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WORKING PAPER 14-12

Analysing the impact of eligibility and financial measures aiming at delaying early retirement in Belgium: a "difference-in-differences" approach using panel data

November 2012

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Responsible publisher: Henri Bogaert
Legal Deposit: D/2012/7433/40

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Analysing the impact of eligibility and financial measures aiming at delaying early retirement in Belgium: a "difference-in-differences" approach using panel data

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Abstract - Belgium is characterised by one of the lowest employment rates of elderly workers in the European Union. Since 1997, attempts have been made to discourage elderly workers from leaving the labour market before the age of 65. In particular, two measures aimed at reducing early retirement have been introduced. The first extends the number of career years required to enter early retirement. The second, called "pension bonus", financially stimulates elderly workers to pursue employment after the age of 62. This paper provides an ex-post evaluation of the impact of these two measures on the probability of remaining employed a year later using a difference-in-differences strategy. Our data consists of individual longitudinal employment data covering the period 2000-2009. Using panel data logit models, we find first that the extension of the career length requirement had a significant impact on the probability of staying employed a year later for blue collar and low income white collar male workers aged 60-61 compared to those aged 62-64 during the period 2000-2006. Our second exercise proceeds to estimate the impact of the "pension bonus" during the period 2004-2009, in the presence of the extension of the career length requirement. Comparing the two exercises allows us to conclude that the "pension bonus" had, if any, a very limited impact on the probability of staying employed a year later for male workers aged 62-64 compared to those aged 60-61.

Jel Classification – J14, J18, J26, C23.

Keywords – Elderly workers, retirement decision, policy evaluation, difference-in-differences, panel data.

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Executive summary

The labour market participation rate of older Belgian workers is one of the lowest in Europe. While the EU average was 46% in 2009 (Eurostat, 2011), the employment rate of Belgian workers aged 55-64 was only 35.3%. At the same time, population ageing is causing an increase in the proportion of older individuals in relation to the working age population. Because these two factors together can generate important financial sustainability problems in the social security system, attempts have been made to discourage elderly workers from leaving the labour market before the age of 65.

The 1997 pension reform increased progressively the retirement age of women from 60 to 65 years by 2009 and the number of career years required to enter early retirement from 20 to 35 years by 2005 for both men and women. In 2005, the Generation Pact introduced the “pension bonus”, a temporary measure covering the period 2007-2012 and which financially stimulates elderly workers to pursue employment after the age of 62 or beyond their 44th career year. Other measures included a more restricted access to the “pre-pension” scheme. This system, introduced in the 1970’s in Belgium when unemployment rates increased dramatically, allows companies to lay off older workers more easily by adding a compensation paid by the employer to the standard unemployment benefits.

In this paper, we investigate the impact of two of these measures: the extension of the number of career years required to enter early retirement and the “pension bonus”. These two measures provide an interesting setting for a comparative analysis of the impact of, on the one hand, an eligibility rule measure and, on the other, a financial incentive measure on the employment rate of elderly workers. Our approach is empirical and makes use of population individual longitudinal employment data covering the period 2000-2009. We estimate the impact of these two measures on the probability of staying employed a year later using a difference-in-differences strategy. This approach which has been extensively used in the evaluation literature on retirement measures identifies the impact of a specific intervention by comparing the differences in outcomes between two periods (before and after the intervention) for two different groups, those affected by the intervention (treatment group) and those unaffected by it (control group). Finally, and because the introduction of the two measures under study coincides with the increase of the full retirement age for women, we restrict our analysis to men.

To evaluate the impact of these two measures, we conduct two separate exercises. The first examines the impact of the extension of the career length requirement on the probability of staying employed during the period 2000-2006, before the introduction of the “pension bonus”. Results show a positive effect of this measure on the probability of staying employed a year later but only significant for blue collar and low income white collar elderly workers. Having established the effect of the extension of the career length requirement, we move on to consider the “pension bonus”. However, the period just prior to the introduction of the “pension bonus” includes the extension of the career length requirement. Therefore, in the second exercise we evaluate the impact of the two measures jointly during the period 2004-2009. Results show that the two measures had a significant impact on the probability of remaining employed for all worker categories. More specifically, the extension of the career length requirement had a dominant effect.

These findings allow us to conclude first that the extension of the career length requirement had a greater impact than the "pension bonus" on the probability of staying employed a year later. Second, that the "pension bonus" had, at best, a very limited impact on the employment rates of elderly workers. While the extension of the career length requirement is a relatively modest measure, it seems to have had a significant impact on discouraging early retirement. While measures which tighten eligibility rules have a direct impact, financial incentive measures can only have a behavioural impact which requires a longer period and well informed target groups in order to be attained. While the reasons for the restricted impact of the "pension bonus" are beyond the scope of this study, there are two obvious candidates worth mentioning: the "pension bonus" is little known by its target population and its temporary character limits its impact especially for "young" elderly workers who are not sure it will still exist when they become eligible for it.

Synthèse

En Belgique, le taux de participation des travailleurs âgés au marché du travail est l'un des plus faibles à l'échelle européenne. Alors que la moyenne européenne atteint 46% en 2009 (Eurostat, 2011), le taux d'emploi des travailleurs âgés entre 55 et 64 ans ne dépasse pas 35,3% en Belgique. Parallèlement, le vieillissement de la population entraîne une augmentation de la part des personnes âgées par rapport à la population d'âge actif. Dès lors que la conjonction de ces deux facteurs peut potentiellement ébranler la soutenabilité financière du système de sécurité sociale, les autorités ont pris différentes mesures pour décourager les travailleurs âgés de quitter le marché du travail avant l'âge de 65 ans.

Ainsi, la réforme des pensions de 1997 a progressivement relevé l'âge de la retraite des femmes de 60 à 65 ans en 2009. En outre, elle a porté la condition de carrière pour avoir accès à la retraite anticipée de 20 à 35 ans en 2005 à la fois pour les hommes et les femmes. En 2005, le Pacte de solidarité entre les générations a introduit le « bonus de pension », soit une mesure temporaire applicable entre 2007 et 2012 et qui incite financièrement les travailleurs âgés à rester actifs au-delà de 62 ans ou de leur 44^{e} année de carrière. D'autres mesures ont également été prises, notamment pour limiter l'accès au système de prépension. Ce système, introduit en Belgique dans les années 70 lorsque le chômage augmentait de façon spectaculaire, prévoit des dispositions particulières en cas de licenciement d'un travailleur âgé. Le cas échéant, ce dernier perçoit, en sus des allocations de chômage, une indemnité complémentaire à charge de l'ex-employeur.

