AgeStart_i + \beta_2 Sex_i + \beta_3 Marital_i + \beta_4 ReasonsStop_i + \beta_5 Education_i + \varepsilon_i$$

where *AgeCessation* is the age of activity cessation, *AgeStart* contains 3 binary variables for the age at starting work (between 17 and 20 years, between 21 and 24 years and 25 years and older, *with 16 years or under as reference*), *Sex* is a binary variable that takes the value 1 for women (and zero for *men that are the reference*), *Marital* includes 3 binary variables for marital status (divorced, widowed and never married, *with married as reference*), *ReasonsStop* contains 6 binary variables, each representing a reason for activity cessation (2 variables are job related reasons: obliged to stop by employer[27] and end of contract/temporary job or sale/closure of own or family business; 4 variables are personal reasons: own illness or disability; family reasons (the need to look after old, sick or disabled persons); wanted to retire or live off private means; and other reasons such as family reasons (in the Belgian and Finnish survey questionnaires), wanted to retire or live off private means (in the British survey questionnaire), marriage, partner's job requiring a move to another place and other unspecified reasons such as synchronized cessation by married couples, wage level,

---

[26] Results allow us to conclude on the relevance of using OLS estimates.
[27] Age discrimination, low productivity, seniority-based pay systems, difficulties in adapting to technological and institutional developments, depreciation of human capital, strict employment protection legislation.

replacement rates, generosity of social security systems, economic situation, etc. (in all four survey questionnaires), *with retired at normal age as reference*) and *Education* contains 2 binary variables for the educational level (to hold at most a lower secondary certificate and to hold an upper secondary certificate, *with higher non-university, university or postgraduate education as reference*).

The model has the advantage of using retrospective data providing individual information at the moment of the activity cessation or earlier.

We also wanted to control for the sector of activity of the last job and the size of the establishment, but the database does not enable us to do so.

5.2. Results

The results obtained from the estimation of the reference model are shown in Table 10. The main explanatory factors for the age of premature activity cessation common to all four countries studied are *obligation to stop by employer* (through business closure, redundancy, dismissal, early retirement, etc.)[28], *marital status* (married/widowed) and *health status* of interviewees. For these factors, the obtained results corroborate those found in the literature (*for the influence of the labour demand*: Lazear, 1979, Disney, 1999, Ilmakunnas *et al.*, 1999, Hirsch *et al.*, 2000, Herbertsson, 2001, Wanner *et al.*, 2003, Aubert and Crépon, 2004, Gautié, 2004, Hellerstein and Neumark, 2004, Aubert, 2005, OECD, 2006; *for the influence of the marital status*: Lilja, 1996, Blau, 1998, Kim and Feldman, 1998, Blau and Riphahn, 1999, Jimenez-Martin *et al.*, 1999, Szinovacz and De Viney, 2000, Sédillot and Walraet, 2002, An *et al.*, 2004, Gustman and Steinmeier, 2004 *and for the influence of health*: Burtless and Moffitt, 1984, Rust and Phelan, 1997, Burtless, 1999, Pienta, 1999, Heyma, 2001, French,

---

[28] Given the nature of our database, it is impossible to determine which factor is decisive among the reasons related to the employer (age discrimination, low productivity, seniority-based pay systems, difficulties in adapting to technological and institutional developments, depreciation of human capital, strict employment protection legislation). Indeed, the obtained estimates for the reason "*obligation to stop by employer*" represent the compiled effect of these factors.

2005, OECD, 2006). Of course, other variables, such as age at starting work, sex, end of contract/temporary job or sale/closure of own or family business, educational level and "*other reasons*" for cessation, also turned out to be determinants of early retirement specific to certain of the countries surveyed. In the case of Belgium and the Netherlands, the age of activity cessation is lowest when cessation is enforced by the employer (through business closure, redundancy, dismissal, early retirement, etc.). In fact, for this type of reason, exit from the labour market occurs 5 years before the official or normal retirement age. Poor health is the second factor that has a significant incidence on the retirement age. The cessation age is more than 3 years and nearly 5 years, for Belgium and the Netherlands respectively, lower than the official retirement age when the exit from the labour market is due to poor health. In the case of Finland, the poor health motive and other reasons (family reasons: the need to look after old, sick or disabled persons; marriage; partner's job requiring a move to another place and other unspecified reasons such as synchronized cessation by married couples, wage level, replacement rates, generosity of social security systems, economic situation, etc.) are the factors that have the strongest negative impact on the retirement age. Indeed, for all of these reasons, the cessation of activity happened nearly 5 years before the official retirement age. As in Finland, poor health represents the main reason for early exit from the labour market in the United Kingdom. The cessation of activity occurs nearly 3 years before the official retirement age in the United Kingdom. It is worth noting that the impact of health on the retirement age in Belgium is significantly different from that of Finland and the Netherlands, while there is no significant difference from that of the United Kingdom (see Table A.4 in appendix). These results are in line with the European Survey on Working Conditions in 2000. Indeed, according to this survey, physically unpleasant working conditions and substantial absences from work because of job-related health problems were more observed in Finland and the Netherlands than in Belgium and the United Kingdom. In

Finland and the United Kingdom, employers' behaviour also influences the official withdrawal age significantly and negatively, but this is less pronounced than in Belgium and the Netherlands. All things being equal, the exit from the labour market arises 1.6 and 3.2 years, for the United Kingdom and Finland respectively, before the official retirement age. The effect of this motive for cessation does not significantly differ between Belgium and the Netherlands, while this is not the case compared to Finland and the United Kingdom (see Table A.4 in appendix). The fact that *Employment Protection Legislation (EPL)* is more rigorous in Belgium and the Netherlands, reducing the flexibility of labour markets and opportunities for the elderly to find new jobs, combined with wages increasing sharply with age/seniority, certainly contribute to explaining the higher impact of employers' behaviour in these two countries compared to the United Kingdom and Finland[29]. The activity cessation resulting from the end of contract/temporary job or sale/closure of own or family business also occurs before the official retirement age, but with some differences between the countries surveyed. In Belgium and Finland, it takes place almost 2 years before the legal retirement age, whereas in the Netherlands it happens only about 1 year before the official age. By contrast, this reason for activity cessation is without significant influence on the retirement age in the United Kingdom. Withdrawal from the labour market due to family reasons has a significant and negative incidence on the retirement age in the Netherlands and the United Kingdom[30]. However, it should be noted that the effect of this reason for cessation is smaller than the motive to stop working under pressure from the employer. Other reasons (a non-exhaustive list)[31] also have a significant and negative impact on the age of exit from the labour market in the Netherlands and Finland.

---

[29] For more information about Employment Protection Legislation (EPL) and the relationship between wages and experience on the labour market or tenure (or age), see OECD (2006).
[30] A significant impact at 1% for the United Kingdom and at 10% for the Netherlands.
[31] See above in the text for more details.

Table 10: Estimated effect on retirement age, 1994-2001 (1996-2001 for Finland)

