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Retirement Incentives in Belgium

Estimations and Simulations Using SHARE Data

DP 04/2013-012

Retirement incentives in Belgium: estimations and simulations using SHARE data

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April 2013

Abstract

The paper studies retirement behavior of wage-earners in Belgium – for the first time using rich survey data to explore retirement incentives as faced by individuals. Specifically, we use SHARE data to estimate a model à la Stock and Wise (1990). Exploring the longitudinal nature of SHARELIFE, we construct measures of financial and non-financial incentive. Our analysis explicitly takes into account the different take-up rates of the various early retirement exit paths across time and ages. The results show that financial incentives play a strong role. Health and education also matter, as does regional variation – though the latter in an unexpected way. A set of policy simulations illustrate the scope and also the limits associated with selective parametric reforms.

JEL Classification Numbers: H55, J21, J26, J14

Keywords: pensions, social security, disability, early retirement, unemployment, labor force participation

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[1] The authors (Alain Jousten, Université de Liège, IZA, and Netspar ; Mathieu Lefebvre, Université de Liège) acknowledge financial support from the SBO-project FLEMOSI (funded by IWT Flanders) and EMPOV (TA/00/45). This paper uses data from SHARELIFE release 1, as of November 24th 2010 and SHARE release 2.4.0, as of March 17th 2010. The SHARE data collection has been primarily funded by the European Commission through the 5th framework programme (project QLK6-CT-2001- 00360 in the thematic programme Quality of Life), through the 6th framework programme (projects SHARE-I3, RII-CT- 2006-062193, COMPARE, CIT5-CT-2005-028857, and SHARELIFE, CIT4-CT-2006-028812) and through the 7th framework programme (SHARE-PREP, 211909 and SHARELEAP, 227822). Additional funding from the U.S. National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG-4553-01 and OGHA 04-064, IAG BSR06-11, R21 AG025169) as well as from various national sources is gratefully acknowledged (see www.share-project.org for a full list of funding institutions).Corresponding author: ajousten@ulg.ac.be

1. INTRODUCTION

Numerous European countries are facing a challenging budgetary situation – Belgium is no exception to this rule with a public debt hovering around 100% of GDP and a deficit of approximately 3 % in 2012. Clearly, some of the challenges are related to the immediate and deferred fallout of the recent financial sovereign debt crisis. Other challenges are less recent and/or more anticipated – hence they should come as less of a surprise to policymakers and citizens alike. One such challenge is the question of pension sustainability and adequacy: in the face of a long term trend towards of increasing life expectancy and lower fertility, the changes in demographic composition are likely to have severe impacts on pension systems of all designs. Though, in spite of the largely predictable nature of the demographic events, reforms have been scarce.

Beyond the purely demographic mutations, behavioral changes have also been noticeable over the last decades all across the developed world. First, for men, the 1980's and 1990's were characterized by a substantial drop in employment rates for older workers. Over the 2000's, an opposite trend in employment rates could be witnessed –cancelling out the preceding drop. However, the moves are in no way sufficient to absorb the ongoing profound demographic transformation related to aging. Second, for women, the changes have been even more profound, with a generalized increase in employment rates both for prime age and older workers 50+. Both of these trends can be observed across a wide range of developed countries – with Belgium being a particularly interesting case study because of the scope of the changes involved – as can be seen from Figure 1.[2]

While some of these behavioral changes are likely the result of longer term trends that involve cohort effects, other substantial elements also have a role to play. In this paper, we explore the impact of individual level characteristics on workers' decision to retire. We pay a special attention to the role of health, education and financial incentives as drivers of retirement behavior. Regarding financial incentives, we focus not only on instantaneous income or wealth effects of the retirement decision but follow in the footsteps of Gruber and Wise (2005) to explore the impact of the retirement decision on the complete set of survival- and eligibility-contingent income and benefit streams all the way into the future. The expected benefit streams, in turn, are clearly country specific and influenced by the individual's exposure to a given social protection system and the applicable rules in terms of eligibility and benefit generosity.[3]

In this respect too, Belgium is a particularly interesting country to look at. It has a very developed social protection environment, with several social insurance programs playing an active role in the particularly in the area of (early-) retirement. Furthermore, Belgium displays rather substantial regional diversity – with its main two regions having notably different employment and activity levels. In sum, the country provides an outstanding background for a study on retirement incentives. It also provides a fertile environment for studying reform proposals, given the low levels

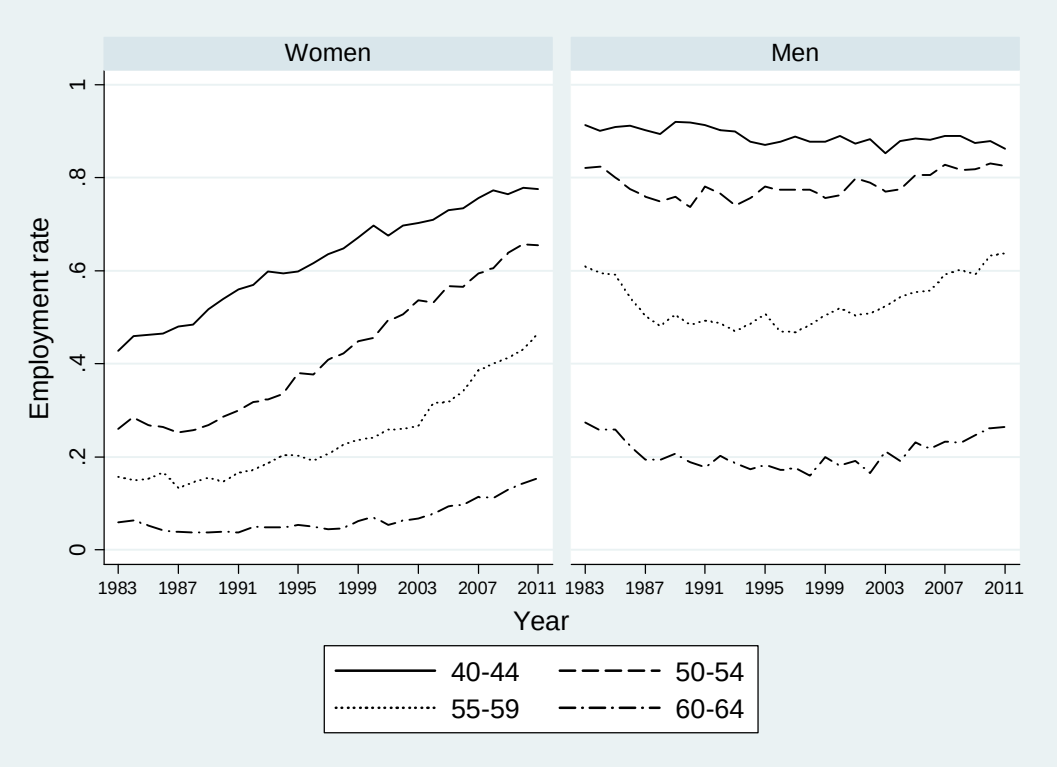
[2] See Wise (2012) for data on a large array of developed countries.

[3] See e.g., Dellis et al (2005) and Kalwij and Vermeulen (2008).

of old-age labor force participation and the low effective retirement age observed in the country. In fact, Belgium clearly missed the European Stockholm target of an employment rate of the age group 55-64 of 50 percent in the year 2010.[4] Mobilizing this unused labor capacity still represents an important factor achieving the long-term sustainability and adequacy of the social protection system that is envisaged under the new European 2020 Strategy – particularly in the face of an extremely challenging budgetary situation.

The paper is structured as follows. Section 2 outlines the institutional background of the Belgian wage earner scheme. Section 3 describes the date, provides the methodology for constructing the dynamic incentive measure used, and provides empirical estimates. Section 4 discusses a series of policy reforms and outlines their effect in terms of labor market exit, but also on distributional outcomes. Section 5 finally concludes.

Figure 1: Employment rate for male (left) and female (right)



Source: Eurostat Labour Force Database (2013)

[4] This Lisbon Strategy aimed at increasing the overall employment rate, with a special focus on female employment. The Stockholm council added an extra target of achieving an employment rate of 50 percent for workers in the age group 55-64 by the year 2010. The Europe 2020 strategy, while still envisaging an overall increase in employment rates of the overall population, gives more ample room to national strategies in terms of how to achieve them. See http://ec.europa.eu/europe2020/index_en.htm.

2. INSTITUTIONAL BACKGROUND

Belgian social protection comprises three schemes for wage-earners, civil servants and self-employed. As in previous work on retirement incentives and labor markets for older workers (see Dellis et al 2003, Jousten et al 2012), we focus exclusively on the wage-earner scheme. Wage earner pensions are financed by tax-deductible employer and employee social insurance contributions, as well as by transfers from the federal budget – it is thus a pure PAYG system. The scheme is by far the largest pension scheme in the country both in terms of enrollment and in terms of the share of public pension spending. Also, it is the median one of the three systems when focusing on the generosity of pension levels – with the civil servant scheme being the most generous and the self-employed scheme being the least generous.