La présente étude analyse l'impact de deux de ces mesures : le renforcement de la condition de carrière pour avoir accès à la retraite anticipée et le bonus de pension. Cet angle d'analyse permet de comparer les incidences de deux mesures différentes, respectivement ciblées sur une condition d'admissibilité et sur une incitation financière, sur le taux d'emploi des travailleurs âgés. L'étude est fondée sur une approche empirique et des données longitudinales individuelles en matière d'emploi qui couvrent la période 2000-2009. L'impact des deux mesures sur la probabilité de rester en emploi l'année suivante est estimé par le biais de la méthode des doubles différences (difference-in-differences). Cette méthode, qui a été éprouvée dans de multiples études d'évaluation de mesures en matière de retraite, permet de déterminer l'impact d'une intervention spécifique en comparant les écarts de résultat entre deux périodes (avant et après l'intervention) au niveau de deux groupes, celui qui est impacté par l'intervention (le groupe de traitement) et celui qui ne l'est pas (le groupe témoin). Enfin, étant donné que l'introduction des deux mesures analysées coïncide avec le relèvement à 65 ans de l'âge légal de la pension des femmes, notre analyse porte uniquement sur la population masculine.

Pour évaluer les deux mesures, nous avons mené deux exercices distincts. Le premier évalue l'impact du renforcement de la condition de carrière sur la probabilité de rester en emploi au cours de la période 2000-2006, soit avant l'introduction du bonus de pension. Les résultats montrent que cette mesure exerce un effet positif sur la probabilité de rester au travail l'année suivante, mais que cet effet est significatif uniquement pour les ouvriers et pour les employés faiblement rémunérés. L'effet du renforcement de la condition de carrière étant établi, nous avons voulu mesurer l'effet du bonus de pension. Etant donné que la condition de carrière a été modifiée au cours de la période précédant l'introduction du bonus de pension, le second exercice mesure l'impact des deux mesures sur la période 2004-2009. Les résultats font apparaître que les deux mesures ont un impact significatif sur la probabilité de rester en emploi pour toutes les catégories de travailleurs, mais que le renforcement de la condition de carrière exerce un effet prépondérant.

Les résultats des exercices nous amènent à tirer les conclusions suivantes. Premièrement, le renforcement de la condition de carrière a eu un impact plus important que le bonus de pension sur la probabilité de rester en emploi l'année suivante. Deuxièmement, le bonus de pension semble avoir eu un impact très limité sur le taux d'emploi des travailleurs âgés. Bien que le relèvement de la condition de carrière représente une mesure relativement modeste, elle semble avoir exercé un impact significatif et découragé les départs anticipés du marché du travail. Alors que les mesures qui renforcent les conditions d'admissibilité ont un impact direct, les incitants financiers ne peuvent induire des changements de comportement que sur une période plus longue et à la condition que le groupe ciblé en soit informé. Même si les facteurs expliquant l'impact limité du 'bonus de pension' tombent hors du champ d'analyse de cette étude, deux semblent évidents et méritent d'être cités : d'une part, la méconnaissance du bonus de pension parmi la population ciblée et, d'autre part, son caractère temporaire qui limite son impact surtout parmi les travailleurs âgés les plus jeunes qui ne sont pas certains que le bonus existera encore au moment où ils pourront y prétendre.

Synthese

De arbeidsmarktparticipatiegraad van oudere werknemers in België behoort tot de laagste van Europa. In 2009 bedroeg die in de EU gemiddeld 46% (Eurostat, 2011), terwijl de werkgelegenheidsgraad van Belgische werknemers in de leeftijdscategorie 55-64 slechts 35,3% bereikte. Tegelijkertijd leidt de vergrijzing tot een toename van het aandeel van ouderen t.o.v. de bevolking op arbeidsleeftijd. Aangezien die twee elementen samen de financiële houdbaarheid van het socialezekerheidssysteem in het gedrang kunnen brengen, werden verschillende pogingen ondernomen om oudere werknemers te ontmoedigen de arbeidsmarkt te verlaten voor de leeftijd van 65 jaar.

De pensioenhervorming van 1997 voorzag in de geleidelijke verhoging van de pensioenleeftijd van 60 tot 65 jaar tegen 2009 voor vrouwen en van het aantal vereiste loopbaanjaren voor vervroegde uittreding van 20 tot 35 jaar tegen 2005 voor zowel mannen als vrouwen. In 2005 introduceerde het Generatiepact de pensioenbonus, een tijdelijk maatregel voor de periode 2007-2012 die oudere werknemers een financiële stimulans geeft om te blijven werken na de leeftijd van 62 jaar of na 44 loopbaanjaren. Andere maatregelen hadden, onder andere, betrekking op een beperktere toegang tot het brugpensioenstelsel. Dat stelsel werd ingevoerd in de jaren 80 toen de werkloosheidsgraad spectaculair was toegenomen en maakt het voor ondernemingen mogelijk oudere personeelsleden gemakkelijker te ontslaan door een toeslag ten laste van de werkgever bovenop de werkloosheidsuitkering.

Deze paper onderzoekt de impact van twee maatregelen: de verhoging van het aantal vereiste loopbaanjaren voor vervroegde uittreding en de pensioenbonus. Deze twee maatregelen vormen een interessant kader voor een vergelijkende analyse van de impact op de werkgelegenheidsgraad van oudere werknemers van enerzijds een maatregel m.b.t. een toelatingsvoorwaarde en anderzijds een financiële stimulusmaatregel. De gehanteerde benadering is empirisch en maakt gebruik van populatiespecifieke longitudinale werkgelegenheidsgegevens over de periode 2000-2009. We ramen de impact van die twee maatregelen op de kans om na een jaar nog aan het werk te zijn door middel van een zogenaamde "difference-in-differences" strategie. Die strategie is wijdverbreid in de evaluatieliteratuur over pensioenmaatregelen en onderscheidt de impact van een specifieke tussenkomst door de verschillen in resultaten te vergelijken tussen twee perioden (vóór en na de tussenkomst) en voor twee afzonderlijke groepen, i.e. de personen die beïnvloed worden door de tussenkomst (betrokken groep) en de personen die er niet door worden geraakt (controlegroep). Tot slot en aangezien de invoering van de twee bestudeerde maatregelen samenvalt met de toename van de volledige pensioenleeftijd voor vrouwen, beperken we onze analyse tot mannen.

Om de twee maatregelen te beoordelen, worden twee afzonderlijke oefeningen gerealiseerd. De eerste onderzoekt de impact van de verhoging van de loopbaanvoorwaarde op de kans om na een jaar nog aan het werk te zijn over de periode 2000-2006, vóór de invoering van de pensioenbonus. De resultaten tonen een positief effect van die maatregel, dat echter enkel significant is voor oudere arbeiders en bedienden met een laag inkomen. Nadat het effect van de verhoging van de loopbaanvoorwaarde gekend is, komt de pensioenbonus aan bod. De periode die net voorafgaat aan de invoering van de pensioenbonus houdt evenwel rekening met de verhoging van de loopbaanvoorwaarde. Om die reden evalueren we in de tweede oefening de gezamenlijke impact van de twee maatregelen over de periode

2004-2009. De resultaten geven aan dat de twee maatregelen een significante invloed hadden op de kans om aan het werk te blijven voor alle categorieën van werknemers. Concreet had de verhoging van de loopbaanvoorwaarde het grootste effect.

