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Tax Incentives to Promote Active Ageing

The Introduction of the Doorwerkbonus in the Netherlands

MSc Thesis 2013-005

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July 2013

Master Thesis
Economics and Finance of Aging
Tilburg University

Thesis Supervisor: Prof. Hans Bloemen
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Abstract

Concerns about sustainability of the Dutch pension system have led policy makers during the last years to rethink the role of older workers by introducing a number of reforms designed to increase employment rates and to extend working life. In 2009, simultaneously with the implementation of other reforms, the Dutch government introduced a work-continuation bonus seeking to delay the retirement of older workers. The so-called doorwerkbonus was applicable to individuals who continued working after the age of 62 and involved a discount on taxable income. The objective of this thesis is therefore to carry out an ex-post evaluation of this reform, more specifically, to examine to which extent the expected retirement age of older workers has been affected by the introduction of the doorwerkbonus.

Using data from LISS panel for the years 2008-2012 and applying a difference-in-differences approach, the study has provided significant evidence to confirm that the reform led to an increase of the expected retirement age of older workers relative to their younger peers. On average, after the reform, older workers expect to retire approximately one year and seven month later than younger workers. Despite the impact of the reform becomes smaller when the model is controlled for unobserved factors, the main conclusions of the study remain unaffected.

Keywords: doorwerkbonus, older workers, expected retirement age (ERA), difference-in-differences (DiD), LISS panel

ACKNOWLEDMENTS

I would like to express my sincere gratitude to my supervisor, Prof. Hans Bloemen, for his excellent guidance and encouragement through the development of this thesis. I gratefully acknowledge the support provided by Towers Watson Uruguay and Towers Watson Netherlands. I would like to thank the participants of Junior Pension Day for their valuable comments. Finally, I would like to give my special thanks to M.H. for his daily support during the last months.

This paper draws on data of the LISS panel of CentERdata.

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1. Introduction

The public pension systems in developed countries are under pressure as a result of rapid population ageing. More specifically, statistics from the World Bank show that for the Netherlands the old age dependency ratio increased from 17.4 percent in 1970 to 24.8 in 2012[1]. Concerns about the systems' sustainability have lead policy makers to rethink the role of older workers by introducing a number of reforms designed to increase employment rates and to extend working life. Although the participation rate of older workers has been increasing during the last ten years, people still leave the labor market significantly early, usually attributable to the generous benefits provided by the pension systems. The average retirement age of Dutch workers has risen from 61 years of age to 63.1 during the period 2000-2011, but it still is below the statutory retirement age (Skugor and Bekker, 2012). As a result, for more than ten years the Dutch government has been undertaking substantial reforms aiming to limit early exits and encourage longer working lives.

Financial incentives, also employed in the Netherlands, have been proven to be an effective measure in delaying retirement in many countries. In 2009, simultaneously with the implementation of other reforms, the Dutch government introduced a work-continuation bonus seeking to delay the retirement of older workers. The so-called doorwerkbonus[2] was applicable to individuals who continued working after the age of 62 and involved a discount on taxable income. It depended on the age and income of each worker and was granted to individuals with an annual gross income of EUR 8,860 or higher. The advantage of this financial incentive was that workers did not have to wait until retirement to receive the bonus, and it could be claimed by any taxpayer who earned income from labor, including income from one or more private enterprises, income from employment or income from other labor. The objective of this thesis is therefore to carry out an ex-post evaluation of this reform, more specifically, to examine to which extent the expected retirement age (ERA) of older workers has been affected by the introduction of the doorwerkbonus.

Several motives underlie this study. Firstly, even though multiple papers have already estimated the impact of pension reforms on actual retirement age, only a little is known about the effect of these measures on the ERA. In addition, the analysis of retirement expectations has become an increasingly important topic in the field of economics during the last decades, not only because expectations are strong predictors of future retirement decisions (Bernheim, 1989; Disney and Tanner, 1999; Chan and Stevens, 2004) but also because they determine current individuals' choices, particularly saving and investment decisions. Finally, due to the former reasons, retirement expectations also play a crucial role in the models that policy makers and pension funds employ to examine how individuals are preparing for retirement. Thus, a better understanding of how workers form their expectations or, more specifically, how sensitive they are to the introduction of the doorwerkbonus, represents an important contribution to the field of economics of ageing and to the evaluation of public policies.