Finally, one particular feature of interest of the Belgian wage-earner scheme is that numerous other social insurance benefits play an important role in determining individual incentives to retire (early). In fact, unemployment as well as sickness and disability benefits are key elements regarding early retirement decisions, as both types of benefits are not necessarily time-limited. Furthermore, special unemployment regimes exist for older workers – hence leading to an even stronger role. The aim of the present section is thus to describe the most important social protection schemes in the context of labor force exit.

2.1. THE PENSION SYSTEM

The current pension insurance (PI) grew out of two separate sets of regulations for blue and white collar workers, dating back to 1953 and 1957 respectively. Individuals are eligible to full benefits at the age of 65, with early retirement possible at age 60 for both women and men – a rule first introduced for men in the year 1967. A full career corresponds to 45 years of earnings or assimilated periods – that count by and large in the same way for the career requirement.[5] Assimilated periods correspond to timespans where the individual was receiving social insurance replacement income or benefiting from special forms of leave. For our analysis, the most important ones will be the sickness and disability regime (DI), unemployment benefits (UI), conventional early retirement benefits (CER) – which represent the bulk of assimilated periods. Other examples do however exist, such as years in study; leave under the career breaks legislation; professional disease leave; workplace injury, etc. In case an individual satisfies the eligibility requirements for early retirement at 60, no explicit actuarial adjustment is applied to take into account the longer benefit period. An implicit adjustment for retirement before the age of 65 may however apply, in case the individual does not satisfy the full career requirement – thus suffering from the incompleteness of the earnings history. Similarly, the Intergenerational Solidarity Pact that was passed in 2005

[5] For the years of observation in our sample, the "full benefit age" and "full career requirement" for women were under a transition regime. The 1997 pension reform introduced the principle of an alignment of the rules of women on those applicable to men. In 2005, the year corresponding to the first wave of SHARE, the parameters are 62 and 42, respectively, and they are 63 and 43 in 2007 during the second wave.

introduced the "pension bonus", a mechanism that increases the pension benefit by an absolute amount for work beyond the age of 62 or beyond 44 years of career – independently of individual earnings or contributions levels.

Social security benefits correspond to 75% of average lifetime earnings for one-earner couples claiming household benefits, individual claimers are entitled to 60%. In the career wage averaging, periods on replacement income are counted at the value of the gross wage that was earned prior to the onset of the inactivity spell – properly adjusted for inflation to keep its real value constant over the entire duration of the inactivity spell. Two earner couples benefits correspond to the sum of the two individual pensions, with a top-up payment possible if the spouse's benefit claim is smaller than the household supplement. Other dependent benefits are also available, such as most notably for surviving spouses.

An elaborate system of maxima and minima applies both on pensionable earnings and on pension benefits. Combined with uncapped social insurance contributions for wage earners, it leads to a highly progressive outcome. The progressivity is further reinforced through the tax code that grants public retirement benefits a preferential tax treatment by means of a bigger allowance for pensioners. De facto, this practice leads to a situation where numerous wage earners do not pay income tax on their benefits, while their contributions are on the other hand fully deductible.[6]

Benefits are automatically indexed to price inflation using the "health index", a Belgian (slowed-down) variant of price indexing. In addition, purely discretionary occasional uprating is performed in order to prevent a severe decoupling of retiree benefits from average wages in the economy. Special (favorable) regimes remain in place for several sectors, such as for example the airline industry and the maritime sector.

2.2. DISABILITY INSURANCE

The DI system provides benefits for individuals that suffer from a loss of their earnings capacity in their usual job of at least 66 percent for a period of at least 12 months duration. During this initial period of working disability, the individuals are covered under the sickness insurance scheme – the latter thus representing a necessary first step for entering DI. DI benefits can be awarded for a fixed time interval, but can also be open-ended – with a system of periodic medical and administrative controls in place. Beyond these requirements in terms of loss of earnings-capacity, workers also have to satisfy minimum contributory requirements to qualify for benefits.[7]

Benefits are financed through a similar mechanism of a mix of social insurance contributions and transfers from the federal budget as observed for pensions. Benefits are payable up to a maximum age of 65 – corresponding to the full benefit age under the pension legislation – at which time the

[6] The implicit progressivity of the civil servant and self-employed schemes are notably different, if only because the former has substantially less of a contributory logic, while the latter has an explicit cap in terms of earnings that are subject to social insurance contributions.

[7] For a detailed review of requirements, we refer to Jousten et al (2012).

disabled are rolled over into the regular pension system. No major structural changes have occurred to the system over the last decades.

The benefit level is a function of the household status of the worker and enjoys a preferential tax treatment under the income tax legislation. The benefit equals 65% of reference earnings for insured with dependents, 40% for cohabitants and 53% for a person living alone. Contrary to the pension system, and to the practice in some other countries, benefits are not computed based on an average career profile but rather on the real observed earnings in the period immediately leading up to the onset of the insured event. As for pensions, a cap on benefits applies for higher levels of income and benefits are also indexed using the "health-index".[8]

2.3. UNEMPLOYMENT INSURANCE

The basic UI system covers wage-earners of all ages (below the full retirement age) and is financed through a mix of social insurance contributions and transfers from the federal budget.[9] Benefits are not limited in time with payments at the latest ending upon reaching the full retirement age – when the people are rolled over into the PI system.

Eligibility for UI benefits is essentially based on having been covered either as a contributing worker or having benefited from assimilated periods for a specific period of time. These requirements are rather intricate and have been revised over time, the most recent set of rules being applicable as of November 1, 2012. The eligibility criteria vary by the age of the applicant as well as by the specific kind of career profile of the applicant. For our population of interest, i.e. those above the age of 50, eligibility is amongst others assured if they fulfill either 24 months of coverage over the last 42 months, or 12 months over the last 42 months and 5 years over the 10 year period prior to the last 42 months. [10]

Benefits are of 60% of the reference wages – except for the first period of 3 months of unemployment where they can reach 65%. However, the system is much less proportional than the replacement rate may indicate at first sight. First, as for DI, an elaborate system of absolute maxima and minima applies at rather low benefit amounts. These floors and ceilings substantially vary by household-type (insured with dependents, cohabitants, individual living alone) – de facto introducing major differences between insured individuals. Furthermore, the maxima (and to a

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[8] The sickness insurance benefits have different eligibility rules, different administrative arrangements (managed by the various health insurance funds) and also different rules on reference wages and replacement rates. Sickness leave benefits are of 60% of reference income during the first month, and for the remaining 11 months of 60% if he has dependents or lives alone and 55% if he cohabits.

[9] A specificity of the Belgian UI system is that benefits are paid out by a federal program while the institutional competency for job placement is in the hands of the various regional authorities.

[10] For the observation years of 2005 and 2007, the system was somewhat more stringent, with a 36 month reference periods rather than the current 42 months. For a detailed discussion of all eligibility rules see http://www.rva.be/D_opdracht_W/Werknemers/T31/InfoFR.pdf

lesser degree the minima) decrease as a function of duration of the unemployment spell – with the maximum and the minimum being equal at the latest after 48 months of unemployment.[11] The progressivity of the system is further reinforced through the tax code, with a favorable tax treatment for UI benefits akin to the mechanism at play for PI or DI.

In general, UI beneficiaries have to be available for the job market and actively look for employment. There are several exceptions to this principle, one of them applying to older workers aged 50+. The preferential status for older unemployed was introduced back in 1985 into the Belgian social insurance landscape – with an underlying logic of freeing up space on the job market in a perspective of redistributing a fixed lump of labor (see Jousten et al, 2010). Beyond relief in terms of required job search, the status also initially automatically entitled beneficiaries to a financial complement varying by age and household composition. Since 2002, the job search and financial complement conditions have been decoupled and substantially tightened – with the most recent reform dating back to September 1, 2012.[12]

Finally, the UI benefits are sometimes also part of ad hoc agreements between employers and employees that are known as « Canada Dry » retirement arrangements (Cremer et al, 2008). By entering into such agreements the two parties avoid the stringent severance pay rules in case of firings by sweetening the worker into accepting a formal lay-off with a lump-sum side payment.

2.4. CONVENTIONAL EARLY RETIREMENT

The system of conventional early retirement (CER) was introduced in 1973 for alleviate the problems related to the industrial restructuring and the firing of older workers. In order to be eligible, a worker has to be laid off by his employer and also satisfy some career length requirements that have evolved over time and are of 35 and 28 years respectively for men and women in 2013, and are scheduled to increase to 40 years for both sexes (men in 2015; women in 2024). [13]. Benefits correspond to a two-tier structure: The basic tier is composed of the unemployment insurance benefits paid out by the Federal Employment Office (ONEM-RVA) – and thus financed by the same mechanisms as regular UI benefits. The second tier consists of a top-up payment paid by the employer who laid-off the worker – the top-up being equal to half the difference between net wage and the unemployment benefit. This two-tiered structure has most recently lead to a general relabeling of the system as “Unemployment with Company Supplement”.