Uit deze bevindingen kan allereerst besloten worden dat de verhoging van de loopbaanvoorwaarde een grotere impact had op de kans om na een jaar nog aan het werk te zijn dan de pensioenbonus. Daarnaast had de pensioenbonus hoogstens een zeer beperkte impact op de werkgelegenheidsgraad van oudere werknemers. Hoewel de verhoging van de loopbaanvoorwaarde een relatief bescheiden maatregel is, lijkt ze een significant effect te hebben gehad op het ontmoedigen van vervroegde uittreding. Daar waar maatregelen ter verstrenging van de toelatingsvoorwaarden een directe impact hebben, kunnen financiële stimulusmaatregelen slechts het gedrag beïnvloeden, indien ze voor een langere periode gelden en ze goed gekend zijn door de doelgroepen. Hoewel de oorzaken van de beperkte impact van de pensioenbonus niet binnen de reikwijdte van deze studie liggen, kunnen twee voor de hand liggende factoren vermeld worden: 1) de pensioenbonus is weinig gekend binnen zijn doelpopulatie en 2) zijn tijdelijke aard beperkt de impact met name voor "jongere" oudere werknemers die niet zeker zijn of die maatregel nog zal bestaan op het moment dat ze ervoor in aanmerking komen.

1. Introduction

Studies on retirement decisions have emphasised the importance of Social Security systems in shaping the labour supply decisions of elderly workers (Blöndal and Scarpetta, 1998; Gruber and Wise, 2004; Duval, 2003). Basically, two models have been put forward. On the one hand, eligibility rules such as eligibility ages are assumed to play an essential role because, in addition to their reglementary character, they become a social norm thereby determining the retirement decision of elderly workers (Lumsdaine et al, 1994). On the other hand, financial incentives are also found to be decisive. According to the option value model (Stock and Wise, 1990), individuals base their retirement decisions at a given age on the comparison of the expected present value of retiring at that age with the expected future value of retiring at each age in the future. In other words, the timing of retirement is determined by the utility gain associated with delaying retirement. Other factors are also recognised as important: "…past changes in implicit tax rates and standard retirement ages are found to explain only a third (31%) of the trend decline in males' labour force participation… "demand-side" determinants may have also played a major role in driving down participation rates" (Duval, 2003, p.21).

Given the future burden on public finances of ageing populations, these findings are particularly relevant to policy makers because it means that reforming Social Security systems should increase participation rates of elderly workers and reduce old-age related expenditures. However, while ex-ante studies seem to find large impacts of such reforms, ex-post studies find more heterogeneous results. Gruber and Wise (2002) find "ex-ante" that "A reform that delays benefit eligibility by 3 years would likely reduce the proportion of men 56 to 65 out of the labor force between 23 and 26%" (p.25). On the other hand, Krueger and Pischke (1992) find "ex-post" that labour supply continued to decline in the US after a reform which lowered Social Security benefits. Similarly, ex-post studies which evaluate the effect of the removal of the "Earnings Test", a measure which limits pension earnings to beneficiaries whose labour income exceeds a certain threshold, find either that it does not have an effect on labour supply decisions of male elderly workers (Gruber and Orszag, 2000) or that it has a substantial effect (Haider and Loughran, 2008; Song and Manchester, 2007).

In this paper, we want to contribute to this literature by investigating the impact of two measures aimed at increasing the effective retirement age of Belgian elderly workers. The first measure, introduced as a complementary measure during the 1996 Pension Reform, extends the number of career years required to enter retirement before the normal retirement age of 65. This extension was progressively introduced from 1997 to 2005, raising the career length requirement for early retirement from 20 to 35 years[1]. The second measure, called "pension bonus", financially stimulates elderly workers to pursue employment after the age of 62 or beyond their 44th career year. It was introduced in 2007 for a period of 5 years[2]. These two measures provide an interesting setting for a comparative analysis of the impact of, on the one hand, an eligibility rule measure and, on the other, a financial incentive measure on the employment rate of elderly workers.

1 The increase was spread as follows: an increase of 2 years for every year between 1998 and 2004 and of 1 year in 2005.

2 The "pension bonus" was further extended for one year in its original form. It is to be reformed starting in January 2013.

Maes (2010)[3] and Lefebvre and Orsini (2011) analyse "ex-ante" the impact of the "pension bonus" on retirement behaviour in Belgium. According to the authors, the "pension bonus" should encourage work before the age of 62 (substitution effect) while reducing work for those already working beyond age 62 (income effect). Both studies find a slight increase in the average age of retirement with the introduction of this measure due to "an income effect" which almost fully compensates for the expected "substitution effect". Finally, Dekkers (2009) shows that because of its flat rate character, the "pension bonus's" possible incentive to delay retirement decreases with age. An increasing amount of the "pension bonus" with age would be needed to obtain a constant incentive to delay retirement.

Our analysis is "ex-post" and uses individual longitudinal employment data. In order to analyse the impact of these two measures on the probability of staying employed a year later, we use a difference-in-differences approach (Imbens and Wooldridge, 2009; Bertrand et al., 2004). Difference-in-differences estimation is used to identify the impact of a specific intervention. One compares the differences in outcomes between two periods (before and after the intervention) and for two different groups, those affected by the intervention (treatment group[4]) and those unaffected by it (control group). This approach has been extensively used in the "ex-post" evaluation literature on retirement measures (Gruber and Orszag, 2003; Pingle, 2006; Song and Manchester, 2007; Haider and Loughran, 2008; Bozio, 2009; Benallah, 2010).

Applying this approach to our setting is not straightforward because workers eligible for early retirement cannot be precisely identified with our data[5]. In order to select suitable treatment and control groups, we argue that the two measures affect differently the "young" elderly workers (aged 60-61) and the "older" ones (62-64) and we use several scenarios to validate our findings. The first scenario examines the impact of the extension of the career length requirement on the probability of staying employed one year later for "young" male elderly workers compared to "older" ones during the period 2000-2006. Using logit regression models, results show a positive effect of this measure on the probability of staying employed a year later but only significant for blue collar and low income white collar male elderly workers.

Having established the effect of the extension of the career length requirement, we move on to consider the "pension bonus". However, the period just prior to the introduction of the "pension bonus" includes the extension of the career length requirement. Therefore, in the second exercise and in order to evaluate the impact of the "pension bonus" in the presence of the extension of the career length requirement, we assign one measure to the treatment group (pension bonus) and the other to the control group (career length extension). Using similar logit models to those of the first exercise, results show that the two measures together had a significant impact on the probability of remaining employed. More specifically, the extension of the career length requirement had a dominant effect, especially for white collar and high income blue collar male workers.

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3 Maes (2010) analyses a previous version of the "pension bonus" from the one implemented by the government.

4 The treatment group refers to workers targeted by the measures under study. In turn, the control group refers to workers similar to those of the treatment group while not targeted by these measures.

5 In order to be eligible for early retirement, workers have to be at least 60 years of age and fulfil a career length requirement (35 years starting in 2005). Our data does not comprise information on workers' career length. This means that all workers aged 60-64 are potentially targeted by the two measures under study.