Variables	Netherlands	Belgium	Finland	United Kingdom
Constant	61.02 (0.49)***	59.65 (0.50)***	60.86 (0.38)***	60.84 (0.44)***
Age at starting work				
16 or under	*Reference*	*Reference*	*Reference*	*Reference*
17-20	0.48 (0.31)	-0.18 (0.37)	-0.42 (0.27)	-0.50 (0.51)
21-24	0.47 (0.46)	0.16 (0.51)	0.09 (0.39)	-0.15 (0.81)
25 or over	1.46 (0.50)**	1.31 (0.56)**	0.09 (0.40)	0.17 (0.91)
Sex				
Male	*Reference*	*Reference*	*Reference*	*Reference*
Female	-0.19 (0.23)*	-1.59 (0.33)***	0.42 (0.23)	-1.87 (0.37)***
Marital status				
Married	*Reference*	*Reference*	*Reference*	*Reference*
Divorced	-0.01 (0.37)	-0.77 (0.57)	-0.42 (0.34)	-0.66 (0.66)
Widowed	1.99 (0.41)***	3.19 (0.62)***	1.90 (0.40)***	3.69 (0.57)***
Never married	0.65 (0.38)*	0.58 (0.55)	-0.08 (0.35)	0.13 (0.67)
Reasons to stop working				
Retired at normal age	*Reference*	*Reference*	*Reference*	*Reference*
Obliged to stop by employer	-4.94 (0.44)***	-4.84 (0.35)***	-3.23 (0.31)***	-1.63 (0.53)***
End of contract/temporary job/ sale or closure of own business	-1.08 (0.60)**	-1.87 (1.10)***	-1.98 (0.45)***	-0.61 (1.05)
Own illness or disability	-4.77 (0.30)***	-3.25 (0.50)***	-4.52 (0.28)***	-2.89 (0.72)***
Looking after old, sick or disabled person	-2.66 (1.79)*	/	/	-1.32 (0.50)***
Wanted to retire or live off private means	-1.60 (0.31)***	-2.00 (0.54)***	-0.16 (0.48)	/
Other	-1.83 (0.30)***	-0.09 (0.65)	-4.42 (0.83)***	-1.39 (0.70)
Education				
Higher non-univ., univ. or postgraduate	*Reference*	*Reference*	*Reference*	*Reference*
No degree, primary or lower secondary	-0.28 (0.30)	0.24 (0.45)	-0.07 (0.35)	1.48 (0.46)***
Upper secondary	-0.26 (0.31)	0.73 (0.43)*	-0.19 (0.37)	0.54 (0.67)
Number of observations	1,395	842	1,174	1,661
Adjusted R-Square	0.21	0.25	0.25	0.18
Chi-Square	118.29***	98.79***	119.77***	109.00***
Shapiro-Wilk	0.97***	0.96***	0.98***	0.99***

Note: Standard errors in parentheses. ***/**/*: indicate significance at the 1, 5 and 10% level, respectively.

The desire to retire or live off private means is only significant for Belgium and the Netherlands. The negative effect of this reason for cessation on the retirement age does not significantly differ between these two countries (see Table A.4 in appendix). Indeed, it is limited to 2 years in the case of Belgium and 1.6 years for the Netherlands and is 2 to 3 times lower (in absolute terms) than the negative impact of the reason for departure enforced by the employer (which was equal to 5 years for these two countries).

Therefore, the results suggest that labour demand has a highly significant effect on the retirement age in all four countries surveyed. In other words, employers' behaviour explains a sizeable part of the low effective average age of exit from the labour market (and therefore early retirement) in Belgium, Finland, the Netherlands and the United Kingdom. Health status also represents a major determinant for early labour market exits. The effect of labour supply on the withdrawal age is also significant but smaller. The significance of the variable "*wanted to retire or live off private means*" for two of the four countries studied (i.e. Belgium and the Netherlands) confirms that a percentage of the working population really wants to leave the labour market sooner than the official retirement age. Several explanations can be given: few incentives to work one year more if tax rates on additional years of work are high or effect of income/wages (Burtless, 1986, 1999, Stock and Wise, 1990, Diamond and Gruber, 1997, Pestieau and Stijns 1997, Costa, 1998, Kim and Feldman, 1998, Samwick, 1998, Heyma, 2001), harsh working conditions, difficulty of work, generosity of the social security system or effect of replacement rates (Fields and Mitchell, 1984, Hausman and Wise, 1985, Sueyoshi, 1989, Krueger and Pischke, 1992, Diamond and Gruber, 1997, Pestieau and Stijns 1997, Gruber and Wise, 1999, Coile and Gruber, 2000, Herbertsson, 2001, Cremer and Pestieau, 2003, Cremer *et al.*, 2004), high expectation of becoming unemployed (through redundancy/dismissal) or anticipation of the company's future activity (effect of economic recession: Disney, 1999, Herbertsson, 2001), substantial and sufficient wealth when retired or

effect of wealth (Boskin, 1977, Burkhauser, 1980, Hanoch and Honig, 1983, Holtz-Eakin *et al.*, 1993, 1999, Joulfaian and Wilhelm, 1994, Costa, 1998, Cheng and French, 2000, Burtless and Quinn, 2001, Imbens *et al.*, 2001, Coronado and Perozek, 2003), etc. The desire to leave the labour market sooner is, however, not significant in Finland or the United Kingdom.

The results shown in Table 10 also indicate that, all other things being equal, widowed workers leave the labour market 2 to 4 years later than married workers, whatever the country surveyed. One possible explanation could be the married couples' arrangement to synchronize their withdrawal (Lilja, 1996, Blau, 1998, Kim and Feldman, 1998 and Sédillot and Walraet, 2002) or the fear of depending on a social allowance or simply the desire to escape loneliness by continuing to work. This postponement of retirement does not significantly differ between Belgium and the other countries studied (see Table A.4 in appendix). Table 10 also shows that, all things being equal, women leave the labour market nearly 2 years earlier than men in Belgium and the United Kingdom[32]. The impact of gender on the withdrawal age is not significantly different between these two countries (see Table A.4 in appendix). This finding seems logical since the official female retirement age is lower than that for men in both countries[33]. Furthermore, it appears to confirm the observation of Szinovacz and De Viney (2000), according to whom women continue less often than men to work once their spouse chooses to retire. Moreover, as women often marry men older than themselves, retirement coordination implies that they tend to leave the labour market at a younger age than their husband (Lilja, 1996, Blau, 1998, Kim and Feldman, 1998 and Sédillot and Walraet, 2002). These findings are, however, absent in the case of Finland and not very significant for the Netherlands.

---

[32] The effect of gender is significant only at 10% and has a very limited impact (-0.19 year) in the case of the Netherlands. It is not significant for Finland.

[33] For the record, the official retirement age is 65 for men, whereas that for women was 60 in Belgium until 1997 and 60 in the United Kingdom. In Belgium, the official age for women rose to 61 years in 1997, 62 in 2000, 63 in 2003, 64 in 2006 and is expected to be 65 in 2009.

6. CONCLUSION

The literature on premature retirement from the labour market usually explains the early cessation of activity by older workers in terms of labour supply. Even today, many scientists emphatically insist on either raising the official retirement age or cutting the pension benefits penalizing those whom they consider as being primarily responsible for the low effective average ages of withdrawal. However, the U.K. Cabinet Office report (2000) on the ageing population of the United Kingdom shows that only one third of retirees aged over 50 and having not yet attained the official retirement age retire voluntarily. The Dutch government (SZW, 2000) is also well aware that factors other than labour supply have played a role in the early retirement process. Recent public policies intended to enhance the liability of employers (especially focused on early retirement schemes and other non-formal early exit alternatives) and information campaigns to support the hiring and retention of older persons (in order to phase out discrimination against elderly people) show that the problem also lies in labour demand and social protection systems.

The goal of this study consisted in introducing some variables related to labour demand, in addition to the labour supply variables, in order to investigate their impact on the age of activity cessation in Belgium, the Netherlands, Finland and the United Kingdom. Whatever the country surveyed, the cessation driven by employers (through business closure, redundancy, dismissal, early retirement, etc.) and the deterioration in health status represent the main factors explaining premature exits from the labour market. On the contrary, being a widow or widower may delay the cessation of activity beyond the official retirement age.

The personal desire to withdraw from the labour market helps only partly to explain early exits from the labour market. Indeed, its impact on the age of activity cessation is relatively low (2 to 3 times lower than the effect of cessation enforced by employers). Nonetheless, the impact of voluntary departure is significant only in Belgium and the Netherlands.

The withdrawal for family reasons has a significant and negative incidence on the cessation age only in the Netherlands (at the 10% level) and the United Kingdom (at the 1% level). Its effect, however, is quite limited. In Belgium and Finland, we cannot pronounce on this reason for departure because it is combined with other reasons for withdrawal not specified by interviewees (marriage, partner's job requiring a move to another place and other unspecified reasons such as synchronized cessation by married couples, wage level, replacement rates, generosity of social security systems, economic situation, etc.).