Using data from the LISS panel for the years 2008-2012, a difference-in-differences (DiD) approach is applied to estimate the increase of the ERA of older workers in response to the introduction of this tax credit. Given the nature of this approach, it is possible to single out the effect of the reform from other factors that could be influencing the reported expectations. It is expected that older workers decide to extend their working lives in order to benefit from it. In order to check the robustness of the results different models and data specifications are used. Furthermore, the model is tested and corrected for unobserved factors using the Heckman's selection model. It is expected that the results remain unchanged after the different tests and adjustments.

[1] Data obtained from the World DataBank, World Development Indicators, The World Bank (http://databank.worldbank.org).
[2] The doorwerkbonus is also known as "career continuation bonus", "carry-on-working bonus" or "deferred pension bonus".

The thesis is organized as follows. Section 2 provides some background information on the Dutch early retirement systems and the recent reforms promoting active aging, and presents in more detail the reform of 2009. Section 3 discusses the motivation of the study and summarizes previous literature. Section 4 gives a description of the data used for the analysis and shows the main statistics of the outcome variable. The empirical strategy and the results obtained are introduced in Sections 5 and 6, and Section 7 presents a few concluding remarks and the limitations of the study.

2. Dutch Pension Reforms to Promote Active Ageing

2.1 Early Retirement in the Netherlands

The Dutch pension system consists of three main pillars: the basic state old-age pension system financed on a pay-as-you-go-basis (AOW), the occupational non-statutory pension scheme (capital funded), and the voluntary private personal accounts, that are complementary to the other two pension arrangements. Together, these three elements determine the pension income that individuals receive after retirement. The first pillar provides to individuals aged 65 and over a flat-rate benefit linked to the statutory minimum wage that depends on how many years the individuals have lived or worked in the country. The replacement rate after completing a 40-year career is usually around 70 percent (OECD, 2011). The second pillar, also compulsory, involves collective schemes administered by pension funds or insurance companies. Benefits received after retirement, in addition to the AOW benefits, are subject to the contributions made during the working life and to the return on the investments of these contributions.

During the 1970s and the beginning of the 1980s, when unemployment was a major problem in the Netherlands, early retirement plans (VUT[3] schemes) were introduced in many industry sectors. The goal of these plans was to make it attractive for employees to stop working earlier in order to create new sources of employment for younger unemployed people. The system was arranged by collective agreements, and promoted by the government through a favorable tax treatment. Despite the fact that the system was financed by employers and employees' premiums, benefits were not linked to past contributions, i.e. the replacement rate did not depend on the retirement age. In fact, the net replacement rate was usually higher than 80 percent, explained by the progressive tax system and the continued accrual of old-age pension rights (Euwals, van Vuuren and Wolthoff, 2006; Euwals, van Vuren and van Vuuren, 2011).

Consequently, after the implementation of these schemes the participation rates of elderly decreased significantly, particularly for men[4]. Kapteyn and de Vos (1999) show that from 1960 to 1994 the percentage of men in the labor force between 60 and 64 years of age dropped from 80 to 20 percent and for men aged 65 or over the participation rate declined from 20 to 3 percent[5]. Moreover, the authors indicate that the percentage of men between 55 and 64 years of age receiving a VUT benefit increased from 2 percent in 1981, to 10 percent in 1987 and 17 percent in 1995.

In the 1990s trade unions and employer organizations agreed that the VUT schemes were not sustainable in the long run and in 1997 the collective pre-pension (PP) plans were executed, gradually replacing the previous system. Under these new schemes benefits were financed on a more actuarially neutral basis, linking retirement benefits to individual contributions (capital-based schemes), making benefits less generous and early retirement less attractive. Euwals, van Vuuren and Wolthoff (2006), using data drawn from the Dutch Income Panel 1989-2000, examine the causal impact of this policy reform on individuals'

[3] In Dutch VUT corresponds to Vervroegde UitTreding.
[4] During this period, due to their incipient labor market insertion, participation rates of women were still low but were showing a notable increase.
[5] Data obtained by the authors from the Statistics Netherlands.

behavior and find that the introduction of PP schemes led to a substantial delay of early retirement. According to the authors, both the price and wealth effects, reducing implicit taxes and early retirement wealth respectively, have shown a positive impact on the retirement age.

2.2 Recent Reforms

Additional major reforms aiming to discourage early exits have been carried out more recently. Until 2006, premiums for early retirement benefits were 50 percent tax deductible, making these plans fiscally attractive for employees. However, in 2004 the government decided to abolish these tax benefits and as from January 2006, contributions became no longer tax deductible for workers born after 1949, i.e. workers who had already reached the age of 55 before January 2005 remain entitled to the pre-pension rights. Indeed, individuals born after 1949 became eligible for less generous pension rights encouraging them to delay their retirement. This measure was applied to individuals in the public and private sector.