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[11]. Before the latest reform, thus also in 2005 and 2007, maxima and minima were less duration dependent. For a more complete discussion of benefit generosity in the current system see http://www.rva.be/D_Opdracht_W/Werknemers/T136/InfoFR.pdf.

[12] By now, a full job search waiver is only automatically granted at the age of 60 or when satisfying rather stringent career requirements. The age-related benefit complement can only be paid as of age 55. Details at http://www.rva.be/D_Opdracht_W/Werknemers/T55/InfoFR.pdf and http://www.rva.be/D_Opdracht_W/Werknemers/T67/InfoFR.pdf.

[13] For workers in our empirical sample, the requirement was of 30 years for men and 26 years for women.

In theory, the system was meant to encourage the replacement of older workers by younger ones by imposing the recruitment of a replacement worker. But the rules have been sufficiently hollowed out to make this constraint an often non-binding one. Similarly, while there is not generalized waiver of the job search requirement for people benefiting from CER, de facto most people would be exempted from actively looking for a job and from having to be available for the job market.[14]

One particularly important feature of the system is that individuals benefiting from the CER system continue to accrue entitlements in the PI. In fact, given that they are technically benefiting from unemployment benefits, they time period spent in CER benefit receipt are assimilated periods that count fully towards career requirements. Similarly, such periods also fully count in the wage averaging formula at the last wage earned prior to retiring early.

3. EMPIRICAL ANALYSIS

3.1. SHARE DATA

In our analysis, we use data from the Survey of Health, Ageing and Retirement in Europe (SHARE). The survey is a cross-national panel database of micro data on health, socio-economic status and social and family networks of European individuals aged 50 and over conducted since 2004/2005. SHARE covers a broad range of variables of special interest for our study such as detailed information on employment, health and the household context as well as rather extensive lifetime information of respondents. We use the first two waves of data (collected in 2005 and 2007 respectively). The third wave of data, known as SHARELIFE (collected in 2008/9) collected information of entire life histories of all previous respondents (waves 1 and 2). This includes retrospective information on childhood, health, family changes and the professional career. We combine the first two waves with the retrospective data from SHARELIFE to construct lifetime earnings profiles.

As compared to other common data sources, SHARE has some distinct advantages – but also some weaknesses. As compared to other surveys such as EU-SILC, the existence of the retrospective SHARELIFE module grants a substantially broader view on accrued-to-date pension entitlements at the individual and household level. Also, self-rated and objective health measures are available, clearly a plus given our interest in retirement decisions. As compared to administrative data, such as those used in Dellis et al (2003), SHARE improves the information on education and health status –at the cost of a lower precision in terms of pension entitlements.

We use a pooled data approach, i.e. we consider each person-year observation as an independent observation and do not explore the panel characteristics of the sample. Our focus is in people that

[14] For a more complete discussion of the regulations, http://www.emploi.belgique.be/defaultTab.aspx?id=743

are still working as wage-earners and actively face a decision to retire in the two reference periods. We thus exclude self-employed and civil servants as well as retired, unemployed, sick and disabled people. We also exclude individuals who were not present anymore in SHARELIFE and for whom we do not have retrospective data. In total the sample is of 655 person-year observations.

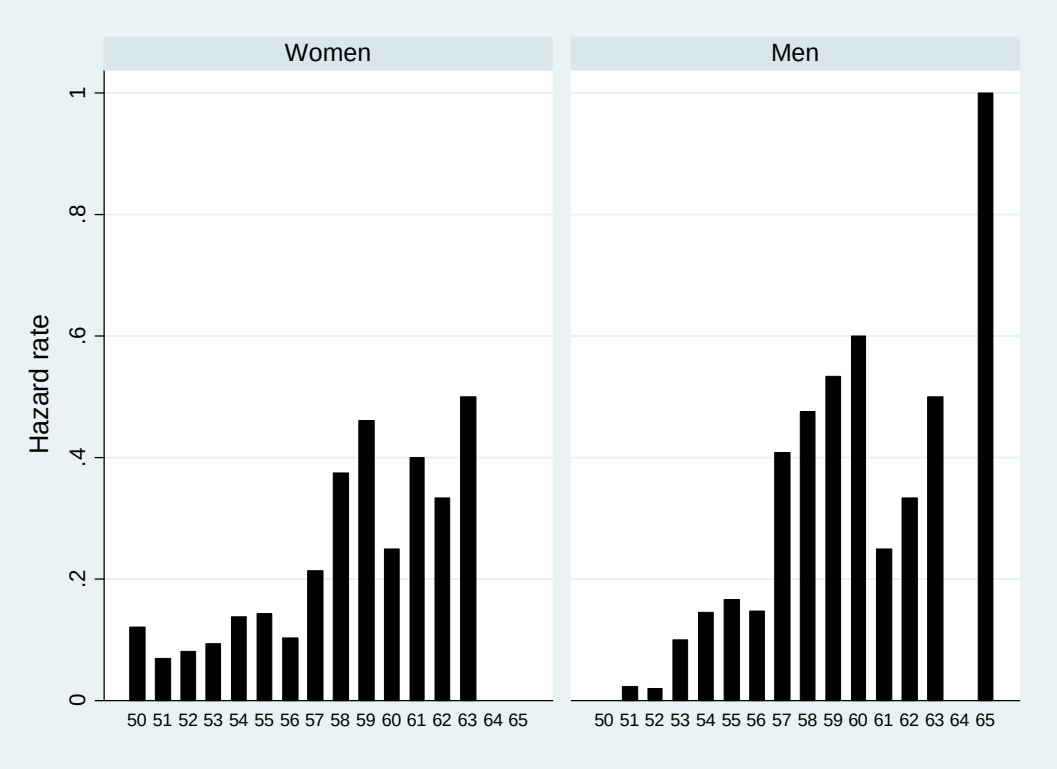
Table 1 provides some key characteristics of the final sample. Notice the rather low sample size, and the rather moderate instantaneous exit rate of 16 percent. While this number may be surprising at first, it is also a reflection of the selection criterion considering only active individuals. This becomes clear when breaking this average exit rate down by age as in Figure 2 – with relatively high exit rates at more advanced ages applying to relatively small numbers of people still working.

Table 1: Sample characteristics

N	655
Average age	54.22
Female	47.02%
Married	80.15%
Spouse active	41.22%
Education	
Primary	21.07%
Secondary	50.38%
Tertiary	28.55%
Health	
Excellent	14.35%
Very good	30.08%
Good	44.43%
Fair	11.15%
Region	
Wallonia	29.92%
Flanders	66.11%
Brussels	3.97%
Exit rate	16.34%
Wallonia	12.24%
Flanders	18.94%
Brussels	3.85%

Source: Author's computations based on SHARE data

Figure 2: Hazard rate of retirement, by age and sex



Note: The "extreme" values for ages 64 and 65 are due to the fact that there is only 1 observation. This men retires.
Source: Authors' calculations

3.2. INCENTIVE VARIABLE

We use retirement model such as in Stock and Wise (1990). The selected probit models have the 0-1 retirement decision as a dependent variable, and a set of demographic and socio-economic parameters as explanatory variables. One of the key elements on the right hand side of the model is the concept of option value (OV), i.e. the value of continued activity versus retirement today. Essentially, this concept of option value is based on intertemporal utility maximization, where a rational forward-looking agent evaluates at each decision point the various retirement options that are open to him. The underlying reduced form expected utility function is assumed to be of the temporally additive form

$$V_t(r) = \sum_{s=t}^{r-1} p_s \beta^{s-t} Y_s^{\gamma} + \sum_{s=r}^{S} p_s \beta^{s-t} \left(kB_s(r)\right)^{\gamma}$$

where income is supposed to be instantaneously consumed and there is no savings. t is the current time, r the retirement age, β the intertemporal discount factor and γ is a risk aversion parameter. The parameter p_s summarizes the relevant demographic projections in terms of survival till any given future point in time conditional on being alive at period t. Labor income is denoted Y, and retirement income $B_s(r)$ – which includes both the workers' benefits as well as any household supplements or survivor benefits. The parameter k summarizes the relative preference retirement

income as compared to wage – thus in a way a leisure preference parameter. As in Dellis et al (2003), we set β=0.97. γ=0.75 and k=1.5.[15]

The concept of option value $OV_t(r^*)$ is then defined as the difference in expected utility terms between retiring now and retiring at the best possible alternative retirement date in the future r^*.

$$OV_t(r^*) = V_t(r^*) - V_t(t)$$

Notice that as an individual ages (t increases) the option value endogenously changes by the combined of a resolution of uncertainty and new information in terms of wage potential under the assumption of continued work.