There are at least two interpretations for our results concerning the “pension bonus”. The first is that the “pension bonus” had little or no effect on the employment probability of “older” elderly male workers (62-64) in the presence of the extension of the career length requirement. In fact, and in addition to its positive effect on the employment rate of “young” elderly workers, the extension of the career length requirement might have had a negative impact on the employment rate of “older” elderly male workers in the period following its implementation: “young” elderly male workers who do not comply with the new career length requirement might simply delay their early retirement until they meet the new career length criterion. For example, a male worker aged 60 with a career length of 32 years in 2004 will have to wait until 2007 when he is 63 to be allowed to take early retirement. In this case, our results show that the “pension bonus” does not help to delay the employment exit any further. On the other hand, it also means that the “pension bonus” might have had a limited effect on the employment rate of “older” elderly workers masked by the full effect of the extension of the career length requirement.

The second explanation is the possibility that we are capturing a “substitution effect” for male workers aged 60-61 and an “income effect” for those already working beyond their 62 year (Maes, 2010; Lefebvre and Orsini, 2011). In this scenario, and in addition to the extension of the career length requirement, the “pension bonus” has a positive effect on the employment probability of “young” elderly male workers by means of a substitution effect (work becomes preferable to retirement), while discouraging the employment rate of older ones through an income effect (a higher income leads to an increase in the demand for leisure). However, this explanation requires that the “pension bonus” be well known of its target group. A survey conducted by the National Pension Office shows that this is far from being the case[6] (Conférence Nationale des Pensions, 2010). Moreover, the “pension bonus” was initially introduced for a period of 5 years (2007-2011). This means that only a few cohorts of workers aged 60 years could rely on its existence when they would become 62. Because the decision to retire in Belgium is often taken a year in advance, it is therefore highly unlikely that in the period under consideration in our study, “young” elderly workers would consider pursuing employment to benefit from the “pension bonus”.

[6] Only one out of five survey respondents was familiar with the “pension bonus” and less than one out of five declared that this measure had an impact on his/her retirement decision (CNP, 2010).

2. Institutional setting

The labour market participation rate of older Belgian workers is one of the lowest in Europe. While the EU average was 46% in 2009 (Eurostat, 2011), the employment rate of Belgian workers aged 55-64 was only 35.3%. At the same time, population ageing is causing an increase in the proportion of older individuals in relation to the working age population. Because these two factors together can generate important financial sustainability problems in the social security system, policy makers have recently tried to increase the employment rate of older workers. In particular, measures aiming at increasing the effective retirement age have been introduced.

While the normal retirement age in Belgium is 65 years, early retirement in the old age pension scheme is possible starting at 60. In 2011, young pensioners aged 60 accounted for 24% of the total number of new pensioners while those aged 65 accounted for 60%[7] of the total (ONP[8], 2012). Since 1997, attempts have been made to discourage elderly workers from leaving the labour market before the age of 65. The 1997 pension reform increased progressively the retirement age of women from 60 to 65 years by 2009 and the number of career years required to enter early retirement from 20 to 35 years[9] by 2005 for both men and women. In 2005, the Generation Pact introduced the "pension bonus", a temporary measure covering the period 2007-2012 and which financially stimulates elderly workers to pursue employment after the age of 62 or beyond their 44th career year. Other measures included a more restricted access to the "pre-pension" scheme. This system, introduced in the 1980's in Belgium when unemployment rates increased dramatically, allows companies to lay off older workers more easily by adding a compensation paid by the employer to the standard unemployment benefits.

While the two measures considered in this study aim at delaying early retirement, they are quite different from each other. The increase of the career length requirement to enter early retirement is a mandatory measure. While it is limited to an increase of 3 years in the period under consideration, this measure is likely to affect the "young" elderly the most, those aged almost 60 who want to leave employment for early retirement. As mentioned previously, early retirement in Belgium takes place mostly at age 60. Moreover, the average duration of working life is relatively low in Belgium compared to other European countries. According to the Pension Adequacy in the European Union Report (2012), Belgian men had an average duration of working life of only 35 years in 2010 while women attained almost 30 years. Therefore, this reform might have had a greater impact than first thought.

Alternatively, by financially rewarding those elderly workers remaining at work at the age of 62 or beyond their 44th career year, the aim of the "pension bonus" is to influence labour supply decisions. In 2011, an extra year of full time work amounted to a "pension bonus" of 689 euro. This means that a worker who stays full time employed until age 65 receives an extra 2,067 euro per year when retiring. As a result, we expect this incentive measure to affect, if any, the employment rate of those elderly workers having relatively low wages and expecting to receive a low retirement pension.

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7 This includes most unemployment and disability beneficiaries who retire at age 65 because it is financially advantageous to remain in these other social security categories as long as possible.

8 National Pension Office.

9 See footnote 1 for a description of this measure.

3. Data description and methodology

Our data comes from the National Social Security Office (NSSO) and covers quarterly the population of wage earners belonging to the private sector[10]. For the purpose of our study, we select all male[11] workers aged 59 to 63 years during the first quarter of each year between 2000 and 2009. Then, we examine whether they stayed employed one year later. The data also includes characteristics of the worker (age, gender, blue/white collar status, place of residence, private or public sector and quarterly gross wage) and of the company (size and industry affiliation). Finally, using the anonymous worker's identification number, we are able to follow individuals in time and obtain an annual panel of the population of elderly male workers aged 59-63 during the 2000-2009 period.

Exits from employment at the selected ages may correspond to retirement but also to departures due to "pre-pension" schemes, unemployment or disability. Our data allows us only to distinguish exits due to "pre-pension" schemes and to unemployment. On the other hand, we cannot identify exits due to disability or death. However, because these departures are relatively limited[12], we assume that all remaining exits correspond to retirements. A second issue with our data is the lack of information on career length and on education level. While we take partly into account these variables by means of random unobserved individual effects in the models, the absence of information on career length has obvious implications for the estimation of the impact of the extension of the career length requirement in the two scenarios. Moreover, it also has implications for the identification of the treatment group in the second exercise. As explained above, the "pension bonus" is granted according to age but also according to a career length requirement (44 years) which we do not observe in our data.

Figures 1 and 2 illustrate annual employment exit rates by age for respectively blue collar and white collar male elderly workers during our observation period (2000-2009). For example, the exit rate of workers aged 59 in a given year equals the proportion of workers aged 59 during the first quarter of that year who are no longer working a year later (when they become 60). As mentioned before, these average rates exclude exits to formal "pre-pension schemes" and to unemployment[13] so that we are as close as we can with our data to approximate exits to retirement.

Both blue collar and white collar elderly workers have the highest employment exit rates at ages 59 and 60, which means that they exit the labour market when they become 60 or 61 years of age. However, exit rates at those ages are much lower for blue collar than for white collar workers, especially at the beginning of the observation period. At ages 61, 62 and 63, average exit rates become more similar, including between blue and white collar workers. While exit rates are strongly decreasing for white collar workers over the observation period, they are much more stable for blue collar workers. For

10 The data also includes public sector workers entitled to a private sector pension scheme, known commonly as "contractuels/contractuelen".

11 Because the introduction of the two measures under study coincides with the increase of the full retirement age for women, we restrict our analysis to men.

12 According to calculations based on the Labour Force Survey for the years 2006-2009, less than 2% of exits from employment for individuals aged between 60 and 64 ended in disability (Van den Bosch, 2012).