At the same time the government sought to discourage early retirement by abolishing the VUT schemes, a new life-course savings scheme (Levensloop) came into force in 2006, allowing employees to leave the workforce earlier by transferring leisure within their life course. The objective was to simultaneously reduce state obligations and expenses while increasing individual responsibility. This new arrangement enabled workers to save part of their gross wage throughout their professional life with the intention of taking an extended unpaid leave[6] or retiring earlier. They could save every year up to 12 percent of their pre-tax income and the total saving balance (including interest) could not exceed the maximum of 210 percent of the last-earned gross annual salary. In effect, if individuals accumulated 210 percent of their annual pre-tax income in the so-called tax-deferred savings account (TDA), they had the opportunity of retiring three years before their pensionable age by receiving 70 percent of their previous income during each early-retirement year (Nies, 2011).

Even though the life-course savings scheme (LCSS) could be used as a route for early retirement, the system was originally meant to improve work-life balances over the life cycle and to encourage individuals to work longer (Delsen and Smits, 2007). During the last decades the conservative three-phased life course evolved into a modern longer life course (Bovenberg, 2005). After the first traditional phase of early youth, from 0 to 15 years old, a new phase named young adulthood was included. During this period of time individuals study, experience relationships and have their first jobs and responsibilities. In consequence the so-called family season or peak hour of life was postponed. Between 30 and 60-65 years of age individuals work, take care of children, continue learning and experience both financial and time pressures. During the fourth phase, approximately between 60-65 and 75-80, leisure is combined with the last years of active life; and finally during the last phase individuals suffer health problem and more intensive care is required. The main goal of the LCSS was therefore to give workers more freedom of choice in order to better spread their activities over the life course, i.e. seeking to achieve work-life balance, and ultimately to increase labor force participation.

Furthermore, another saving plan known as Spaarloon or Salary saving scheme (SSS) was in place in the Netherlands since 1994. Its purpose was to encourage individual saving by allowing employees to save up to a maximum annual amount of their gross salary without paying any extra taxes above it. According to L. Bovenberg, an expert on this field and one of the architects of the LCSS, the participation rate on the Levensloop was far below the participation rate on the Spaarloon. The main explanation, as he stated, was that employees could not participate in both schemes simultaneously (during the same tax year) and as a consequence they tended to stay with the scheme they were already familiar with, i.e. the Spaarloon (IPE, 2006). In 2012 both the LCSS and the SSS were abolished. At the same time it was announced that they

[6] The extended unpaid leave could be taken for any lifetime event the workers may consider, including sabbaticals, study, part-time work, maternity/paternity leave, or time out of the labor market for caring responsibilities.

will be replaced by the Vitality Savings Scheme (VSS) in 2013. Savings under VSS would be tax deductible and would be taxed when money is withdrawn from the accounts. This new arrangement belongs to the Vitality Package (Vitaliteitspakket) whose main objectives are to encourage individuals to work longer based on higher mobility and more facilities during their careers (Delsen and Smits, 2012). Despite the original plans, the VSS was actually never implemented.

2.3 The Reforms of 2009 and the Introduction of the Work-Continuation Bonus

As it will be discussed in the next section, financial incentives have been proven to be an effective measure in delaying early retirement in many countries. Thus, aiming to promote the sustainability of public finances and therefore to keep the provision of pension benefits at the desired level, a few governmental policies in this area have been introduced in 2009.

The first measure implemented consists of an insurance contract against the risk of hiring an older worker that may become ill for a longer period. Employers who hire employees aged 55 or over that have been unemployed or disabled for over a year get a compensation that covers the wage costs if employees fall ill for a period longer than 13 weeks. Furthermore, employers who keep workers older than 62 years of age or hire an employee aged 50 or over who has been on benefits for a period of three years, receive an annual reduction of social security contributions (Conen, 2013).