While this model is rather straightforward for the case of a single ubiquitous retirement program, the situation is slightly more complex in a setting where numerous alternative exit routes may or may not co-exist at any given age and in any given year. The latter is precisely the situation encountered in Belgium, where the multiplicity of systems that we outlined in section 2 leads to a significantly more complicated incentive structure. Ideally, one would want to obtain person-specific indicators of the real eligibility of these various exit routes to the different individuals. In practice, given the enormous information requirement to correctly do so in the face of a rather archaic system as in Belgium, we address this problem by computing a weighted incentive indicator taking into account the various exit options. Two pieces of information have to be derived: the probabilities associated with these different exit routes and the benefit flows under the 4 possible exit routes (PI, DI, UI and CER).

To construct the weights we proceed in two steps. First, for each individual in our sample, we allocate age-and year of observation specific weight of each of the four main labor force exit pathways, PI, DI, UI and CER. To obtain these weights, we use SILC data from 2006-2009 to derive a cross-sectional decomposition. Table 2 summarizes this information. Given that we are interested in the split conditional on retirement, for each age-year-sex, the sum of probabilities equals 1. Second, we assume that individuals take these cross-sectional probabilities as input in their intertemporal problem. For example, a 50 year-old person in 2005 will contemplate the decomposition of a 55 year old in 2005 as his own when evaluating the value of the option of retiring in 5 years' time in 2010.[16]

Regarding the benefit streams associated with the different retirement pathways, we make the assumption that conditional on being in the DI, UI or CER exit route, individuals claim the relevant benefits (and are rolled over into the regular retirement program at the age of 65). This assumption

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[15] We have performed extensive sensitivity analysis, amongst others with respect to: changes in the discount rate (1 percent); the curvature of the utility function (0.9 and 1); different formulations relating to leisure preference (k=1,25 as well as a conversion of future benefit flows into a continuous lifetime annuity).

[16] While this assumption is clearly imperfect, it is at least as plausible as a series of other assumptions we have also done validity checks with. Its main advantage is that it allows us to take the changes in institutional settings from 2005 to 2007 into account.

is not implausible as under the rules described in section 2, individuals may be benefiting from DI, UI or CER benefits at ages as low as 50. For PI, the situation is slightly different, as by law there is a minimum entitlement age of 60. Thus, at ages below 60, we assume that the individual leaving the labor force on the PI route will have 0 incomes until age 60, at which time he will claim early pension benefits that will stay unchanged for the rest of his life. For ages between 60 and 65, we assume that the individual retires immediately with the associated benefits.

Table 2: Decomposition by exit pathway conditional on exit at any given age in 2005 and 2007

2005		Women				Men		
Age	PI	DI	UI	CER	PI	DI	UI	CER
50	0.333	0.167	0.500	0.000	0.400	0.500	0.100	0.000
51	0.545	0.273	0.182	0.000	0.364	0.455	0.091	0.091
52	0.437	0.125	0.375	0.063	0.300	0.200	0.400	0.100
53	0.625	0.125	0.125	0.125	0.333	0.167	0.500	0.000
54	0.286	0.286	0.429	0.000	0.375	0.125	0.375	0.125
55	0.000	0.500	0.375	0.125	0.083	0.417	0.083	0.417
56	0.286	0.214	0.071	0.429	0.389	0.111	0.000	0.500
57	0.300	0.100	0.400	0.200	0.250	0.375	0.062	0.312
58	0.267	0.133	0.067	0.533	0.313	0.250	0.125	0.313
59	0.444	0.000	0.222	0.333	0.400	0.133	0.133	0.333
60	0.853	0.029	0.000	0.118	0.805	0.024	0.000	0.171
61	1.000	0.000	0.000	0.000	0.846	0.000	0.000	0.154
62	0.500	0.500	0.000	0.000	0.500	0.000	0.167	0.333
63	1.000	0.000	0.000	0.000	0.750	0.125	0.125	0.000
64	1.000	0.000	0.000	0.000	0.667	0.167	0.000	0.167
65	1.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000
2007		Women				Men		
Age	PI	DI	UI	CER	PI	DI	UI	CER
50	0.500	0.250	0.250	0.000	0.200	0.600	0.200	0.000
51	0.111	0.556	0.333	0.000	0.250	0.500	0.125	0.125
52	0.364	0.182	0.364	0.091	0.143	0.286	0.429	0.143
53	0.778	0.111	0.000	0.111	0.000	0.000	1.000	0.000
54	0.500	0.125	0.375	0.000	0.286	0.143	0.571	0.000
55	0.000	0.250	0.500	0.250	0.083	0.417	0.083	0.417
56	0.267	0.333	0.067	0.333	0.450	0.150	0.000	0.400
57	0.250	0.125	0.500	0.125	0.364	0.364	0.091	0.182
58	0.235	0.118	0.059	0.588	0.278	0.333	0.056	0.333
59	0.182	0.182	0.273	0.364	0.176	0.118	0.176	0.529
60	0.941	0.000	0.000	0.059	0.795	0.051	0.000	0.154
61	0.889	0.111	0.000	0.000	0.846	0.000	0.000	0.154
62	1.000	0.000	0.000	0.000	0.500	0.000	0.125	0.375
63	1.000	0.000	0.000	0.000	0.750	0.250	0.000	0.000
64	1.000	0.000	0.000	0.000	0.667	0.222	0.000	0.111
65	1.000	0.000	0.000	0.000	0.944	0.000	0.000	0.056

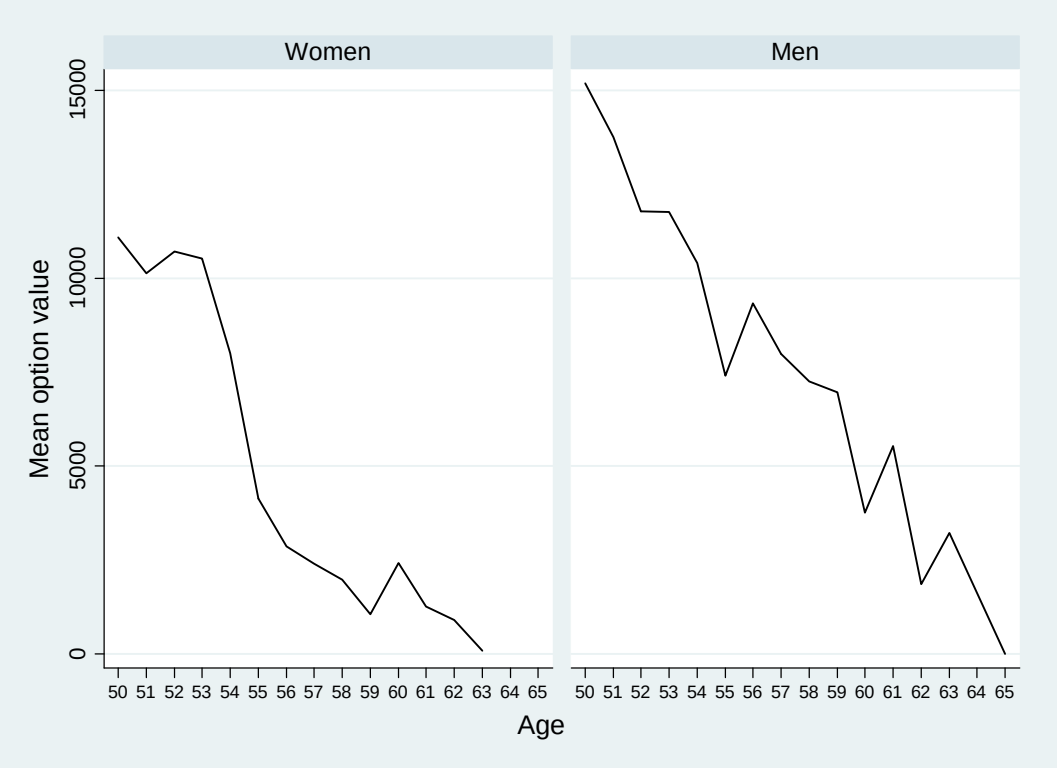
Source: Belgian SILC data for the years 2006-2009 – SPF Economie- DG Statistique et Information économique
Note: We pool several years. The numbers we allocate to 2005 correspond to the average for 2006-2008. The numbers for 2007 correspond to 2007-2009.

The results of these option value calculations are summarized in Figure 3. The overall pattern of average OV is downward sloping both for men and women. The pattern is the result of a combination of two main factors. The first part of the utility function $V_t(r)$ consists of the scope for

extra wages across the range of options – substantially larger at younger than at older ages. The second part of the utility function $V_t(r)$ is heavily influenced by the way the weights attributed to the different retirement pathways as well as the eligibility rules attached to these pathways vary as a function of age. The overall effect both the wage and the benefit component is negative, and sensitivity analysis shows that holds true for a large set of parameter values in a reasonable range.

A second interesting metric reflecting the outcome of this optimization is r^* - the retirement age that maximizes the value of the option of continued work. Figure 4 summarizes the information on r^* for each current age cohort, separated by sex. For men, the age of 65 is largely predominant as an optimizer as an overwhelming majority of workers finds their optimum at this age. For women, the situation is significantly less pronounced, with numerous female workers having an optimum well below the full retirement age. This difference is driven by a series of interacting factors, such as lower earnings levels, entitlements to household and survivor benefits as well as the empirically observed exit patterns of Table 2.