In terms of policy recommendations, we would recommend action in three major directions: improving employment practices with respect to seniors in order to support their hiring and retention, promoting their employability and (to a lesser extent) inciting seniors to continue working. Although our results suggest that the first two approaches are the most important, comprehensive (i.e. on all fronts) and coordinated action in consultation with public authorities, employers, trade unions and workers is essential if active policies are to be implemented to stimulate the employment of older workers in order to avoid, or reduce, premature cessations of activity (especially those that are involuntary).

The first line of action is to eliminate some preconceived and false ideas (or stereotypes) about the capacity of seniors and the replacement of older workers by younger ones. Several studies and our results have shown, on this subject, that older and younger workers each have strengths and weaknesses that they can contribute to their firms. Therefore, a mixed age group in the company is beneficial for employers since it allows them to compensate for one person's weaknesses with another's strengths. In addition, a perfect substitution of seniors by younger workers has been observed in hardly any countries, especially when the adjustment costs of labour are high and early retirement costs are paid (even partially) by employers.

The second line of action is to enhance the employability of older workers by upgrading their skills (which would not correspond to those sought by employers), improving their working

conditions, improving employment services and career advice for older workers to help them to find a job and keep it.

Karakaya *et al.* (2007) show that the initial educational level of seniors is generally lower than that of younger workers. In addition, difficulties in adapting to technological and institutional developments and the depreciation of older workers' human capital, combined with a preference on the part of companies to train young staff in particular, certainly explain the need to make training more attractive and accessible for seniors.

The aim of employment services and career advice for older people is to assist them in their job search tasks (for instance, phasing out the dispensation for older unemployed people from looking for work) and to facilitate labour mobility among older people (facilitating access to part-time jobs and developing flexible work arrangements for instance).

Our results have also shown that deteriorating health represents an important reason for the cessation of activity. The improvement of older workers' working conditions in order to enhance health and safety at work is also expected to contribute to lengthening working life.

Any reforms of retirement systems not accompanied by these first two lines of action are likely to have only a limited effect (or none at all).

The last line of action is to strengthen incentives to work. Several ways can be envisaged: phasing out formal early retirement schemes (*pre-pension plans*) in parallel with the closure of other pathways into early retirement (avoiding other access routes, such as unemployment and disability/sickness insurance, to replace formal early retirement plans), actuarial reductions and increases in pension benefits for earlier and later retirement respectively, enhancing childcare support and facilitating access to part-time jobs.

This paper therefore suggests, through the sample used, that we cannot confine our analysis to the labour supply to explain early exits from the labour market. Recent reforms and changes in legislation intended to affect both labour supply and labour demand certainly explain the

increase in the effective average age of exit from the labour market observed in all four countries surveyed since the beginning of the 21st century.

7. APPENDIX

Pension systems

1) Netherlands

The pension system in the Netherlands is characterized by a basic scheme and occupational schemes. The former distributes pension benefits to all residents who have reached the legal age of 65. The latter are set up and administered in most cases by the social partners and apply to the majority of employees in the private and public sectors and to self-employed workers (covering more than 90% of the active population).

A) Basic scheme (first pillar)

The public and mandatory basic scheme, created in 1957 and called *Algemene Ouderdomswet and (AOW)* (*general law on old age pensions*), covers all residents of the Netherlands[34] for the payment of old age pensions from the age of 65 (the legal or normal or official retirement age) until death. These retirement benefits are flat-rate (universal and homogeneous), based only on the statutory minimum wage, and are not affected by previous occupational earnings or contributions paid. There is no distinction between men and women or between private sector employees, civil servants, the self-employed, farmers and housewives. The retirement benefits differ only according to the marital status of the beneficiary. This basic scheme is financed out of social security contributions depending on the taxable incomes of residents under age 65. For most people, pensions paid by the AOW are supplemented by private pensions accumulated during their working life.

---

[34] Inhabitants of the Netherlands, however, must have lived in the Netherlands before the age of 65. Benefits are paid in proportion to the duration of residence in the Netherlands (without nationality being a condition). The flat-rate benefits are full if the beneficiary has resided in the Netherlands for 50 years (between the ages of 15 and 65). The full basic pension amounts to 70% of the net minimum wage in the case of a beneficiary living alone and 50% for each member of a couple aged over 65 (married or not). If only one person of the couple reaches the age of 65, he/she is entitled to receive an additional benefit amounting to 50% of the net minimum wage, in addition to the basic pension benefits (equal to 50% of the net minimum wage). However, any revenue from the work of the younger partner will be deducted from this additional benefit.

B) Occupational pensions (second pillar)

These occupational schemes are regulated by legislation and by the public agency "*Pensioen & Verzekeringskamer (PVK)*". They usually apply to employees aged over 25 and to the majority of companies (usually large and medium-sized companies and some small companies). The majority of employees take part in such private pensions programmes offered by employers. Very small companies tend to resort to group contracts via external insurance companies. Occupational schemes resulting from collective agreements negotiated at different levels can cover the employees of a firm, an industry, a public administration or a type of liberal profession. The establishment of such a scheme is not made mandatory by the legislator, but when negotiations take place at the level of an industry or profession, the scheme often extends to all firms in this sector or profession. Sterdyniak (2004) argues that about 71% of contributors are covered by sectoral schemes, 15% by group insurance contracts, 14% by firm plans and 0.7% by liberal profession schemes. In almost all occupational schemes, the benefits depend on the wages paid in the last few years of a person's career or sometimes differ according to the average wage earned during the career. Typically, pensions paid by these occupational schemes are complementary to those distributed by the basic scheme, so that the two combined pensions form a total accounting for 70% of gross wages at the end of the career, for a person retiring at the age of 65 and having spent 40 years on the labour market without changing schemes (i.e. meeting the conditions for a full occupational pension). But with premature withdrawals from the labour market, few people receive a full occupational pension. Moreover, a change of scheme during a person's career usually leads to a loss of rights. Occupational schemes are financed out of the contributions collected and the returns on pension funds[35] (Sterdyniak, 2004). In periods of high returns on pension funds, contribution rates have often been reduced and some

---

[35] Fully-funded financing where the share of pension funds invested in equities rose from 10% in 1990 to 40% in 2000 and the share of investments outside the Netherlands rose from 10% in 1984 to 60% in 2000.

schemes have even temporarily stopped collecting them. Pensions have even been paid from the age of 60 (rather than 65) with higher benefits (indexed to prices or wages). By contrast, in periods of negative or low returns we have witnessed increases in contribution rates, collective renegotiations of occupational pensions, the raising of the retirement age beyond 60 years, the use of average wages rather than final wages (received at end of the career) to assess pension benefits and difficulties over the indexation of benefits.

2) Belgium

Like in most OECD countries (including the Netherlands, Finland and the United Kingdom), the Belgian pension system is based on several pillars. The system is mainly dominated by the first pillar, namely the basic PAYG scheme. This one allots pension benefits to all active people who have reached the legal age of 65. It should be noted that the required age (i.e. the eligibility age for pension benefits) was once 60 years for women, but from 1st July 1997 it rose to 61 years and will gradually reach that of men (65 years) by 2009[36]. The other two voluntary pillars, based on a capitalization of pensions at the initiative of either firms/sectors (second pillar), or workers (third pillar), complement the public pension system (first pillar). Tax incentives (i.e. tax deductions) have been introduced by the government to reinforce the use of supplementary pension schemes.

A) Basic scheme (first pillar)

The functioning of this mandatory scheme differs according to the worker's occupational status (private-sector worker, self-employed or civil servant). The average pension benefits for private-sector workers and the self-employed depends on the length of career (including periods likened to an occupation, such as periods of unemployment, sickness, disability, career breaks or pre-pension), on the average annual pay indexed to the cost of living and

---

[36] The official age for women to claim a pension allowance increased to 61 years in 1997, 62 in 2000, 63 in 2003 and 64 in 2006, to finally reach the official age for men in 2009 (65 years).

capped (during likened periods, only the last wage is considered) and on the beneficiary's marital status. These pension benefits cannot be paid until the age of 65. However, for people who have worked in special schemes (as miners, sailors, professional journalists or civil aviation flight crew), the legal age may differ (usually lower than 65).