Since the aim of the present research is to examine workers' retirement expectations, the reform of interest for the analysis is the introduction of financial incentives for older workers. In 2009, simultaneously with the previously mentioned reforms, the government introduced a work-continuation bonus seeking to promote active aging. The so-called doorwerkbonus was applicable to individuals who continued working after the age of 62 and involved a discount on the taxable income, and hence on the taxes individuals are paying. The tax credit went up to a maximum of EUR 4,592 when the reform came into force (EUR 4,070 in 2012) and depended on the age and income of each worker. In 2009 it was granted to individuals with an annual gross income of EUR 8,860 (EUR 9,295 in 2012) and higher. As shown in Table 1, the tax deduction increased with age up to 64. Starting from 65, since government considered that it was the end of the working life and also because from this age it was harder to motivate people to work longer, the percentage declined (Belastingdienst, Dutch Tax Administration[7]).

Table 1. Work-Continuation Bonus (2009)[8]

Age	Born in	Tax Deduction	Maximum Deduction (EUR)
62	1947	5%	2,296
63	1946	7%	3,214
64	1945	10%	4,592
65	1944	2%	918
66	1943	2%	918
67+	1942 or before	1%	459

Source: Belastingdienst (Dutch Tax Administration)

The amount of work-continuation bonus was calculated as follows:

$$\text{Doorwerkbonus} = \text{Tax Deduction} * (\text{Income} - \text{Minimum Income}) \quad (1)$$

[7] http://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/prive/aangifte_doen/fiscale_informatie_2012/heffingskortingen_2012/doorwerkbonus/doorwerkbonus (accessed July 10, 2013).

[8] Data for 2012 is included in Table A1 of the Appendix.

The basis for calculating the bonus was the income in excess of EUR 8,860 but no more than EUR 54,776 (EUR 47,871 in 2012). Therefore, if the person was 61 at the beginning of 2009, i.e. born in 1947, and had an annual income of EUR 28,705, then the bonus in 2009 was of:

$$\text{Doorwerkbonus} = 5\% * (28{,}705 - 8{,}860)\text{EUR} = 992.25\ \text{EUR} \quad (2)$$

The advantage of this financial incentive is that workers did not have to wait until retirement to receive the bonus, which is usually the case of reforms aimed at extending the working life. As an example, individuals received a tax credit of 5 percent in the same tax year they reached 62 years of age, and further increased to 7 percent the year they celebrated their 63rd birthday. Lastly, the doorwerkbonus could be claimed by any taxpayer who earned income from labor, including income from one or more private enterprises, income from employment or income from other labor. As of 2013 the doorwerkbonus has been cancelled and replaced by the so-called werkbonus (Belastingdienst, Dutch Tax Administration[9]).

3. Background Literature on Retirement Expectations

In life cycle models, consumption, saving and labor supply decisions depend not only on current individuals' choices, but also on their future preferences, and therefore on their expected income, health status and so on. Retirement expectations are important, in part, because they predict future individual behavior but also because they partially determine current choices, e.g. how much to save for retirement. However, expectations are usually difficult to observe, and micro and macro models are based on different assumptions about individual future preferences and how expectations are formed. A recent trend in the empirical microeconomics field has been to measure expected future decisions through survey questions. Particularly in the field of economics of ageing an increasing number of large longitudinal datasets has been developed during the last decades[10], aiming to collect information on the expected pension income, the ERA, how much to save for retirement, or how much to invest in health or in housing.

Retirement expectations play nowadays a decisive role for policy makers, pension funds and insurance companies. The information from the above mentioned surveys allows them to model and better predict individuals' behavior towards retirement, their saving decisions and their investment choices. Moreover, these studies provide them the opportunity to analyze retirement expectations across age or socioeconomic groups, and to find out whether or not their future choices depend on financial literacy, health status or current job status, among other factors. Ultimately, these analysis help policy makers and fund managers to improve the information provided to pension plan participants to better prepare them for retirement.

Concerning the accuracy of subjective expectations, numerous works have proven that they are strong predictors of future realizations. Focused on retirement expectations, Bernheim (1989) finds for the US that individuals are capable to form relatively accurate expectations about their future retirement consequently affecting their actual behavior. Employing the Health and Retirement Study (HRS), Chan and Stevens (2004) confirm that there is a significant correlation between expectations and realizations. Additionally, Disney and Tanner (1999) carry out a similar study for the UK and also conclude that retirement expectations tend to report accurate predictions of the actual retirement age; half of the individuals of their sample actually retired at the reported expected age.

[9] Ibid.

[10] Some examples are: the Health and Retirement Study (HRS) for the US, the English Longitudinal Study of Ageing (ELSA) for the UK, the Survey of Health, Ageing and Retirement in Europe (SHARE), the Japanese Health and Retirement Study (JHRS), the Chinese Health and Retirement Longitudinal Survey (CHARLS), the Longitudinal Aging Study in India (LASI) and the Mexican Health and Aging Study (MHAS) among others.