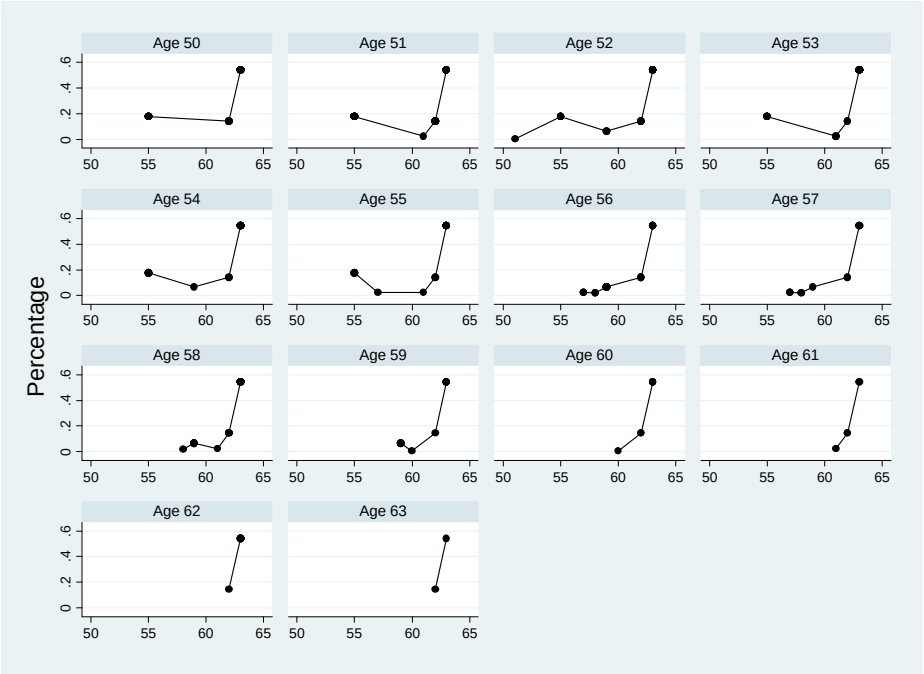
Figure 3: Mean OV, by age and sex



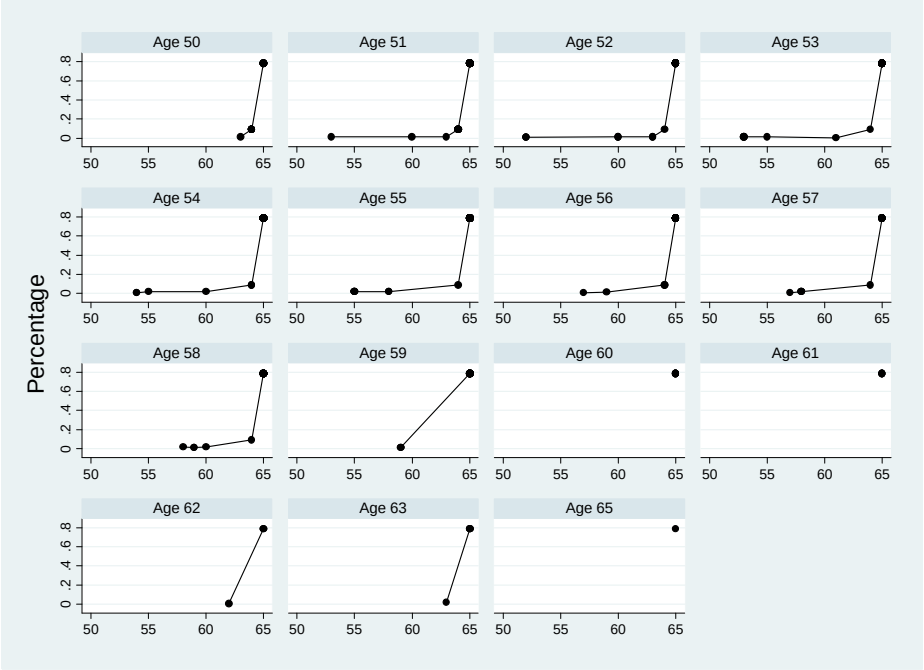
Source: Authors' calculations
Note: β=0.97. γ=0.75 and k=1.5

Figure 4: Percent of age cohort maximizing OV at any possible future retirement age

Women



Men



Source: Authors' calculations

3.3. ESTIMATION RESULTS

We estimate a series of Probit models linking the hazard of retirement to a large array of explanatory variables as well as our constructed OV incentive variable. Table 3 summarizes our results. The incentive variable – summarizing the payoff of an optimal retirement behavior – turns out to be strongly significant, with the expected sign: a larger value continued work leads to lower retirement instantaneous retirement probabilities. The significance of the OV estimate is not affected by the age specification, be it linear (specifications 1 and 2) or in dummies (specifications 3 and 4). Marital status and labor market activity of the spouse also have a major influence on retirement behavior. Being married induces an increase in the probability of retirement – not least because of the ensuing entitlements in terms of household and spousal benefits under the PI. The opposite holds true of the dummy variable "active spouse" – the latter likely acting as a proxy for the loss of dependent benefits in the PI for two earner-couples as compared to one-earner couples due to the offset/top-up rule of section 2.1.

Specifications (2) and (4) add a regional dimension to the analysis by introducing a regional dummy for the three Belgian economic regions. When controlling for a large array of socio-economic and demographic variables, we find that Flemish workers are significantly more likely to retire than their Walloon counterparts. Our results may be perceived as surprising against a general backdrop of a much stronger economic activity in Flanders, both for men and for women. The employment rate of the population 20-64 is noticeably higher in Flanders than in Wallonia, attaining respectively 77.0% and 68.7% for men, and 66.4% and 55.8% for women in 2011.[17] However, when focusing on the narrower group of older workers 55-64, these differences in employment rates almost vanish and regional differences disappear: 46.3 versus 44.3 for men, and 31.4 and 29.9 for women for the same time period. Our results show that there are however substantial differences subsisting – if not in activity rates of older workers, then at least in terms of retirement probabilities.

We also include self-reported health and education as explanatory variables in all specifications. As regards health, only the lowest self-declared health category has a significantly higher instantaneous retirement probability than the other groups.[18] On the other hand, having obtained tertiary education (i.e. post-high school) significantly lowers the probability of retirement as compared to the baseline.

Figure 5 compares the predicted hazards of retirement to the actual hazard observed in our sample – for the two "full" specifications including the health, education and regional dummies (specifications 2 and 4). Unsurprisingly, the dummy model performs significantly better in predicting actual exits as compared to the linear age model. This finding was to be anticipated – given the key role played by eligibility ages as outlined in section 2.

[17] Data extracted from Eurostat Labour Force Database (2013).

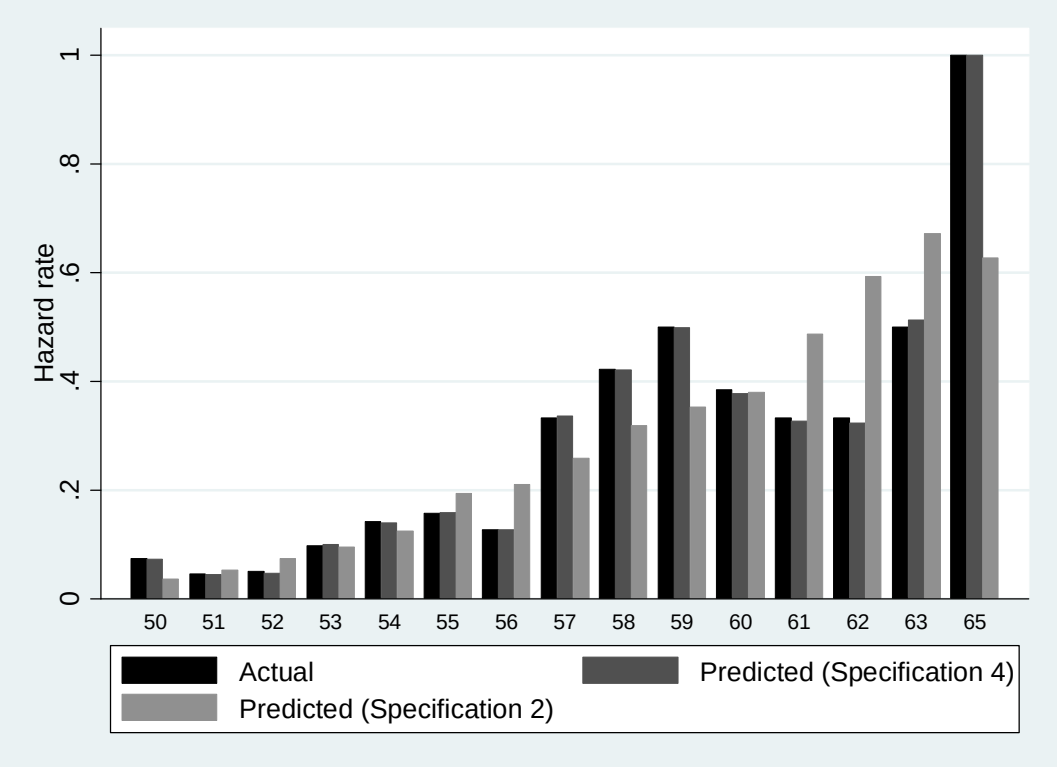
[18] We have performed extensive sensitivity analysis with an array of self-reported and objective health measures.