According to marital status, the average pension for employees and self-employed persons is calculated by multiplying the average annual remuneration indexed and capped at 60% or 75%. The rate is 60% for a single person and 75% for a married couple whose spouse:

- has ceased all unauthorized activity;

- and who does not receive any replacement income;

- nor any pension benefit exceeding the difference between the household pension (based on the 75% rate) and the single pension (based on the 60% rate). If a pension benefit is received by the spouse but does not go beyond this difference, the household rate will apply but the spouse's pension will be deducted from the household pension.

This distinction between single rate and household rate is absent for civil servants. Regardless of a civil servant's marital status, the 75% rate is applied. Moreover, only the annual earnings received during the last five years of their career are taken into consideration for calculating the average pension for civil servants, whereas in the case of employees and the self-employed reference is made to all earnings received throughout their career.

The pension benefit is full when 45 years of service are completed (except for special schemes where it is usually lower than 45 years). In parallel with the increase in the official retirement age for women, the required number of years of service to claim full benefit rose from 40 years to 41 years from 1st July 1997 and will gradually reach that of men (45 years) by 2009.

There is also, under certain conditions, a specific annual minimum guaranteed benefit for a full career in each official scheme. It also differs according to the beneficiary's marital status.

In 2007, the employees' annual minimum guaranteed benefit was € 13,515 for a household and € 10,815 for a single person. For the same year, it was respectively € 12,307 and € 9,232 for the self-employed and € 16,151 and € 12,921 for civil servants. The minimum guaranteed benefit may be increased, under certain conditions, to the level of *GRAPA* (*garantie de revenus aux personnes âgées*/guaranteed benefit for seniors). The *GRAPA* covers individuals in need or with insufficient resources. It may not be granted until the official retirement age[37]. In the light of the various components influencing pension benefits, the mandatory basic scheme seems to be more profitable to civils servants and less favourable to the self-employed.

In 2001, a *Silver Fund* was created to build up reserve funds to finance the anticipated additional costs of the basic scheme for the period 2010-2030. It is financed by funds deriving from budgetary surpluses, social security surpluses, non-tax revenues and investment income. Nowadays, more and more people complement their basic pension through capitalization-based private pensions offered by their employer.

B) Occupational pensions (second pillar)

The second pillar relates to the pension plans arranged at the discretion of firms or sectors. These supplementary pensions are based on the capitalization principle and are funded by extra contributions made to pension funds or insurance groups. This scheme primarily aims to attenuate the loss of income following retirement. Indeed, the official pension benefits are generally lower than the last occupational earnings (end of career). Furthermore, the second pillar scheme benefits from very advantageous tax advantages since funds are taxed at only 16% and annuities at 20%, while gross wages are taxed at about 45% on average and pensions at 40%. Most beneficiaries of such pensions are white-collar workers and

---

[37] The guaranteed benefit for the elderly is a form of social assistance which can be granted, under certain conditions, in the case of insufficient pension and even in the absence of income during the career. However, this social assistance can be only paid in the absence of other resources.

executives/managers in some sectors (such as chemicals, banking, transport and telecommunications). In order to extend the scheme to more sectors, SMEs and blue-collar workers, the Act of 13 March 2003 provides tax exemptions on insurance contracts and very favourable tax treatment for funds and annuities (taxed at only 16%).

According to Callataÿ (2002), second pillar pensions may well be paid out before the official retirement age, combined with other benefits (unemployment, disability or pre-pension) and in this way may constitute an early retirement incentive. However, new regulations, gradually entering into force between 2003 and 2009 and designed to remove tax benefits if the second pillar pension is paid before the age of 60, have been introduced to eliminate the advantages of accumulation.

3) Finland

The Finnish pension system is also based on several pillars. The first public and mandatory pillar consists of a national basic pension scheme (PAYG) and an earnings-related pension scheme (partly funded). In Finland, the public pension system is very unusal in that it comprises a mix of the Dutch and Belgian public systems (first pillar). In fact, it not only provides a minimum pension depending exclusively on residence, but also offers pensions based on the length of a person's career and their previous wages. The implementing rules are very similar whatever the worker's status. The official retirement age (previously 65 years) has been removed through the reform of 2005 and replaced by a minimum retirement age set at 63 years.

The other two pillars are voluntary and based on a capitalization of pensions (funded system) at the initiative of employers/sectors (second pillar) or employees (third pillar). These two pillars are underdeveloped and not very widespread in Finland. Capped tax deductions are also granted to stimulate recourse to supplementary pension schemes, including the condition that the retirement age should be above 60 years.

A) Mandatory and public scheme (first pillar)

The basic pension is a minimum pension provided to all residents (requires no prior contributions). The amount of the benefit differs according to the municipality, marital status, the retiree's length of residence (40 years of residence after the age of 16 years are required to claim the full rate) and the amount of other benefits (beyond a certain limit, no basic pension will be paid). Besides this basic pension, retirees receive a pension directly linked to their average earnings throughout their career (indexed but not capped). Before 2005, the average was only related to the last ten years of service and a career of about 40 years was enough to claim the maximum pension since the replacement rate was limited to a maximum of 60% of average earnings. In fact, the employee's pension was calculated using a ratio (or pension multiplier) of 1.5% (between 23 and 59 years) and 2.5% (between 60 and 65 years) per year worked by the employee applied to his/her average earnings. Since 2005, this ratio is equal to 1.5% (between 18 and 52 years), 1.9% (between 53 and 62 years), 4.5% (between 63 and 68 years) and 4.8% (after 68 years) and the limitation on the replacement rate (i.e. 60%) has been abolished. Both old age pensions can be paid only from the age of 65, but since 2005 this official retirement age has been replaced by the minimum retirement age of 63. Moreover, pension benefits have been adapted to the lengthening of life expectancy.

The first pillar benefits cover not only old age but also disability, long-term unemployment of persons aged over 60 years and survivors.

The disability pension is granted to anyone aged between 16 and 64 unable to work due to illness/sickness, disability or injury and whose inability lasts longer than 12 months.

The individual early retirement pension (pre-pension) is granted to persons over the age of 60 whose work capacity is permanently reduced. The career length and working conditions are taken into account in the assessment of this early retirement pension.

The partial retirement pension is paid to people over the age of 58 and who have switched to a part-time job.

The unemployment pension is granted to the long-term unemployed who are at least 60 years old and is paid until the official pensionable age.

The survivor's pension is granted to widow(er)s under the age of 65 and to orphans under the age of 18.

Before 1996, these pensions were assessed by taking into account the period to be completed (i.e. the period between the event and the official retirement age) provided that the event occurs when working or one year after the employment contract ended. For unemployed and disabled workers, twelve months of work in Finland during the last ten years and at least five years of residence in Finland are also needed.

In view of these premature exit pathways, in 1996 the Finnish government reduced such pensions to below the old age pension by making the ratio of these pensions (or pension multiplier) lower than the old age pension.

After age 65, disability, unemployment and individual early retirement pensions becomes the old age pension.

B) Occupational pensions (second pillar)

The second pillar concerns pension plans arranged at the initiative of firms or sectors. These supplementary pensions are based on the capitalization principle (funded system) and are not very widespread in Finland.

4) United Kingdom

The British pension system is a typical example of a multi-pillar model combining public and private old age pensions. It consists of:

- a basic State pension (first pillar);

- supplementary pensions (second pillar);

- a private and voluntary pension at the initiative of the individual (third pillar).

The official retirement age is 65 years for men and 60 for women, but with a gradual increase (between 2010 and 2020) in the age for women to reach 65 years as for men. Pension benefits can be received if, and only if, the official retirement age is attained, even for people who remain active (regardless of their wage and without reduction). Moreover, work beyond the official pensionable age (with a maximum of five years and without receiving State pension benefit during this period) enables the pension benefits to be permanently increased by 7.5% per annum[38]. The goal of the second pillar (supplementary pensions), as is also the case in the other three countries studied, is to ensure some financial security for retirees. Furthermore, a *minimum income guarantee* (*MIG* introduced in 1999 and replaced in 2003 by *Pension Credit*), which is based on marital status, is intended for people who could not build up a suitable supplementary pension (in particular because of low wages and/or short hours of work).