The aim of this thesis is not to compare expected and actual retirement age. In fact, what distinguishes this research study from previous works is the intention to explain how the promotion of new pension reforms has changed the retirement expectations of older workers, particularly the ERA. While a large number of studies (Hurd and Boskin 1984; Van Dalen and Henkens 2002; Euwals, Van Vuuren and Wolthoff 2006; Bernal and Vermeulen 2013, among others) have already measured the effectiveness of pension reforms on increasing the actual retirement age, very little is known about how such reforms affect individuals' retirement expectations.

One of the first papers that mentions the idea of ERA is Hall and Johnson (1980). Using data from the US Longitudinal Retirement History Study (LRHS), the authors were the first to analyze the determinants of "planned early retirement", rather than to explain actual retirement age, or to compare expectations and realizations. A large number of related works have followed this study, and during the last years the analysis of retirement expectations has become an increasingly important topic in the field of economics. Several authors have estimated the determinants of retirement expectations directly and have shown that they respond to different economic and non-economic factors.

The study of Honig (1998), analyzing the behavior of older married women, reveals that their expectations towards retirement are strongly influenced by their expected income and benefits provided by the employer (health, disability and pension). The effect of a generous social security scheme is also important in determining their ERA albeit less so than the other factors. Chan and Stevens (2004) also find that individuals' expectations of continuing working into their sixties are significantly influenced by pension incentives, particularly by forward-looking measures of pension accumulations. Despite these findings, Dwyer and Mitchell (1999) and McGarry (2004) argue that health problems influence retirement expectations more strongly than financial incentives do. Using different measures of health, both studies find that individuals in poor overall health expect to retire earlier. Moreover, Cobb-Clark and Stillman (2009) examine the retirement expectations of Australian middle-aged workers (aged 45-55) and show that retirement planning is strongly correlated with the current labor market position, especially with having a well-defined pension program and standard retirement ages. Furthermore, Pang, Warshawsky and Weitzer (2008) find that specifications of retirement plans also provide a significant influence. Employees covered by a defined benefit scheme expect to retire earlier than those with a defined contribution plan.

In fact, several studies have already estimated the determinants of retirement expectations but only a few authors have analyzed the impact of policy changes on expectations. Bottazzi, Jappelli and Padula (2006), using a DiD approach, investigate for Italy the effect of pension reforms on individuals' expectations of retirement age and replacement rate. Based on data from the Survey of Household Income and Wealth (SHIW) for the years 1989-2002, the authors look at the combined impact of a set of pension reforms introduced in 1992, 1995 and 1997. The main ideas of these reforms were to increase the retirement age and the minimum number of years of contributions for pension eligibility, the abolition of seniority pensions, a gradual reduction of pension benefits and their indexation to prices instead of wages. The authors define the treatment group as the middle-aged workers (public-sector employees and self-employed) and compare their behavior with the old private-sector employees, i.e. the reference group unaffected by the reform. As expected, they find that individuals have adjusted their expectations in the direction induced by the reform. Specifically, they obtain that as a consequence of the quasi-simultaneous pension reforms the ERA for middle-aged workers increased, particularly for public employees and self-employed. On average men increased their ERA by around 2 years and women by almost 3 years.

Furthermore, Michaud and van Soest (2007) study for the US the effect of the abolishment of the social security earnings test, which taxes away earnings later in life. In 2000 the earnings test for workers aged 65 to 69 were eliminated. Therefore, using panel data models and a DiD strategy, the authors examine how workers in their late fifties or early sixties, i.e. workers that did not reach an age at which they are entitled

for these benefits, adjusted their retirement expectations in response to the reform. Treatment and control group are defined based on the percentage of social security benefits predicted to be lost as a consequence of the reform. The results show a considerable increase in the subjective probability to work after 65 for men whose wage rate increased as a consequence of the reform. Applying the same methodology no significant effects are found for women.