Table 3: Retirement Probit model, marginal effects

	Linear age		Age dummies	
	(1)	(2)	(3)	(4)
Incentives				
OV	-0.083***	-0.088***	-0.079***	-0.085***
	(-2.97)	(-3.29)	(-2.86)	(-3.21)
Socio-economic variables				
Age	0.026***	0.025***	n.a.	n.a.
	(5.40)	(-5.25)		
Age dummies	n.a.	n.a.	YES	YES
Female	-0.027	-0.028	-0.024	-0.026
	(-0.97)	(-1.04)	(-0.87)	(-0.96)
Marital status (Ref=living alone)				
Married	0.059**	0.051*	0.063**	0.054**
	(2.18)	(-1.93)	(2.46)	(-2.14)
Active spouse	-0.046*	-0.048*	-0.044	-0.044*
	(-1.72)	(-1.83)	(-1.64)	(-1.72)
Education (Ref=Primary)				
Secondary	-0.039	-0.051	-0.037	-0.048
	(-1.20)	(-1.58)	(-1.16)	(-1.52)
Tertiary	-0.085***	-0.090***	-0.093***	-0.096***
	(-2.74)	(-3.06)	(-3.11)	(-3.44)
Region (Ref=Wallonia)				
Flanders		0.058**		0.063**
		(-2.29)		(-2.52)
Brussels		-0.04		-0.017
		(-0.57)		(-0.20)
Self-rated Health (Ref = Excellent)				
Very good	0.021	0.011	0.024	0.014
	(0.44)	(-0.25)	(0.52)	(-0.31)
Good	0.027	0.026	0.038	0.035
	(0.63)	(-0.63)	(0.89)	(-0.87)
Fair	0.162**	0.170**	0.169**	0.176**
	(2.02)	(-2.10)	(2.06)	(-2.12)
Financial Resources				
Total assets	0.001*	0.001	0.001	0.001
	(1.75)	(-1.40)	(1.55)	'-1.16)
Private pension	-0.066**	-0.063**	-0.077***	-0.073***
	(-2.47)	(-2.46)	(-3.05)	(-3.02)
N	655	655	655	655
Pseudo R^2	0.199	0.215	0.232	0.249

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; z-statistics in parentheses

Figure 5: Predicted and actual hazard rate of labor force exit, by age



Source: Authors' calculations

4. SIMULATIONS

Using the results of section 3, we investigate the effects of a series of policy simulations – relying on the age dummy specification. Two broad types of simulations are provided. A shift in key retirement ages and changes to the way early exit programs are handled, both in terms of immediate payouts and in terms of accrued pension rights.

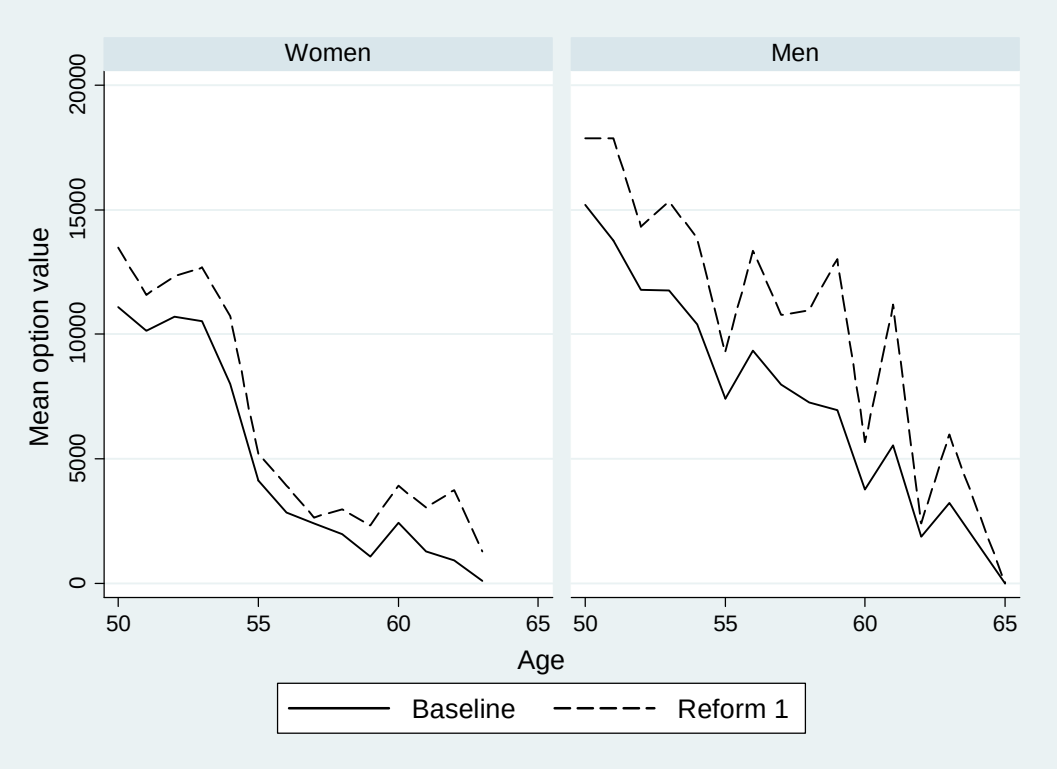
4.1. CHANGES IN ELIGIBILITY AGES

The first one, inspired by Desmet et al (2005) considers the increase of all key access ages by 2 years – both for early and regular retirement. The motivation for this simulation ("Reform 1: + 2 years") is the often heard idea of changing pension systems by merely adapting the eligibility ages. While the absract discussions are generally positioned in the context of a single pension system, the Belgian example is a perfect example of a multi-tiered system with multiple competing exit routes co-existing at any given point in time. As a result, this reform has to be applied to all exit routes in parallel. The way we implement this reform is to follow Desmet et al (2005) by shifting all age-relevant parameters upwards. Thus we increase the key ages for access to the early exit programs from 50 to 52, the early retirement age under the PI from 60 to 62, and the full benefit age under the

PI to 67. Also, to have a consistent reform proposal, we increase the full career requirement by 2 years (e.g., from 45 to 47 for men).

To evaluate this proposal, we recompute benefit entitlement under this new set of rules and shift the weights and the estimated dummies associated with the different ages up by two years. The results are summarized in Figures 6 and 7. They document a non-linear impact as a function of age – both on incentives and outcomes in terms of predicted exit rates. This reform scenario leads to substantial strengthening of work incentives for people below the age of 52. For these individuals, PI is the only remaining exit route – with benefits now only accessible at 62 instead of 60. On the graphs, this leads to simulated exit rates at 50 and 51 that are close to zero – not zero. Similarly, people in the 60-64 age bracket overall face substantially stronger incentives to continue working – while at age 65 there is a small effect.[19] The effect is particularly strong for women where PI plays a much more important role than for males where DI, UI and CER as seen in Table 2.

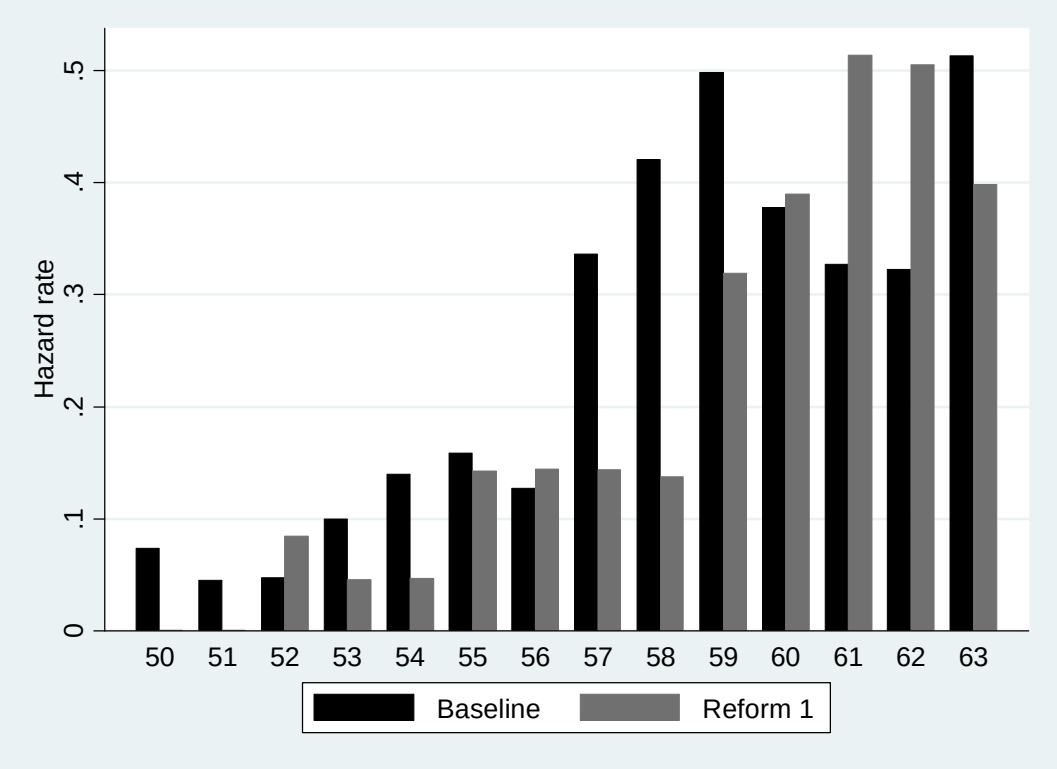
Figure 6: Reform 1 – Impact on OV by age and sex