13 We identify exits from employment to unemployment by examining the presence of severance payments during each of the following four trimesters. This means that a worker who is not working a year later and receives severance payments during at least one of these trimesters will be considered as exiting to unemployment.

white collar workers aged 59, the decrease is clearly the strongest between 2004 and 2006 coinciding with the introduction of the extension of the career length requirement (one year in 2004 and two years in 2005). However, one more measure was introduced in 2004 to promote the employment of elderly workers: a 400 euro cut in employers' social security contributions for workers aged 57 and more. Therefore, this measure might also be playing a role.

Figure 1 Annual employment exit rates by age: blue collar elderly males (2000-2009)

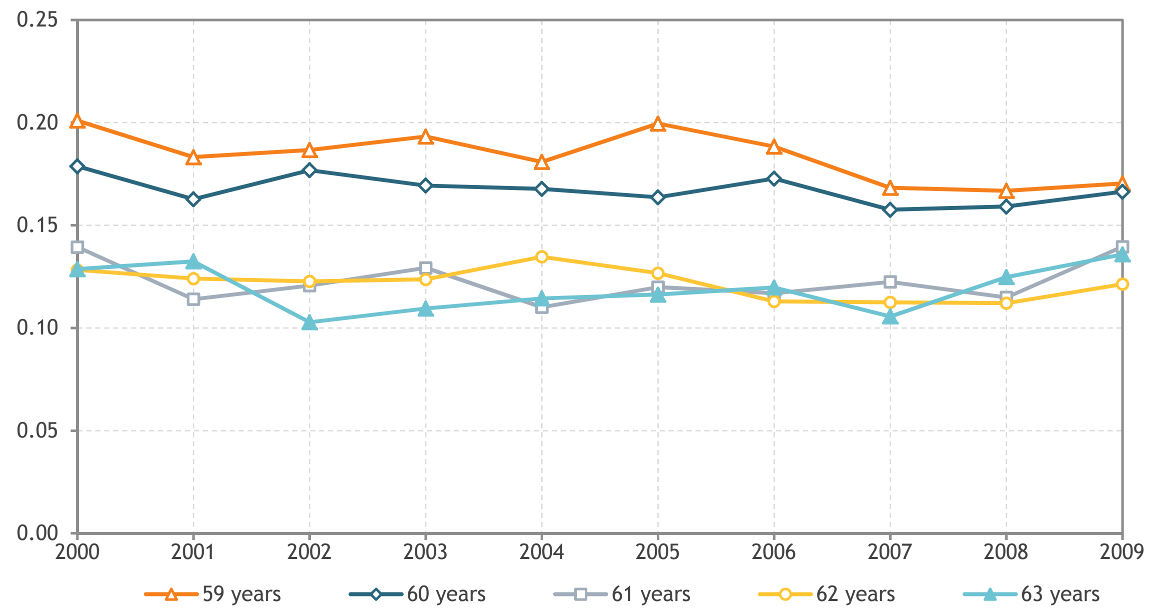
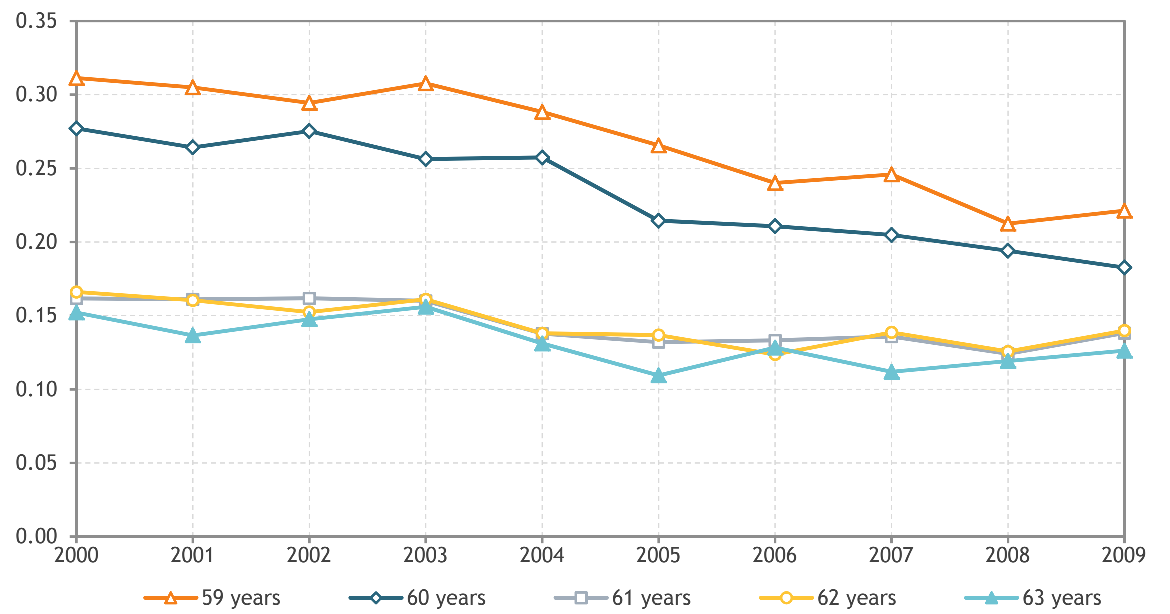


Figure 2 Annual employment exit rates by age: white collar elderly males (2000-2009)



In order to apprehend the impact of the two measures under consideration on the employment probability a year later, we conduct two exercises using a difference-in-differences approach. The first examines the impact of the extension of the career length requirement for early retirement from 32 to 35 years introduced in 2004 (one year) and 2005 (two years). To do so, we restrict our data to the period 2000-2006, before the introduction of the "pension bonus", where the years 2000-2003 (2004-2006) amount to the period before (after) the introduction of the measure[14]. Because retirement in Belgium takes place mostly at ages 60 (early retirement age) and 65 (normal retirement age) and much less between those two age years, our "treatment group" comprises workers aged 59 and 60[15]. Since this is the age-group in Belgium most inclined to take early retirement, it should be the group most affected by the extension requirement. People who retire early at 60 comprise, among others, white collar workers who benefit from a firm pension plan which might encourage them to early exit the labour market. For example, until 1/1/2007, it was fiscally advantageous to claim company pension benefits starting at 60[16]. Similarly, our "control group" comprises older workers aged 61 to 63 who are less inclined to early retirement and therefore less affected by the extension of the career length requirement. Finally, we also assume that other measures introduced in 2004, such as the reduction of social security contributions for elderly workers aged 57 and more, affect similarly the control and the treatment group[17].

After examining the impact of the extension of the career length requirement, we proceed, in a second exercise, to study the effect of the "pension bonus" introduced in January 1, 2007. Recall that this measure financially stimulates elderly workers to pursue employment after the age of 62 or beyond their 44th career year. However, the period preceding its introduction coincides with the extension of the career length requirement for early retirement. As a consequence, and in order to use a difference-in-differences approach, we assign in this exercise the two measures respectively to the treatment and control groups. Then, we consider the period 2004-2009 which we divide in two: during the first period (2004-2006), the career length requirement is extended from 32 to 35 years, during the second (2007-2009), the "pension bonus" is introduced. This time, the "control group" comprises workers aged 59 and 60 which are entitled to early retirement when fulfilling the career length requirement but not to the "pension bonus". Our "treatment group" comprises workers aged 61 to 63 which are entitled to the "pension bonus" and are relatively unaffected by the extension of the career length requirement. Finally, and in order to isolate the effect of the "pension bonus" on the employment probability a year later, we confront the two exercises with each other.