More recently, two similar studies were carried out for Germany and the Netherlands studying the sensitiveness of retirement expectations to increases in the statutory retirement age, both of them also applying a DiD methodology. Coppola and Wilke (2010) look at the 2007 German pension reform whose objective was to gradually increase the statutory retirement age from 65 to 67. The aim of their study is therefore to analyze to which extent individuals have adjusted their expectations in response to this increase. Using data from SAVE (Sparen und Altersvorsorge in Deutschland) a longitudinal dataset that includes questions on individual expectations from 2005 to 2009, the authors observe how expectations vary over time comparing expectations of employees born after 1964, the group affected by the reform, with self-employed individuals of the same cohort, the reference group. The results exhibit heterogeneous responses. Younger cohorts and individuals that attain the highest educational level expect to remain longer in the labor force. However, for women, especially among the youngest cohorts, the reform does not seem to be very successful. In addition, the findings confirm that being informed about the pension system plays a crucial role in the analysis since the lack of information is negatively correlated with the ERA.

Lastly, Fouarge, de Grip and Montizaan (2013) study the response of workers to the announcement of a gradual increase of the eligibility age for the state pension in the Netherlands in 2010. The reform implies an increase from the current statutory retirement age of 65 to 66 in 2020 for individuals born after 1954, and to 67 in 2025 affecting those born after 1959. Thus, taking different cohorts of public sector employees as treatment and control group[11], the authors find that the announcement of the reform shifted upwards the expectations of employees born between 1954 and 1959 on average by 3.6 months, and that those born after 1959 expected now to retire 10.8 months later than individuals on the control group.

Overall, these studies have demonstrated the key role of the ERA as a relevant source of information and most importantly the fact that individuals have usually adjusted their expectations in the direction sought by each particular reform. Using a methodology similar to the previously mentioned approaches, the present study intends to analyze if and how older workers adjusted their expectations after the introduction of the doorwerkbonus.

4. Data and Analysis

4.1 Sample Specifications and Descriptive Statistics

The study is based on data extracted from the LISS panel (Longitudinal Internet Studies for the Social sciences), a household panel that collects data from 5,000 Dutch households, comprising 8,000 individuals. The survey has been conducted every year since October 2007 by the CentERdata research institute within the MESS project, and is designed to follow changes in the life course and living conditions of the respondents. The panel was selected based on a random sample of households registered by Statistics Netherlands and the questionnaire is always conducted in Dutch.

[11] The authors compare over time retirement expectations of workers born between 1955 and 1959 and between 1960 and 1964 (treatment group) with outcomes of individuals born in 1950-1954 (control group).

Three modules from the LISS Core Study are used for the analysis: "Health", "Work and Schooling" and "Background Variables". The "Health" module includes information on health, health perception and health related to job situation, and has been carried out since November 2007. The "Work and Schooling" Core Study focuses on labor market participation, job characteristics, pension, retirement expectations and education of the panel members, and is available from April 2008. Individuals' socio-economic characteristics have been collected through the "Background Variables" module. Personal information is fielded every month by the panel members in order to include any changes that may have occurred. Pooling together all the data from pre- and post-reform periods (2008-2012) allows analyzing to what extent individuals' behavior reacts to the introduction of the doorwerkbonus in 2009 by comparing how their ERA has evolved over time.

The sample has been restricted in numerous ways. Firstly, since the reform affects only individuals who receive an income, i.e. who reported to be working for pay, respondents without a paid job are discarded from the sample. Furthermore, the sample selected for the analysis includes respondents aged 45 to 75 years of age. Younger workers are dropped from the dataset because they do not answer the question regarding retirement age expectations, even though the question has been asked. It is assumed therefore that they are not yet thinking about their retirement. Hyperbolic discounting, one of the main branches of behavioral economics, helps explain this behavior. Individuals tend to be hyperbolic discounters, meaning that instead of discounting the future at a constant rate they tend to value the present more. They will usually prefer the small reward in the short term rather than a larger reward at later date (Kirby and Herrnstein, 1995). In fact, in this case, since for young workers retirement is a decision to be taken far in the future, they wrongly assume that it is not as important as their present actions or choices (Benartzi and Thaler, 2004); hence they seem not to be interested in taking decisions concerning their retirement yet, i.e. they are not even thinking about it. Indeed, neither young workers nor retirees are taken into account for the analysis.

In addition, as mentioned in Section 2, in 2009 the doorwerkbonus was granted to employees with an annual gross income of EUR 8,860 and higher. Therefore, 3,445 observations with an income below this minimum level were dropped from the sample. These individuals are mostly part-time workers; on average they work less than 30 hours per week. Individuals that do not know their gross income or prefer not to answer this question were also dropped from the sample since it is not possible to know if they were affected by the reform or not.