Source: Author's calculations

[19] The almost complete absence of an effect at age 65 may look somewhat surprising. However, as reported in Figure 2, there is only one observation at this age. More specifically, it is a man with a rather long career (42 years). It appears that the small difference between the PI benefits amount under the two reforms and their low levels compared to other routes make the OV rather small, and this under the two scenarios.

Figure 7: Reform 1 – Impact on hazard rate of labor force exit, by age



Note: Exits at 65 not represented as equal to 1 in the baseline and approximately equal to 1 in the reform scenario.
Source: Author's calculations

Another way of looking at the impact of the reform is to consider the effect on the average retirement age. Table 4 reveals that Reform 1 induces an increase in the average retirement age from a baseline observation of 56,58 to 59,24 – thus an increase of approximately two and a half years. The simulated impact is thus substantially larger than the decreed increase as people endogenously decide to retire later as a consequence of the lowered generosity of the system, including the PI system. This result illustrates that endegenous reactions are a key element to be taken into account after any policy change.

Table 4: Average retirement age: Baseline and simulations

Baseline	Reform 1: +2 years	Reform 2: no deferred benefits	Reform 3: Actuarial PI	Reform 4: Actuarial PI – no deferred benefits	Reform 5: Actuarial PI only
56.58	59.24	56.81	56.86	57.09	63.85

Authors' calculations

Beyond the impact on labor force exit, distributional considerations also play a prime role in evaluating the impacy of this policy reform. To illustrate this distributional impact, we refer to the concept of social security wealth (SSW). The SSW represents the expected present discounted value of all future net benefit payments that an individual can expect to receive from the system. We calculate the SSW for each individual in our sample. The thus defined SSW indicator fully integrates the intertemporal dimension of the consequences of the retirement decision.

Table 5 provides a summary of the effects on SSW in terms of the interquartile ratio of SSW of the top wealth quartile relative to the lowest quartile for three age subgroups. We separate the individuals in various age groups as the impact of the various reform proposals is – as previously discussed – different by age. Table 5 confirms that the impact of the reform is highly selective in terms of age groups affected: beyond the average OV effects of Figure 6, there is also powerful intra-generational distributional effect.

Table 5: Interquartile ratio of gross pension wealth

Age group	Baseline	Reform 1: +2 years	Reform 2: no deferred benefits	Reform 3: Actuarial PI	Reform 4: Actuarial PI – no deferred benefits	Reform 5: Actuarial PI only
50-54	1.669	2.447(+47%)	1.888(+13%)	1.719(+3%)	1.947(+17%)	2.628(+57%)
55-59	1.820	1.992(+9%)	2.054(+13%)	1.874(+3%)	2.069(+14%)	2.403(+32%)
60-64	2.171	2.514(+16%)	2.322(+7%)	2.283(+5%)	2.335(+8%)	2.127(-2%)

Note: Variation from the baseline in parentheses

4.2. CHANGING EARLY EXIT RULES

The second set of reforms considers changes to the generosity of the early labor market exits in the Belgian context. Three stylized reforms are explored.

The first one maintains current early retirement benefits under the DI, UI and CER system for all individuals in our sample. However, periods spent on these programs after the age of 50 do – from now on – no longer count towards the calculation of pension entitlements under the PI system ("Reform 2: No deferred benefits"). Expressed differently, early retirees in the DI, UI and CER system would have unaffected instantaneous benefits but substantially lower deferred entitlements once rolled over in the PI system at age 65. Reform 2 has immediate policy relevance as is a stylized version of the latest Belgian pension reform applicable as of January 1, 2013. The reform reduced the wage at which periods on UI or CER are taken into consideration for pension purposes from the last real wage to the minimum pensionable wage. [20]

The second one would leave the DI, UI and CER programs unaffected but would introduce changes to the PI system by re-introducing an actuarial adjustment factor of 5 % into the benefit formula ("Reform 3: Actuarial PI"). Benefits that are claimed before the full benefit age would be adjusted downwards by 5 percent per year of anticipation (e.g., for a men first claiming benefits at age 60, payouts would be reduced by 25 percent for the remainder of the life), whereas late benefits would be increased by 5 percent per year of delay (e.g., for a woman aged 65 in our sample in 2005, the benefits would be increased by 10 percent on a remaining life basis).

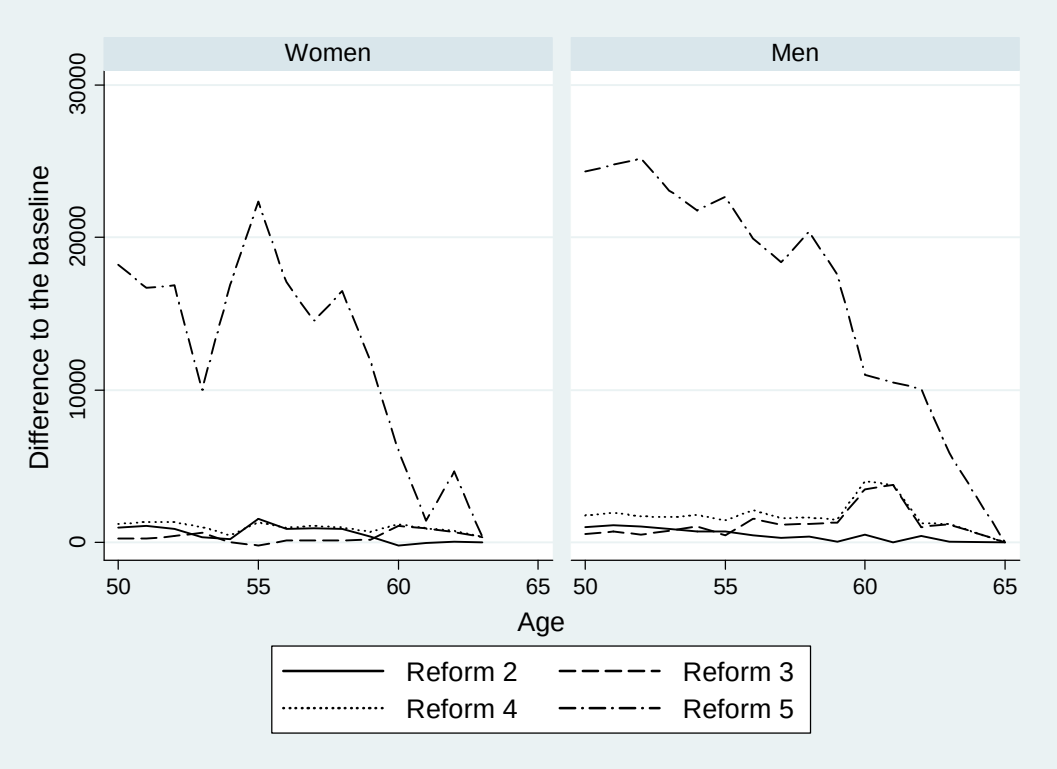
[20] In our simulations, we assume that these changes do not prevent individuals from benefiting from minimum pension benefits – in line with the real-world Belgian pension.

The third one simply combines Reforms 2 and 3 – by introducing actuarial adjustments and limiting deferred right while keeping current DI, UI and CER benefits intact ("Reform 4: Actuarial PI – no deferred benefits").

The last one would be the most drastic one as it would combine the complete elimination of the early exit routes DI, UI and CER with the actuarial adjustment of Reform 3 ("Reform 5: Actuarial PI only").

The consequences of these reforms on the OV indicator are reported in Figures 8. The figures illustrate the strongly heterogeneous impact on the various age and sex groups. For example, while Reform 2 most strongly impacts on age groups below 60 – Reform 3 essentially affects individuals above that age threshold. Reform 4 – by design a combination of these two reforms – displays a less distinct age profile of OV changes. Reform 5, by its more fundamental nature, generates an impact in terms of OV (and benefit generosity) that is orders of magnitude larger than those of the other three reforms.