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14 Notice that the career length requirement was also increased in 2000-2003 from 26 to 32 years. Therefore, we are actually evaluating the impact of an increase from 33 to 35 years (2004-2005) versus one from 26 to 32 years (2000-2003).

15 As said previously, most early retirement happens at age 60 in Belgium. By choosing workers aged 59 and 60 as treatment group, we attempt to capture, on the one hand, those workers who leave the labour market when they just turn 60 and, on the other hand, those aged 60 who wait beyond their actual birthday to leave the labour market. However, and because we do not have information on actual birthdates, we are also partly capturing in the treatment group workers who actually turned 61 when leaving the labour market.

16 After 2007, further fiscal incentives were introduced to encourage people to stay even longer in the labour market (65 years).

17 Employers might prefer young "elderly workers" to older ones. In this case, we will be measuring the impact of the extension of the career length requirement and of the reduction of social security contributions together on the employment probability a year later.

Our model is similar in the two exercises and looks as follows:

$$E_{it} = \eta_i + \lambda TIME + \varrho TREAT + \delta DID + \beta X_{it} + u_{it} \quad (1)$$

where E_{it} is the probability at time t that individual i remains employed at time t+1 and X_{it} is a data matrix of time-varying characteristics of the worker and the company which employs him (region of residence, gross wage, working time regime, company size, private/public sector and industry affiliation).

In the first exercise, *TIME* is a dummy variable equal to one if the worker is present in 2004-2006, *TREAT* is a dummy variable equal to one if the worker is aged 59 and 60 and *DID* is the product of the two previous variables and equals one if the worker is both aged 59-60 and present in 2004-2006.

In the second exercise, *TIME* is a dummy variable equal to one if the worker is present in 2007-2009, *TREAT* is a dummy variable equal to one if the worker is aged 61 to 63 and *DID* equals one if the worker is both aged 61-63 and present in 2007-2009. In both exercises, the effect of the measures under consideration is identified by the δ coefficient.

4. Empirical Results

We estimate equation 1 using different logit models where the logarithm of the odds ratio[18] of staying employed between t and t+1 is a function of difference-in-differences variables and of observed and unobserved control variables. Table 1 shows the results for the first exercise which evaluates the impact of the extension of the career length requirement to enter early retirement during the period 2000-2006. Model 1 presents results for blue and white collar workers separately. Model 2 further desegregates each of these categories according to income: low (high) income workers are defined as those having a quarterly gross wage under (above) the quarterly median at time t. For each of these models, three specifications are presented: (a) includes only difference-in-differences variables as explanatory variables (TREAT, TIME and DID); (b) takes also into account (observed) control variables; and (c) adds to the former variables individual (unobserved) random effects.

4.1. First scenario: impact of the extension of the career length requirement for early retirement

Let us first look at the results of the first exercise (see Table 1) which estimates the effect of the extension of the career length requirement to enter early retirement on the logarithm of the odds ratio of staying employed a year later during the period 2000-2006.

Belonging to the treatment group (males aged 59-60) rather than to the control group (males aged 61-64) significantly decreases the logarithm of the odds ratio of remaining in employment in all models (see coefficient of the variable TREAT). It confirms our expectations since it is known that Belgian elderly workers leave employment for early retirement the most when they turn 60 and very little between 60 and 65. However, this coefficient becomes much smaller, especially for white collar workers, when control variables and unobserved individual effects are introduced. This means that these variables play an important role in the differences in employment probabilities between young and old elderly workers.

In contrast, the coefficient of the variable TIME fluctuates much more between the different models. This coefficient which captures the evolution of the exit rate between the two periods, before and after the introduction of the extension of the career length requirement, is positive for white collar workers and becomes negative for blue collar workers in the model taking into account individual random effects (Model 1c). This means that the employment odds of blue collar workers significantly decreases during the period 2004-2006 with respect to 2000-2003 while it increases for white collars. However, when disaggregating by income level, this coefficient remains positive only for high income white collar workers.

Regarding the impact of the extension of the career length requirement, the coefficient of the variable DID is positive and significant for blue collar workers and positive but not significant for white collar workers (Model 1c). However, when disaggregating by income level (Model 2c), this coefficient becomes larger for blue collar workers whose wage is above the median wage and positive and significant for white collar workers whose wage is below the median wage. Therefore, this measure seems to have affected mostly blue

[18] The odds ratio is the ratio of the probability of occurrence of an event to that of non-occurrence. In our context, it means the ratio of the probability of staying employed to that of not staying employed a year later.

collar workers, in particular, those with a relatively higher income, and low income white collar workers. On the other hand, it does not seem to have affected high income white collar workers.

Before commenting on the results of our second exercise, a few words over the impact of the control variables on the logarithm of the odds ratio of staying employed. The coefficients for the first scenario are presented in Table 3 of the appendix for the models including individual random effects[19]:

- Compared to small companies (< 5 workers), larger companies have a positive and significant effect on the logarithm of the odds ratio of staying employed for (elderly) blue collar workers. However, when disaggregating by income level (Model 2c), this result remains only significant for workers whose wage is lower than the median. For white collar workers, this effect is mostly negative but only significant for very large companies (larger than 200 workers).
- Both blue and white collar elderly workers have a significantly higher (logarithm of the) odds ratio of staying employed if they live in Brussels or in Wallonia rather than in Flanders.
- Compared to full-time work, part-time work has a negative and significant effect on the employment odds of white collar elderly workers (Model 1c). When disaggregating by income level (Model 2c), this effect is reinforced for white collar workers whose wage is above the median and becomes positive and significant for high income blue collar workers. On the other hand, it is positive and significant for blue white collar workers whose wage is below the median and negative and significant for those above the median. One possible explanation is that high income elderly workers might reduce their work volume as a means of leaving gradually the labour market.
- The individual's wage level has a negative and significant effect on the employment probability of white collar workers. It has a positive and significant effect for blue collar workers whose wage is below the median. However, even if significant, this coefficient is always very small and close to zero.
- Individual random effects are significantly different from zero in all models. Therefore, not taking them into account might lead to biased estimators of the impact of the policies under consideration.

[19] The coefficients of the control variables for the second exercise are very similar to those obtained for the first scenario and are therefore not presented.