Finally, 1,157 observations were dropped from the sample due to missing value; 22.2 percent of these observations correspond to people with work disabilities, 8.1 percent to individuals performing voluntary work, and 54.0 percent are regular employees that decided not to answer this question. Moreover, more than 50.0 percent of the regular employees are younger than 50 years of age. Despite the high number of non-responses, it is important to take into consideration that more than 80 percent of surveyed people who do not respond to this question either do answer other questions relevant for the analysis. Lastly, the "don't know" answers, representing the 5.4 percent of the responses, are not included in the main sample and are commented later on.

Overall, the empirical analysis is based on a pooled cross section sample which includes 3,408 observations distributed over five years. An overview of the main characteristics of this population is presented in Table 2.

Table 2. Characteristics of the Sample[12]

	2008	2009	2010	2011	2012	Total
Gender						
Male	60.4%	58.9%	58.8%	59.2%	58.8%	59.2%
Female	39.6%	41.1%	41.2%	40.8%	41.2%	40.8%
Age						
45-49	26.8%	22.6%	23.7%	20.2%	20.9%	22.9%
50-54	30.9%	31.7%	27.0%	30.3%	28.6%	29.6%
55-59	31.7%	31.8%	31.0%	29.5%	29.8%	30.8%
60-64	9.9%	12.5%	17.0%	17.8%	19.3%	15.4%
65 and above	0.7%	1.4%	1.3%	2.1%	1.4%	1.4%
Mean	53.2	54.0	54.3	54.6	54.6	54.2
Median	53	54	54	54	55	54
Marital Status						
Married	74.3%	74.0%	70.0%	70.5%	72.2%	72.1%
Divorced	13.5%	12.9%	14.6%	14.4%	14.8%	14.1%
Widowed	2.2%	2.7%	2.7%	2.6%	1.7%	2.4%
Other	10.1%	10.5%	12.7%	12.6%	11.2%	11.4%
Education						
Low	23.7%	22.9%	21.2%	18.9%	17.8%	20.9%
Medium	31.5%	29.9%	30.4%	30.2%	34.4%	31.3%
Medium-High	31.2%	32.1%	33.3%	35.4%	32.8%	33.0%
High	13.6%	15.0%	15.0%	15.5%	15.0%	14.8%
Annual Net Income						
EUR 10,000 or less	16.0%	14.7%	12.1%	11.1%	13.1%	13.4%
EUR 10,001 to EUR 20,000	28.8%	28.1%	27.6%	26.8%	24.2%	27.1%
EUR 20,001 to EUR 30,000	36.5%	36.5%	39.8%	40.3%	41.2%	38.9%
EUR 30,001 to EUR 40,000	12.3%	14.1%	14.5%	14.8%	14.7%	14.1%
More than EUR 40,000	6.4%	6.6%	6.0%	7.0%	6.9%	6.5%
Mean	28,429	25,017	23,422	23,487	23,344	24,710
Median	21,036	21,600	22,200	22,800	22,800	22,056
Future Income						
Knowledge about Future Income (1=Yes)	39.3%	35.1%	34.4%	36.1%	33.5%	35.6%
Health Status						
Poor Health - Subjective Measure (1=Yes)	34.5%	40.0%	38.2%	33.9%	33.7%	36.1%
Poor Health - Objective Measure (1=Yes)	37.4%	43.3%	47.5%	46.7%	46.0%	44.2%
Subjective Survival Probability						
Low	17.0%	15.5%	15.5%	46.2%	15.7%	21.4%
Moderate	27.7%	30.6%	28.6%	46.7%	27.6%	31.8%
High	34.2%	33.5%	30.4%	6.0%	35.3%	28.3%
Very High	20.7%	19.3%	24.3%	0.0%	20.9%	17.6%
Number of Observations	676	638	786	613	695	3,408

Source: LISS panel

The table above reports statistics of several individual characteristics used later on for the analysis. Concerning educational level four different groups are defined based on the survey question "Highest level of education irrespective of diploma". The group with a low level of education includes persons with no education, primary school and intermediate secondary education (VMBO), a medium level involves higher secondary education (HAVO and VWO) and intermediate vocational education (MBO), and the medium-high and high levels refer to higher vocational education (HBO) and university education respectively. The group with the lowest educational level is used later on as the reference point.