A) Basic scheme (first pillar)

The basic State scheme is a PAYG type. The payment of contributions to the *National Insurance Contributions (NICs)* is compulsory for all persons, except those on the lowest incomes (defined by law).

The basic pension can be paid if the official retirement age and enough years of contributions[39] have been achieved. A full pension requires a contribution to the basic pension system during at least 90% of a working life beginning at the age of 16 and ending at the official retirement age. Below this rate, the basic pension is reduced in proportion to the contributory period. However, the "*Home Responsibilities Protection rules*" (referring to

---

[38] From 2006, the maximum deferment period to retire is unlimited and the pension benefit (when retired) is expected to increase by approximately 10% for each year of deferment.
[39] At least 25% of a working life beginning at the age of 16 and ending at the official retirement age is required to be entitled to a basic State pension.

people on low incomes or those who have left the labour market to look after children or disabled persons) reduce the contributory period required for a full pension[40]. Moreover, the disability/sickness or unemployment periods may count, under certain conditions, to calculate the basic pension. Married women do not have to pay contributions to be entitled to the basic pension. They are entitled to the pension if their husband receives a basic pension. For those who contribute, they may only require the highest pension. From 2010, men will also have the right (without personal contributions) to the basic pension based on their wife's contributions.

B) Complementary pensions (second pillar)

The supplementary pension scheme is mandatory for all employees whose income exceeds a certain level (*Lower Earnings Limit*), except the self-employed. Since 1988, employees have had a choice between the public supplementary scheme (originally introduced in 1978 under the name "*State Earnings-Related Pension Scheme – SERPS*" and then replaced in 2002 by the "*State Second Pension – S2P*"[41]) and an approved private pension plan ("*Occupational Scheme*", "*Personal Pension Scheme*" or "*Stakeholder Pension Scheme*"). The public scheme *S2P* is financed, like the basic pension, through contributions (PAYG type) while private schemes are funded. The right to substitute private schemes for the public scheme *S2P* is undoubtedly intended to reduce the burden of public finances on pensions.

In the public supplementary scheme *S2P*, pension benefits are proportional to the average salary with a maximum of 20% of the average salary for a full career starting at the age of 16 and ending at 65[42]. The scheme applies to all employees who are not covered by a private pension plan. The aim of reforms in the public supplementary scheme is to incite people with

---

[40] The required contributory period to claim the full pension benefit cannot be lower than 20 years.
[41] S2P is more generous than SERPS for people on low incomes and for individuals who do not work for health reasons or to look after children or disabled persons.
[42] The maximum replacement rate (i.e. 20%) is not applicable to people on low incomes (ruled by law). The replacement rate for these people is higher than 20%.

middle or high incomes to subscribe to private pension plans and in the long run to keep only people with low incomes (who have the most difficulty in saving).

The "*Occupational Scheme*" is based on firms' pension funds, usually financed on a funded base with a defined benefit[43]. The pension is equivalent to a percentage of last salary multiplied by the number of years spent in the company.

The "*Personal Pension Scheme*" is based on individual savings in an individual pension fund.

Finally, the "*Stakeholder Pension Schemes*", created in 2001, are characterized by individual pension funds with defined contributions, highly regulated and inexpensive, mainly designed to encourage personal savings.

Tax incentives are provided by the government to stimulate the use of private supplementary funds.

A final pillar (*third pillar*) common to all four countries studied is individual and voluntary saving in pension funds or insurance companies (banks, insurance companies or others) to constitute enough resources for retirement.

---

[43] The rules of the scheme are specified by the employer at the time of its creation.

Table A.1: Institutional structure of the pension system

Pillars		Risks	Participation	Access	Benefit structure	Financing	Administration	Collectors and providers
Dutch system								
1st pillar	*Universal insurance*	Old-age, disability, survivorship	Compulsory	Residence	Flat-rate[a]	Taxation, PAYG	State	State
Social assistance	*Social minimum*		Universal	Residence	Means-tested[b]	Taxation	Municipalities	Municipalities
2nd pillar (occupational pensions)		Old-age (survivorship), disability, unemployment	Quasi-compulsory	Contributions	Contributions-related	Contributions, fully-funded	Social partners	Private funds
3rd pillar (annuity insurance)		Old-age	Voluntary	Contributions/ Premiums	Contributions/ Premiums-related	Contributions/ Premiums, fully-funded	Private companies	Private companies
Belgian system								
1st pillar	*Retirement pension*	Old-age, disability, survivorship	Compulsory	Contributions	Contributions-related	Contributions/ PAYG	State and social partners	State
	Minimum pension			Minimum working career	Employment-related			
Social assistance	*GRAPA[c]*			Need	Means-tested[b]	Taxation		
2nd pillar (occupational pensions)		Old-age (survivorship)	Voluntary	Contributions	Contributions-related	Contributions, fully-funded	Social partners	Private funds
3rd pillar (individual savings plans/private life insurance)		Old-age	Voluntary	Contributions/ Premiums	Contributions/ Premiums-related	Contributions/ Premiums, fully-funded	Licensed private life insurance companies/pension funds	Private companies/pension funds

Pillars			Risks	Participation	Access	Benefit structure	Financing	Administration	Collectors and providers
Finnish system									
1st pillar	*Earnings-related pension*	*Collective funds*	Old-age, disability, old-age unemployment, survivorship	Compulsory	Contributions	Contributions-related	Contributions, funded	State and social partners	State and social partners
		Pooled component			Contributions	Contributions-related	Contributions, PAYG	State and social partners	State and social partners
	National pension				Residence and need	Flat-rate[a] and means-tested[b]	Taxation/Contributions, PAYG	State	State
2nd pillar (occupational pensions)			Old-age	Voluntary	Contributions	Contributions-related	Contributions, fully-funded	Private fund managers	State/Private funds
3rd pillar (individual schemes)			Old-age	Voluntary	Contributions	Contributions-related	Contributions, fully-funded	Private companies	Private companies
UK system									
1st pillar	*Basic state pension*		Old-age, disability, survivorship	Compulsory	Contributions	Flat-rate[a]	Contributions, PAYG	State	State
	Minimum income guarantee (then Pension Credit)				Citizenship	Means-tested[b]	Taxation, PAYG		
2nd pillar		*State second pension*	Old-age	Compulsory[d]	Contributions	Contributions-related[e]	Contributions, PAYG	State	State
		Occupational pension	Old-age			Contributions-related	Contributions, fully-funded/PAYG	Employers	Employers
		Personal pension	Old-age			Contributions-related	Contributions, fully-funded	Private managers	Private companies
		Stakeholder pension	Old-age			Contributions-related	Contributions, fully-funded	Private funds	Private funds
3rd pillar (individual schemes)			Old-age	Voluntary	Contributions	Contributions-related	Contributions, fully-funded	Licensed private life insurance companies/banks	Private companies

[a] When benefits are universal and homogeneous.
[b] When benefits are directed at the most disadvantaged people, who have to prove their need.
[c] Garantie de Revenus Aux Personnes Agées (old-age minimum income guarantee).
[d] The second pillar is compulsory but just one of the four kinds of scheme has to be chosen.
[e] The State second pension is expected to become a flat-rate benefit.
Source: Natali (2004).