Table 1 Extension of the career length requirement for early retirement: impact on the probability of being employed one year later (male workers aged 59-63 years in t, 2000-2006)

	Model 1						Model 2											
	Blue collar workers			White collar workers			Blue collar < median			Blue collar > median			White collar < median			White collar > median		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
TREAT	-0.47***	-0.48***	-0.37***	-0.79***	-0.48***	-0.40***	-0.43***	-0.44***	-0.33***	-0.61***	-0.61***	-0.52***	-0.64***	-0.49***	-0.36***	0.79***	-0.44***	-0.39***
	(.05)	(.05)	(.04)	(.07)	(.04)	(.03)	(.05)	(.06)	(.05)	(.08)	(.09)	(.08)	(.16)	(.05)	(.07)	(.06)	(.03)	(.03)
TIME	0.04	0.02	-0.19***	0.21***	0.23***	0.13***	0.04***	-0.07	-0.32***	0.01	0.02	-0.20**	0.07	0.04	-0.15**	0.26***	0.30***	0.23***
	(.03)	(.03)	(.05)	(.00)	(.01)	(.03)	(.01)	(.04)	(.06)	(.12)	(.13)	(.10)	(.08)	(.06)	(.08)	(.02)	(.03)	(.04)
DID	-0.03	-0.02	0.17**	-0.00	-0.06*	0.04	-0.04	-0.03*	0.16**	0.04	0.05	0.24**	0.03	-0.01	0.16*	-0.03	-0.09**	-0.03
	(.03)	(.03)	(.06)	(.01)	(.01)	(.04)	(.03)	(.03)	(.07)	(.14)	(.15)	(.11)	(.09)	(.08)	(.10)	(.03)	(.04)	(.04)
Control variables	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Random effects	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Nb observations	61,530	61,526	61,526	105,242	105,211	105,242	42,168	42,168	42,168	19,362	19,357	19,358	20,755	20,736	20,755	84,487	84,475	84,487
Loglikelihood	-26,355	-26,178	-26,056	-54,281	-50,064	-50,004	-18,192	-17,973	-17,861	-8,150	-8,017	-7,991	-9,741	-9,340	-9,269	-44,475	-40,517	-40,493

Standard errors in parenthesis. In the models without unobserved random effects, the standard errors are clustered according to age. *** significant at 1%, ** at 5% and * at 10% level.

Table 2 Extension of the career length requirement and “pension bonus”: impact on the probability of being employed one year later (male workers aged 59-63 years in t, 2004-2009)

	Model 1						Model 2											
	Blue collar workers			White collar workers			Blue collar < median			Blue collar > median			White collar < median			White collar > median		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
TREAT	0.49***	0.51***	0.47***	0.80***	0.58***	0.50***	0.47***	0.50***	0.45***	0.63***	0.60***	0.56***	0.71***	0.58***	0.52***	0.82***	0.56***	0.47***
	(.06)	(.07)	(.04)	(.08)	(.04)	(.03)	(.05)	(.06)	(.04)	(.14)	(.14)	(.11)	(.13)	(.11)	(.06)	(.06)	(.06)	(.04)
TIME	0.11***	0.10**	0.10***	0.21***	0.24***	0.25***	0.07***	-0.03	-0.05**	0.33***	0.34***	0.40***	0.27***	0.22***	0.24***	0.19***	0.24***	0.25***
	(.04)	(.04)	(.03)	(.00)	(.00)	(.02)	(.02)	(.05)	(.04)	(.11)	(.10)	(.09)	(.03)	(.02)	(.05)	(.00)	(.01)	(.03)
DID	-0.14**	-0.14**	-0.34***	-0.20***	-0.20***	-0.42***	-0.10**	-0.09*	-0.32***	-0.31**	-0.27*	-0.57***	-0.22***	-0.18***	-0.47***	-0.20***	-0.20***	-0.44***
	(.06)	(.06)	(.05)	(.02)***	(.02)	(.04)	(.05)	(.05)	(.06)	(.15)	(.14)	(.16)	(.05)	(.05)	(.08)	(.01)	(.01)	(.05)
Control variables	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Random effects	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Nb observations	70,937	70,937	70,937	118,585	118,580	118,584	60,571	60,571	60,571	10,366	10,365	10,366	31,605	31,584	31,605	86,980	86,976	86,979
Loglikelihood	-29,823	-29,655	-29,568	-56,605	-52,583	-52,433	-25,599	-25,313	-25,212	-4,212	-4,212	-4,090	-14,300	-13,635	-13,540	-42,278	-38,738	-38,619

Standard errors in parenthesis. In the models without unobserved random effects, the standard errors are clustered according to age. *** significant at 1%, ** at 5% and * at 10% level.

4.2. Second scenario: impact of the "pension bonus" in the presence of the extension of the career length requirement for early retirement

Let us now look at the results of the second exercise which aims to evaluate the impact of the "pension bonus" in the presence of the extension of the career length requirement (Table 2). In all models, belonging to the age group 61-63 (TREAT) increases the logarithm of the odds of staying employed a year later with respect to workers aged 59-60. This result is always significant and consistent with the results of the first exercise. Similarly, there is a significant increase in the odds of staying employed in the period 2007-2009 with respect to the period 2004-2007 in all models, with the exception of low income blue collar workers where the coefficient of the variable TIME becomes negative and significant in the model which takes into account individual random effects (Model 2c).

The coefficient of the variable DID which captures the effect of the two measures under study is negative and significant in all models indicating that the logarithm of the odds ratio of staying employed a year later is negatively affected by the two measures. Because we are comparing two measures using a control and a treatment group, a negative coefficient for this variable actually means that the employment odds of the control group (workers aged 59-60) increases relatively more than the employment odds of the treatment group (workers aged 61-63) between the two periods. In other words, this means that the first measure which affects the control group (the increase of the career length requirement to enter early retirement) appears to have had a greater impact than the second measure which affects the treatment group (the pension bonus) on the odds of staying employed in the period 2004-2009. Model 1 shows that while this result is common to both blue collar and white collar workers, this impact is slightly greater for white collar workers than for blue collar workers.

The introduction of individual random effects has a considerable impact on the coefficients of the variable TREAT for white collar workers and DID for both white and blue collar workers (Model 1). In other words, when taking into account unobserved individual effects, the differences in employment odds between control and treatment groups decrease for white collar workers while they remain relatively unaffected for blue collar workers (see coefficient of TREAT). Unobserved individual effects can account for education level, the availability of company pension plans, etc. Nevertheless, even if these differences are reduced when controlling for unobserved characteristics, they remain considerable for both white and blue collar workers. In the case of the measures under study (see coefficient of DID), the introduction of individual random effects reinforces the impact of the increase of the career length requirement with respect to the "pension bonus".

These findings are relatively unaffected for white collar workers when we desegregate the estimations according to the level of income (Model 2). This is not the case for blue collar workers. The employment odds of high income blue collar workers is much more affected by the three variables TREAT, TIME and DID than for low income blue collar workers. High income blue collar workers have the largest coefficient for the variable TIME which means that their probability of staying employed a year later increases considerably between the two periods. Moreover, the extension of the career length requirement seems to have had a much greater impact for this category than the "pension bonus".