Figure 8: Reforms 2 to 5 – Absolute change of OV as compared to baseline, by age and sex



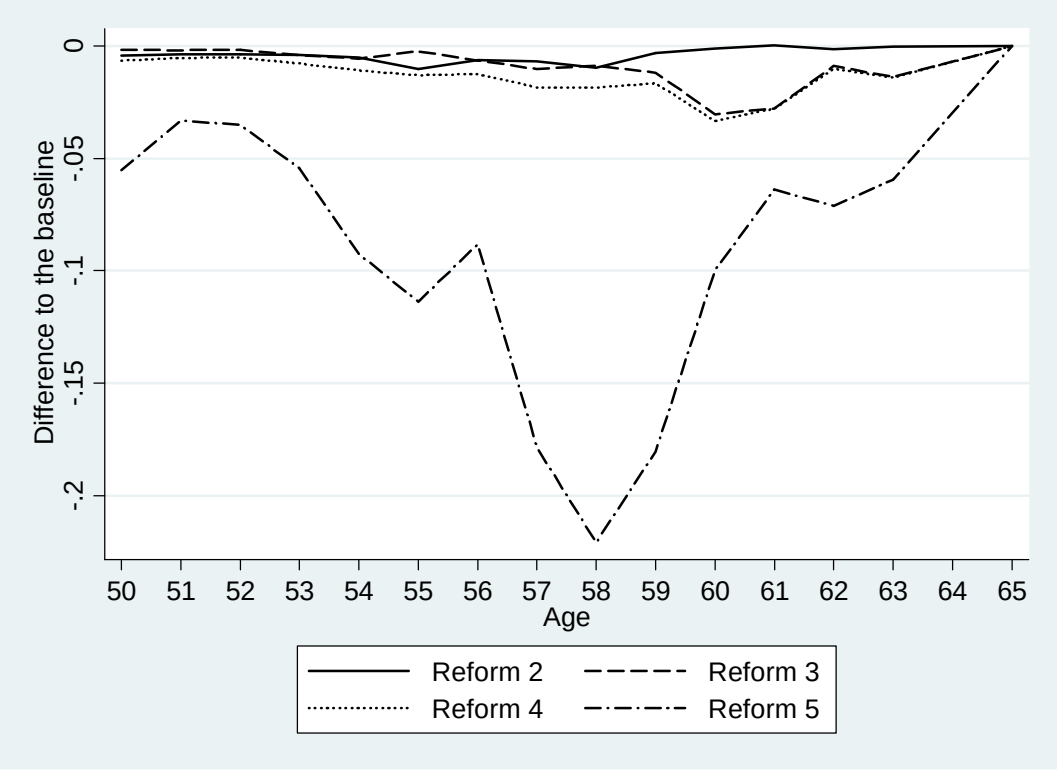
Source: Authors' calculations

The effect of these incentives in terms of instantaneous retirement hazards is summarized in Figure 9. It plots the change in instantaneous exit rates by age for the 4 early exit reforms as compared to the baseline. While the change is rather modest for Reforms 2-4, Reform 5 achieves a substantially larger impact in terms of retirement hazards. Similarly, the impact in terms of the average retirement age for our sample is only extremely modest for our sample for Reforms 2-4 as can be read off Table 4. Only Reform 5 manages to generate a substantial increase in the average retirement age of more than 7 years.

The distributional consequences of the 4 early exit reforms also differ markedly. For example, Reform 3 with its actuarial PI system leads to the smallest increase in interquartile differences as it affects all age and wealth groups in a rather linear way as far as the PI system is concerned. It is also noteworthy that while Reforms 2 and 3 have an impact in terms of average retirement age of respectively +0.23 and +0.28 that exactly adds up to the impact of the combined Reform 4 (+0.51), the same "additivity" of the effects does not hold true in distributional terms where the non-uniform effect on all members of each age-group leads to intricate distributional consequences.

Finally, the last reform provides a nice illustration of the importance of clearly differentiating labor market and inequality outcomes. Reform 5 leads to a smaller interquartile difference than the baseline – and this in spite of substantial cuts in benefit generosity. In fact, the cuts of the Reform 5 are so severe that any remaining entitlements are rather closely aligned between individuals.

Figure 9: Reforms 2-5 – Percentage point change of hazard rate of labor force exit, by age



Source: Authors' calculations

The implications for actual and contemplated Belgian pension policy are simple, but also powerful: modest reforms of the early retirement systems that only affect some small subgroups of the population are unlikely to achieve any substantive impact in terms of labor market participation. As such, the 2012 reforms of the Belgian pension system are unlikely to affect the observed incentives

in a sufficient way to lead to a strong impact on pension entitlements – at least in the short to medium run.[21]

5. CONCLUSIONS

The paper investigates retirement behavior of Belgian wage earners. We document the various possible early-retirement and retirement pathways offered by the Belgian social protection environment – emphasizing the interactions between them.

Using SHARE data, we estimate a reduced form behavioral model of retirement. We use a rich set of socio-economic, health and demographic variables to estimate various specifications of retirement probit models. One key independent variable is a dynamic indicator of retirement incentives, that we construct on the basis of lifetime earnings profiles of the individuals. This forward-looking parameter summarizes the financial incentives faced by an individual within the Belgian institutional setting.

Our estimation shows that retirement probabilities are strongly influenced by the dynamic incentive variable. We further show a significant role for health and education as a driver of retirement. Our results also reveal an important regional dimension to the retirement process. Controlling for all other indicators, we find that Flemish workers are significantly more likely to retire than their Walloon counterparts. This result, though at first sight surprising, is perfectly consistent with the aggregate observation of comparable activity rates in higher ages and substantially stronger activity rates in lower ages.

Using our probit estimates, we simulate a series of policy reforms. Our results indicate the importance of endogenous retirement behavior. For example, when increasing all key eligibility ages and conditions by 2 years, our results indicate that the overall increase in terms of retirement ages will be close to 3 years. We also analyze a series of reforms regarding the generosity of the early-retirement options. Our results show that only strong changes have the power to change labor force behavior substantially. We also explore distributional consequences of these measures – revealing the largely non-uniform impact of the various reform proposals on inequality, both within age groups, but also across.

We do not address the question of the budgetary impacts of these reform proposals for the government. In fact, our sample of individuals is neither representative of individuals in their age group, nor of the population at large. Such a calculation, for example using the methodology of Desmet et al (2007), constitutes an interesting are for future research.

[21] In the longer run, the 2012 reform could have a somewhat stronger effect on retirement behavior, given that these changes will progressively also affect periods of absence below the age of 50, thus lowering entitlements for future retirement candidates as compared to current ones.

REFERENCES

Cremer, H., Lozachmeur, J.M. and Pestieau, P. (2009). "Use and Misuse of Unemployment Benefits for Early Retirement". *European Journal of Political Economy*, vol. 27(2), pp.174-185.

Dellis, A., Desmet, R. Jousten, A. and Perelman, S. (2003) "Micro-Modelling of Retirement in Belgium," in *Social Security and Retirement Around the World: Micro-estimation*, ed., by J. Gruber and D. Wise (Chicago: University Chicago Press).

Desmet, R., Jousten, A. , Perelman S. and Pestieau, P. (2007) "Micro-Simulation of Social Security in Belgium," in *Social Security Programs and Retirement Around the World: Fiscal Implications of Reform*, ed., by J. Gruber and D. Wise (Chicago: University Chicago Press).

Human Mortality Database. University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany). Available at www.mortality.org or www.humanmortality.de.

Jousten, A., Lefebvre, M., Perelman, S. and Pestieau, P., (2010), "The effect of Early Retirement on Youth Unemployment. The Case of Belgium" in *Social Security Programs and Retirement Around the World: The Relationship to Youth Employment*, ed. by J. Gruber and D. Wise (Chicago: University Chicago Press).

Jousten, A., Lefebvre, M., and Perelman, S., (2012), "Disability in Belgium: There Is More Than Meets the Eye" in *Social Security Programs and Retirement Around the World: Historical Trends in Mortality and Health, Employment, and Disability Insurance Participation and Reforms*, ed. by D. Wise (Chicago: University Chicago Press).

Kalwij, A. and F. Vermeulen (2008) "Health and Labour Force Participation of Older People in Europe: What do Objective Health Indicators add to the Analysis", Health Economics vol. 17(5), 619-638.

Pestieau, P. and J.P. Stijns (1999) "Social Security and Retirement in Belgium" in Social Security *Programs and Retirement Around the World*, ed. by J. Gruber and D. Wise (Chicago: University Chicago Press).

Stock, James H & Wise, David A, (1990). "Pensions, the Option Value of Work, and Retirement," *Econometrica*, Econometric Society, vol. 58(5), pages 1151-80, September.

Wise, D. (2012), *Social Security Programs and Retirement Around the World: Historical Trends in Mortality and Health, Employment, and Disability Insurance Participation and Reforms*, (Chicago: University Chicago Press).