Table A.2: Evolution of the official/normal, minimum and maximum retirement age (1998-2007)

Country	Official/normal age	Minimum age	Maximum age
Belgium	*Men*: 65 years; *Women*: from 60 years (before 1st July *1997*) to 65 years (the age is progressively raised to 65 during a transitory period running from 1997 to 2009).	Age 60 for men and women, if: - *1998*: 20 years of professional activity can be proved (progressive increase up to 35 years in *2005*); - *2005-2007*: 35 years of professional activity can be proved.	No deferred pension.
Finland	- *1998-2004*: 65 years; - *2005-2007*: 65 years for the national pension (*Kansaneläke*) and between the ages of 63 and 68 for the statutory eanings-related pension (*Työeläke*).	- *1998-2004*: early old-age pension from the age of 60 (no other conditions), but the pension is permanently reduced if the pension is taken early (by 0.5% per month between *1998* and *1999* and by 0.4% per month between *2000* and *2004*); - *2005-2007*: early old-age pension from the age of 62 (60 if born in 1944 or earlier), but the pension is permanently reduced if the pension is taken early (by 0.4% per month for *Kansaneläke* and by 0.6% per month for *Työeläke*).	- *1998-2004*: deferment possible (no upper age limit) with a pension increased by 1% per month beyond the age of 65 between *1998* and *1999* and by 0.6% per month beyond the age of 65 between *2000* and *2004*; - *2005-2007*: deferment possible (no upper age limit) with a pension increased by 0.6% per month beyond the age of 65 (*Kansaneläke*) or 68 (*Työeläke*).
Netherlands	65 years.	65 years for the mandatory basic AOW scheme and generally 60 years for the pension funds.	No deferred pension for the mandatory basic AOW scheme.
United Kingdom	*Men*: 65 years; *Women*: 60 years (gradually rising to 65 over period *2010* to *2020*).	No early State pension (the minimum age is the official/normal age).	- *1998-2005*: maximum deferment period of 5 years (until 70 years of age for *men* and 65 years for *women*) with a pension increased by approximately 7.5% for each year of deferment; - *2006-2007*: unlimited deferment possible with a pension increased by approximately 10.4% for each year of deferment.

Table A.3: Pre-pension schemes

Country	Pre-pension schemes
Belgium	*Full conventional pre-pension scheme:* set up in *1974* (on the basis of the cross-industry Collective Labour Agreement nr. 17), it distributes an extra allowance (paid by the employer) to the unemployment benefits in the case of redundancy removing older employees (i.e. wage earners) aged at least 60 years. - *1975*: aged at least 60 years (but this age can be further reduced by sectorial or establishment CLA); - *1984*: aged at least 55 years; - *1986*: aged at least 57 years with 25 years of professional activity and obligation of substitution by unemployed worker (no replacement obligation for companies with financial difficulties or in restructuring); - *1989*: aged at least 58 years with 25 years of professional activity; - *2002*: aged at least 60 years (CLA nr. 17), or 58 years (sectorial or establishment CLA), or 50, 52, 55 years (CLA for establishments recognised as being in difficulties or in a process of reorganization). *Exception*: since *1983*, the minimum age to be entitled to this scheme can be reduced to 50 in the case of an establishment recognised as being in difficulties or in a process of reorganization. *Part-time conventional pre-pension scheme:* set up in *1994*, it distributes an extra allowance (paid by the employer) in addition to the wage from part-time employment and unemployment benefit in the case of redundancy removing employees aged at least 55 who have at least 25 years of professional activity. The employer's agreement is required to be entitled to this pre-pension. There is also a replacement obligation *"Canada Dry" arrangements:* a pseudo-pre-pension freely negotiated between the employer and (a group of) workers to avoid all constraints of legal early retirement (no minimum age, no replacement obligation, no contributions paid by the employer). Since *2006*, these arrangements are subject to the same rules as the legal pre-pension (which reduced their attractiveness). The pre-pensioner can continue to practise a professional activity, but only under very strict conditions (usually related to wages earned from employment).
Finland	*Voluntarily pre-pension or early old-age pension scheme:* can be paid from the ages of 58 in *1994*, 60 in *1998* and 62 in *2005* to private sector employees with abatements that vary according to the age of cessation; *Part-time pre-pension scheme:* the partial pension represents 50% of the difference between full-time and part-time wages. This exit pathway was taken infrequently until *1997* (due to very strict conditions).
Netherlands	*VUT pre-pension scheme (vervroegde uittredingsregelingen)[44]:* set up in the early *1980s* through a cross-industry CLA; provides benefits equal to 80% of a worker's final wage if 10 years of professional activity can be proved. These VUT schemes are sector and company specific and negotiated with trade unions. They are usually paid to employees aged between 58 and 60 years. Until 1997, these VUT schemes were PAYG systems and did not involve early retirement costs (very generous). From *1997*, VUT schemes have been administered by a sector or company specific VUT fund (through contributions paid by employers and employees) and are much less generous (still set up via CLA). The earlier the pre-pension is taken, the lower the benefits (and vice versa). Early retirement, this time, causes significant costs. Moreover, since *2006*, the tax advantages for pre-pension and VUT programmes have been abolished.
United Kingdom	No early retirement programme and no partial retirement in the basic scheme. In some supplementary occupational schemes (therefore in some companies), early retirement may occur once the age of 50 is attained. In this context, Disney (1999) affirms that UK employers use these schemes as a way to remove unwanted labour (considered less productive).

---

[44] Van Oorschot (2007).

Table A.4: Test for national differences (compared to Belgium) using the t-test statistic

Variables	Netherlands	Finland	United Kingdom
Constant	-1.95	-1.93	-1.79
Age at starting work			
17-20	-1.37	0.52	0.50
21-24	-0.45	0.11	0.32
25 or over	-0.20	1.77	1.07
Sex			
Female	-3.48***	-5.00***	0.56
Marital status			
Divorced	-1.12	-0.53	-0.13
Widowed	1.61	1.75	-0.59
Never married	-0.10	1.01	0.52
Reasons to stop working			
Obliged to stop by employer	0.18	-3.44***	-5.05***
End of contract/temporary job/sale or closure of own business	-0.63	0.09	-0.83
Own illness or disability	2.61***	2.22**	-0.41
Looking after old, sick or disabled person	/	/	/
Wanted to retire or live off private means	-0.64	-2.55***	/
Other	2.43***	4.11***	1.36
Education			
No degree, primary or lower secondary	0.96	0.54	-1.93
Upper secondary	1.87	1.62	0.24
Number of observations	1,395	1,174	1,661

Note: t-test statistic $= \dfrac{\hat{\beta}_{Belgium} - \hat{\beta}_i}{\sqrt{VAR(\hat{\beta}_{Belgium}) + VAR(\hat{\beta}_i) - 2COV(\hat{\beta}_{Belgium}, \hat{\beta}_i)}}$. For each variable, we test the null hypothesis H0: there is no difference in the estimated

effect compared to Belgium $(\hat{\beta}_{Belgium} = \hat{\beta}_i)$.

***/**: indicate significance at the 1 and 5% level, respectively (the significance implies the reject of the null hypothesis).

References

Alba-Ramirez, A. (1997), "Labour force participation and transitions of older workers in Spain", Universidad Carlos III de Madrid, Working Paper n° 97-39.

An, M.Y., Christensen, B.J. & Gupta, N.D. (2004), "Multivariate mixed proportional hazard modeling of the joint retirement of married couples", *Journal of Applied Econometrics*, 19(6), 687-704.

Ando, A. & Modigliani, F. (1963), "The 'life-cycle' hypothesis of saving: Aggregate implications and tests", *American Economic Review*, 53(1), 55–84.

Aubert, P. (2005), "Les salaires des seniors sont-ils un obstacle à leur emploi?", Les salaires en France, INSEE.

Aubert, P. & Crépon, B. (2004), "La productivité des salariés âgés : une tentative d'estimation", *Economie et statistique*, n° 368, 95-119.

Behaghel, L. (2003), "Insécurité de l'emploi : le rôle protecteur de l'ancienneté a-t-il baissé en France ?", *Economie et Statistique*, n° 366, 3-29.

Behaghel, L. & Greenan, N. (2005), "Training and age-biased technical change: Evidence from French micro data", CREST, Working Paper n° 6, INSEE, Paris.

Blau, D.M. (1998), "Labor force dynamics of older married couples", *Journal of Labor Economics*, 16(3), 595-629.

Blau, D.M. (1994), "Labor force dynamics of older men", *Econometrica*, 62(1), 117-156.

Blau, D.M. & Riphahn, R.T. (1999), "Labor force transitions of older married couples in Germany", *Journal of Labor Economics*, 6(2), 229-252.

Blöndal, S. & Scarpetta, S. (1998), "The retirement decision in OECD countries", Documents de travail du Département des affaires économiques de l'OCDE, n° 98.

Bommier, A., Magnac, T. & Roger, M. (2001), "Départs en retraite : évolutions récentes et modèles économiques", *Revue Française d'Economie*, 16(1), 79-124.