4.3. Comparing the two scenarios: impact of the "pension bonus"

Let us now compare the two exercises in order to better isolate the impact of the "pension bonus". Comparing the coefficients of the variable DID in the two exercises for each category (models 1c and 2c), we see that they are always larger in absolute value in the second scenario. This means that the impact of the extension of the career length requirement is larger in the second than in the first exercise despite the presence of the "pension bonus". Recall that the extension of the career length requirement was introduced in 2004 (one year) and in 2005 (two years). Therefore, this measure appears to have a greater impact in 2004-2006 with respect to 2007-2009 than to 2000-2003. This effect is particularly clear for high income white collar workers. While there was no significant impact of the extension of the career length requirement in the first scenario, we find a significant negative effect of the two measures in the second. This means a reduction of the odds ratio of staying employed for the treatment group which benefits from the "pension bonus" with respect to the control group which benefits from the career length extension.

There are several explanations for our results. The first is that the extension of the career length requirement to enter early retirement was simply a much more effective measure than the "pension bonus". The first scenario shows that even when the extension of the career length requirement is not fully operational, it has a significant impact on the odds ratio of staying employed. In the second exercise, when this measure is fully effective, its impact becomes even greater confirming its importance and undermining the effect, if any, of the "pension bonus". In both exercises, we find the greatest impact of the measure(s) for high income blue collar workers. In the first exercise, we saw that the odds ratio of remaining employed of elderly workers aged 59-60 with respect to those aged 61-63 increased by 27% with the extension of the career length requirement for early retirement. In the second exercise, the odds ratio of workers aged 61-63 with respect to those aged 59-60 is reduced by 45% with the introduction of the two measures. While in this scenario, the "pension bonus" should have a positive effect on the odds ratio of elderly workers aged 61-63, the extension of the career length requirement clearly plays a dominant role on the odds ratio of workers aged 59-60.

In fact, the extension of the career length requirement might have had a negative impact on the employment rate of "older" elderly workers in the period following its implementation: "young" elderly workers who do not comply with the new career length requirement might simply delay their early retirement until the moment they meet the new career length criterion. For example, a male worker aged 60 with a career length of 32 years in 2004 will have to wait until 2007 when he is 63 to be allowed to take early retirement. In this case, our results show that the "pension bonus" does not help to delay the employment exit any further. On the other hand, it also means that the "pension bonus" might have had some effect on the employment rate of "older" elderly workers masked by the full effect of the extension of the career length requirement. In fact, we expected the "pension bonus" to have an impact on the employment odds of low income blue collar elderly workers. Indeed, in the second scenario we obtain the smallest coefficient of the variable DID for this category (Model 2c). While the employment odds increase by 17% in the first scenario, it decreases by 27% in the second. Therefore, and even for this category, the "pension bonus" does not seem to be playing a significant role.

The second explanation is the possibility that we are capturing a "substitution effect" for workers aged 59-60 and an "income effect" for those already working beyond their 62 year (Maes, 2010; Lefebvre and Orsini, 2011). In this scenario, and in addition to the extension of the career length requirement, the "pension bonus" has a positive effect on the employment probability of "young" elderly workers by means of a substitution effect (work becomes preferable to retirement in the presence of the "pension bonus"), while discouraging the employment rate of older ones through an income effect (a higher pension induced by the "pension bonus" leads to an increase in the demand for leisure). While we cannot reject this hypothesis, this explanation requires that the "pension bonus" be well known of its target group which does not seem to be the case[20] (Conférence Nationale des Pensions, 2010). Finally, the "pension bonus" was initially introduced for a period of 5 years (2007-2011). This means that only a few cohorts of workers aged 60 years could rely on its existence when they would become 62. Because the decision to retire in Belgium is often taken one year in advance, it seems highly unlikely that in the period under consideration in our study (2007-2010), "young" elderly workers would consider pursuing employment to benefit from the "pension bonus". Assuming they would know about this measure, only the cohort aged 59 in 2009 would be able to anticipate the benefit of the "pension bonus" when becoming 62 years of age. The majority of those aged 59 at the end of the first quarter of 2008 would have already made their decision to retire a year before, thus mostly before the introduction of the "pension bonus"[21].

[20] See footnote 5, p.6.

[21] Notice that those aged 59 in 2009 are not include in our data.

5. Conclusions

In this paper, we provide an estimation of the impact of two recent measures introduced in Belgium to delay early retirement of elderly workers. The first measure is a mandatory measure extending the career length requirement to enter early retirement by three years. The second is an incentive measure aiming at financially rewarding those workers remaining employed beyond their 62 year or 44th career year.

The results of our first exercise show that the extension of the career length requirement had a significant impact on the probability of staying employed a year later, especially for blue collar workers. Furthermore, in our second exercise, the extension of the career length requirement has a much stronger effect that the "pension bonus", especially for white collar and high income blue collar workers. This impact is more limited for low income blue collar workers. Therefore, these findings allow us to conclude first that the extension of the career length requirement had a greater impact than the "pension bonus" on the probability of staying employed a year later. Second, that the "pension bonus" had, at best, a very limited impact on the employment rates of elderly workers.

These results confirm some of our expectations. While the extension of the career length is a relatively modest measure, it seems to have had a significant impact on discouraging early retirement. Measures which tighten eligibility rules have a direct impact. In turn, financial incentive measures can only have a behavioural impact which requires a longer period and well informed target groups in order to be attained. While the reasons for the restricted impact of the "pension bonus" are beyond the scope of this study, there are two obvious candidates worth mentioning: the "pension bonus" is little known of its target population and its temporary character limits its impact especially for "young" elderly workers who are unsure of the existence of this measure when they become eligible for it.

Appendix

Table 3 Appendix 1: Control variables first exercise: models with individual random effects (see table 1)

Control variables	Model 1c		Model 2c		Model 2c	
	Blue collar	White collar	Blue collar <median	Blue collar >median	White collar <median	White collar >median
Company size						
<5 workers			reference			
5-9 workers	0.21***	0.08*	0.21***	0.11	0.06	0.11*
10-19 workers	0.27***	0.01	0.30***	0.04	0.13	-0.01
20-49 workers	0.34***	-0.08**	0.33***	0.16	0.01	-0.09*
50-99 workers	0.40***	-0.07	0.40***	0.22	-0.15	-0.06
100-199 workers	0.23***	-0.05	0.18**	0.04	-0.02	-0.07
200-499 workers	0.52***	-0.14***	0.49***	0.36***	-0.21	-0.15***
500-999 workers	0.26***	-0.43***	0.28*	0.22	-0.53**	-0.43***
>1000 workers	0.22**	-0.90***	0.28***	0.20	-0.77***	-0.94***
Region						
Flanders			Reference			
Brussels	0.40***	0.35***	0.31***	0.73***	0.39***	0.33***
Wallonia	0.32***	0.24***	0.21***	0.51***	0.29***	0.23***
Part-time	0.03	-0.41***	0.17***	-0.24**	0.07	-0.57***
Gross wage	0.00	-0.00***	0.00***	-0.00***	0.00*	-0.00***
Sector						
Private			Reference			
Public	-0.39**	0.31***	-0.68***	-0.58	0.37*	0.27***
constant	1.90***	1.92***	0.53***	2.56***	1.81***	1.87***
Individual effects	0.32***	0.14***	0.37***	0.32***	0.37***	0.09***
# observations	61,526	105,242	42,168	19,358	20,755	84,487

Notes: all models include 28 industry dummies and random individual effects.
*: significant at the 10% level, **: at the 5% level and ***: at the 1% level.

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