Börsch-Supan, A. (1992), "Population aging, social security design, and early retirement," *Journal of Institutional and Theoretical Economics*, 148(4), 533-557.

Boskin, M.J. (1977), "Social security and retirement decisions", *Economic Inquiry*, 15(1), 1-25.

Burkhauser, R.V. (1980), "The early acceptance of social security: An asset maximization approach", *Industrial and Labor Relations Review*, 33(4), 484-492.

Burkhauser, R.V., Couch, K.A. & Phillips, J.W. (1996), "Who takes early social security benefits? The economic and health characteristics of early beneficiaries", *The Gerontologist*, 36(6), 789-799.

Burniaux, J-M., Duval, R. & Jaumotte, F. (2003), "Coping with ageing: A dynamic approach to quantify the impact of alternative policy options on future labour supply in OECD countries", OECD Economics department, Working Paper n° 371, Paris.

Burtless, G. (1999), "An economic view of retirement", in H. Aaron (Ed.), *Behavioral Dimensions of Retirement Economics.* Washington, D.C.: The Brookings Institution, 7-42.

Burtless, G. (1986), "Social security, unanticipated benefit increases, and the timing of retirement", *Review of Economic Studies*, 53(5), 781-805.

Burtless, G. & Quinn, J. (2001), "Retirement trends and policies to encourage work among older Americans", in P. Budetti, R. Burkhauser, J. Gregory & A. Hunt (Eds.), *Ensuring Health and Income Security for an Aging Workforce*. Kalamazoo: The W.E. Upjohn Institute for Employment Research, 375-416.

Burtless, G. & Moffitt R.A. (1984), "The effect of social security benefits on the labor supply of the aged", in H. Aaron & G. Burtless (Eds.), *Retirement and Economic Behavior*. Washington, DC: The Brookings Institution.

Cabinet Office (2000), "Winning the Generation Game: Improving opportunities for people aged 50-65", in work and community activity report, (London: The Stationery Office).

Casey, B., Oxley, H., Whitehouse, E., Antolin, P., Duval, R. & Leibfritz, W. (2003), "Policies for an ageing society: Recent measures and areas for further reform", Documents de travail du Département des affaires économiques de l'OCDE, n° 369.

Cheng, I-H. & French, E. (2000), "The effect of the run-up in the stock-market on labor supply", *Economic Perspectives*, Federal Reserve Bank of Chicago, issue Quarter IV, 48-65.

Coile, C. & Gruber, J. (2000), "Social security incentives for retirement", National Bureau of Economic Research, Working Paper n° 7651.

Coronado, J.L. & Perozek, M.G. (2003), "Wealth effects and the consumption of leisure: Retirement decisions during the stock market boom of the 1990s", The Federal Reserve Board, Finance and Economics Discussion Series, Working Paper n° 2003-20.

Costa, D.L. (1998), "The evolution of retirement: An American economic history, 1880-1990", The University of Chicago Press.

Cremer, H., Lozachmeur, J.-M. & Pestieau, P. (2004), "Social security, retirement age and optimal income taxation", *Journal of Public Economics*, 88(11), 2259-2281.

Cremer, H. & Pestieau, P. (2003), "The double dividend of postponing retirement", *International Tax and Public Finance*, 10, 419-434.

Dahl, S-A., Nilsen, Ø.A. & Vaage, K. (2002). "Gender differences in early retirement behaviour" IZA, Discussion Paper n° 522.

Diamond, P. & Gruber, J. (1997), "Social security and retirement in the U.S", National Bureau of Economic Research, Working Paper n° 6097.

Disney, R. (1999), "Why have older men stopped working?", in P. Gregg & J. Wadsworth (Eds.), *The state of Working Britain*, Manchester University Press.

Disney, R., Grundy, E. & Johnson, P. (1997), "The dynamics of retirement: Analyses of the retirement surveys", Department of Social Security, Research Report n° 72, London: HMSO.

Duval, R. (2003), "The retirement effects of old-age pension and early retirement schemes in OECD countries", OECD Economics department, Working Paper n° 370, Paris.

Esping-Andersen, G. (1990), "The three worlds of welfare capitalism", Princeton University Press.

Eurostat (2005), "Projection de la population 2004-2050", Communiqué de presse, STAT/05/48, avril 2005.

Fields, G.S. & Mitchell, O.S. (1984), "The effects of social security reforms on retirement ages and retirement incomes", *Journal of Public Economics*, 25(1-2), 143-159.

French, E. (2005), "The effects of health, wealth, and wages on labour supply and retirement behaviour", *Review of Economic Studies*, 72(2), 395-427.

Fronstin, P. (1999), "Retirement patterns and employee benefits: Do benefits matter?", *The Gerontologist*, 39(1), 37-47.

Gautié, J. (2004), "Les marchés internes du travail, l'emploi et les salaires", *Revue Française d'Economie*, 18(4), 33-63.

Gruber, J. & Wise, D. (2004), "Social security programs and retirement around the world: Micro-estimation", University of Chicago Press.

Gruber, J. & Wise, D. (1999), "Social security and retirement around the world", National Bureau of Economic Research Conference Report, University of Chicago Press.

Gustman, A.L. & Steinmeier, T.L. (2004), "Social security, pensions and retirement behavior within the family", *Journal of Applied Econometrics*, 19(6), 723-737.

Gustman, A.L. & Steinmeier T.L. (1986), "A structural retirement model", *Econometrica*, 54(3), 555-584.

Gustman, A.L. & Steinmeier T.L. (1985), "The 1983 social security reforms and labor supply adjustments of older individuals in the long run", *Journal of Labor Economics*, 3(2), 237-253.

Hanoch, G. & Honig, M. (1983), "Retirement wages and labor supply of the elderly", *Journal of Labor Economics*, 1(2), 131-151.

Hausman, J.A. & Wise, D. (1985), "Social security, health status, and retirement", in D. Wise (Ed.), *Pensions, labor, and individual choice*, University of Chicago Press, 159-191.

Hellerstein, J.K. & Neumark, D. (2004), "Production function and wage equation estimation with heterogeneous labor: Evidence from a new matched employer-employee data set", National Bureau of Economic Research, Working Paper n° 10325.

Herbertsson, T.T. (2001), "Why Icelanders do not retire early", Pensionsforum, Stockholm.

Heyma, A. (2001), "Dynamic models of labour force retirement: An empirical analysis of early exit in the Netherlands", PhD Dissertation, University of Amsterdam.

Hirsch, B.T., MacPherson D.A. & Hardy, M.A. (2000), "Occupational age structure and access for older workers", *Industrial and Labour Relations Review*, 53(3), 401-418.

Holtz-Eakin, D., Joulfaian, D. & Rosen, H. (1999), "Estimating the income effect on retirement", Center for Economic Policy Studies, Princeton University, Working Paper n° 60.

Holtz-Eakin, D., Joulfaian, D. & Rosen, H. (1993), "The Carnegie conjecture: Some empirical evidence", *Quarterly Journal of Economics*, 108(2), 413-435.

Ilmakunnas, P., Maliranta, M. & Vainiomäki, J. (1999), "The roles of employer and employee characteristics for plant productivity", Helsinki School of Economics and Business Administration, Working Paper n° 223.

Imbens, G.W., Rubin, D.B. & Sacerdote, B.I. (2001), "Estimating the effect of unearned income on labor earnings, savings, and consumption: Evidence from a survey of lottery players", *American Economic Review*, 91(4), 778-794.

Jacobs, K., Kohli, M. & Rein, M. (1991), "The evolution of early exit: A comparative analysis of labor force participation patterns", in M. Kohli, M. Rein, A-M. Guillemard & H. van Gunsteren (Eds.), *Time for retirement: comparative studies of early exit from the labor force*, Cambridge University Press.

Jimenez-Martin, S., Labeaga, J.M. & Martinez Granado, M. (1999), "Health status and retirement decisions for older European couples", IRISS Working Paper Series n° 1999-01.

Joulfaian, D. & Wilhelm, M.O. (1994), "Inheritance and labor supply", *Journal of Human Resources*, 29(4), 1205-1234.

Jousten, A. (2002), "Départ à la retraite. Une perspective internationale," Centre de Recherche en Economie Publique et de la Population, Working Paper 0209, HEC-Management School, Unive.

Jousten, A. & Pestieau, P. (2000), "Sécurité sociale et départ à la retraite", Centre de Recherche en Economie Publique et de la Population, Working Paper 0002, HEC-Management School, Unive.

Karakaya, G., Plasman, R. & Rycx, F. (2007). "Overeducation on the Belgian labour market: Evaluation and analysis of the explanatory factors through two types of approaches", *Compare: A journal of comparative education*, 37(4), 513-532.

Karakaya, G., Plasman, R. & Rycx, F. (2005), "The incidence and determinants of overeducation in Belgium", *Brussels Economic Review/Cahiers Economiques de Bruxelles*, 48(1/2), 113-135.

Kim, J.E. & Moen, P. (2001), "Moving into retirement: Preparation and transitions in late midlife", in M.E. Lachman (Ed.), *Handbook of Midlife Development*, New York: J. Wiley and Sons, 487-527.

Kim, S. & Feldman, D.C. (1998), "Healthy, wealthy, or wise: Predicting actual acceptances of early retirement incentives at three points in time", *Personnel Psychology*, 51(3), 623-642.

Krueger, A.B. & Pischke, J-S. (1992), "The effect of social security on labor supply: A cohort analysis of the notch generation", *Journal of Labor Economics*, 10(4), 412-437.

Lazear, E. P. (1979), "Why is there mandatory retirement?", *Journal of Political Economy* 87(6), 1261–1284.

Lilja, R. (1996), "Microeconomic analysis of early retirement in Finland", in E. Wadensjö (Ed.), *Leaving the Labour Markets Early in the Welfare State*, Elsevier Science Publishers, Amsterdam, 157-173.

Lindeboom, M. (1996), "Vervroegde uittreding uit de arbeidsmarkt: een empirische analyse naar de determinanten van stoppen met werken", *Tijdschrift voor Politieke Economie*, 19(1), 67-86.

Marmot, M.G., Bosma, H., Hemingway, H., Brunner, E. & Stansfeld, S. (1997), "Contribution of job control and other risk factors to social variations in coronary heart disease incidence", *Lancet*, 350, 235-239.

Meghir, C. & Whitehouse, E. (1996), "The evolution of wages in the United Kingdom: Evidence from Micro Data," *Journal of Labor Economics*, 14(1), 1-25.

Modigliani, F. & Brumberg, R.H. (1954), "Utility analysis and the consumption function: An interpretation of cross-section data", in K.K. Kurihara (Ed.), *Post-Keynesian Economics*, New Brunswick, NJ. Rutgers University Press, 388-436.

Moore, D.E. & Hayward, M.D. (1990), "Occupational careers and mortality of elderly men", *Demography*, 27(1), 31-53.

Morel, A., Joly, B. & Maigne, G. (2004), "Rapport sur la gestion des âges et les politiques de l'emploi dans l'Union Européenne", Rapport n° 2004 053.

Natali, D. (2004), "The pension system: Belgium, the Netherlands, Finland and United Kingdom", Service Public Féféral Sécurité Sociale, La méthode ouverte de coordination (MOC) en matière des pensions et de l'intégration européenne.

OECD (2006), "Live longer, work longer", Ageing and Employment Policies, OECD, Paris.

OECD (2005), "Ageing and Employment Policies: Netherlands", OECD, Paris.

OECD (2004a), "Ageing and Employment Policies: United Kingdom", OECD, Paris.

OECD (2004b), "Ageing and Employment Policies: Finland", OECD, Paris.

OECD (2003), "Vieillissement et politiques de l'emploi: Belgique", OECD, Paris.

O'Rand, A.M., Henretta, J.C. & Krecker, M. (1992), "Family pathways to retirement", in M. Szinovacz, D. Ekerdt & B. Vinick (Eds.), *Families and retirement*, Sage Publications, Newbury Park, CA: Sage, 81-98.

Orszag, M. & Snower, D.J. (2002), "Pensions taxes versus early retirement rights", IZA Discussion Paper Series, n° 536.

Peracchi, F. & Welch, F. (1994), "Trends in labor force transitions of older men and women", *Journal of Labor Economics,* 12(2), 210-242.

Pestieau, P. & Stijns, J-P. (1997), "Social security and retirement in Belgium", National Bureau of Economic Research, Working Paper n° 6169.

Pienta, A. (1999), "Early childbearing patterns and women's labor force behavior in later life", *Journal of Women and Aging*, 11(1), 69-84.

Quinn, J.F., Burkhauser, R.V. & Myers, D.A. (1990*)*, "Passing the torch: The influence of economic incentives on work and retirement", Kalamazoo: The W.E. Upjohn Institute for Employment Research.

Reitzes, D.C., Mutran, E.J. & Fernandez, M.E. (1998), "The decision to retire: A career perspective", *Social Science Quarterly*, 79(3), 607-619.

Renterghem J. (2001), "Early retirement in Belgium: Causes and consequences", Research Paper, Katholieke Universiteit Leuven.

Rust, J. (1989), "A dynamic programming model of retirement behavior", in D. Wise (Ed.), *The Economics of Aging*, University of Chicago Press, 359-398.

Rust, J. & Phelan, C. (1997), "How social security and medicare affect retirement behavior in a world of incomplete markets", *Econometrica*, 65(4), 781-831.

Salthouse, T.A. (1984), "Effects of age and skill in typing", *Journal of Experimental Psychology: General*, 113(3), 345-371.

Samwick, A. (1998), "New evidence on pensions, social security, and the timing of retirement", *Journal of Public Economics*, 70(2), 207-236.

Schils, T. (2005), "Early retirement patterns in Europe: A comparative panel study", Dutch University Press, Amsterdam.

Sédillot, B. & Walraet, E. (2002), "La cessation d'activité au sein des couples : y a-t-il interdépendance des choix ?", *Economie et Statistique*, n° 357-358, 79-102.

Skirbekk, V. (2003), "Age and individual productivity: A literature survey", Max Planck Institute for Demographic Research, Rostock (Germany), Working Paper n° 2003-028.

Sterdyniak, H. (2004), "Pays-Bas : un modèle hollandais pour les retraites?", Les réformes des systèmes de retraite en Europe, Rapport réalisé par l'OFCE pour le Conseil d'orientation des retraites.

Stock, J. & Wise, D. (1990), "Pensions, the option value of work and retirement", *Econometrica*, 58(5), 1151-1180.

Sueyoshi, G.T. (1989), "Social security and the determinants of full and partial retirement: A competing risks analysis", National Bureau of Economic Research, Working Paper n° 3113.

Szinovacz, M.E. & De Viney, S. (2000). "Marital characteristics and retirement decisions", *Research on Aging*, 22(5), 470-498.

SZW (2000). "Kabinetsstandpunt: Bevordering arbeidsdeelname oudere werknemers", The Hague: Ministerie van Sociale Zaken en Werkgelegenheid.

Taylor, M.A. & Shore, L.M. (1995), "Predictors of planned retirement age: An application of Beehr's model", *Psychology and Aging*, 10(1), 76-83.

United Nations (2007a), "World population ageing", Department of Economic and Social Affairs, Population Division, New York.

United Nations (2007b), "World population prospects: The 2006 revision. Highlights", Department of Economic and Social Affairs, Population Division, New York.

Van Oorschot, W. (2007), "Narrowing pathways to early retirement in the Netherlands", *Benefits*, 15(3), 247-255.

Wanner, P., Stuckelberger, A. & Gabadinho, A. (2003), "Facteurs individuels motivant le calendrier du départ à la retraite des hommes âgés de plus de 50 ans en Suisse", Rapport dans le cadre du programme de recherche interdépartemental sur l'avenir à long terme de la prévoyance vieillesse (IDA ForAlt), n° 8/03. Berne: Federal Social Insurance Office.

White, H. (1980), "A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity". *Econometrica*, 48, 817-830.