[12] Table A4 of the Appendix gives a more detailed definition for some of the variables

Another factor playing a key role in determining the decision on retirement is the health status of workers. Objective and subjective measures of this factor are included in the analysis. Many authors have questioned the reliability of subjective measures of health. Anderson and Burkhauser (1985), for example, argue that self-assessed health is an inaccurate measure of health. The so-called "justification bias", discussed in numerous studies, suggests that measuring health effects using subjective measures could be untrustworthy if it is offered as an explanation for early retirement. In other words, it is assumed that many individuals use subjective poor health as a justification for leaving the labor force earlier, instead of giving the actual reason for it (McGArry, 2004). Conversely, Dwyer and Mitchell (1999) using data from the HRS explore different measures of health status as determinant of retirement plans and do not find evidence supporting the "justification bias". Additionally, McGarry (2004) obtains that self-reported health is an important explanatory variable of individuals' expected probability of working, even when more objective measures of health are added into the model.

In the present study the subjective measure of health is defined as physical and emotional ability to perform work. Specifically, the dummy variable "poor health" is defined as physical or emotional problems that hinder individuals' work in their jobs or housekeeping. In addition, a dichotomous variable indicating the presence of one of more diseases is included as an objective measure of health. Individuals are asked if a physician has ever told them that they suffer from a disease. The variable is therefore defined equal to one if the individual has been diagnosed with a chronic or acute condition, and zero otherwise.

Subjective survival expectations have also been included in the analysis as an alternative measure of health. The variable is defined as the reported chance of living to be 75 years old or older and is rated in a scale from 0 to 10. In order to include the variable in the model responses are classified in four different groups: low (0-5), moderate (6-7), high (8) and very high (9-10) subjective survival probability (SSP). The group with the highest SSP is used as the reference. In fact, according to the life-cycle hypothesis, survival expectations are a key factor in the analysis of individuals' behavior towards savings and retirement (Wolfe 1983; Bloom, Canning et al. 2007). Individuals who expect to live longer will retire later than those whose survival probabilities are lower because they will need to save more in order to finance a longer retirement period. Hurd, Smith and Zissimopoulos (2002) analyze for the US to what extent individuals' retirement behavior is determined by mortality expectations and confirm that individuals with a low survival probability do retire earlier compared to those with moderate and high expected life expectancy. Moreover, O'Donnell, Teppa and Doorslaer (2008) obtain a significant concave relationship between the probability of retirement and the SSP, that is as the workers become more pessimistic about their survival probability the propensity to retire increases but at a declining rate. The remaining variables such as income or knowledge about future income are described in more detail in Table A4 of the Appendix.

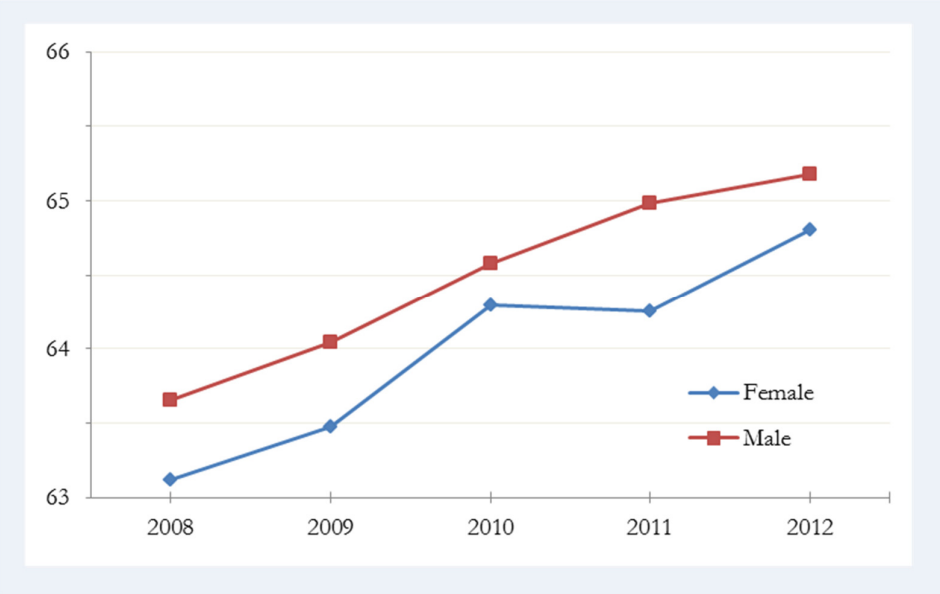
Table 2 reveals that the structure of the sample is reasonably stable over time. Moreover, the distribution of the different variables does not exhibit a specific bias toward a specific subgroup. Even though on average almost 60 percent of the sample are males, this is explained by the fact that the sample is restricted to individuals with a paid job and that usually the participation rate on the labor market is higher for men than for women. Concerning the age of the respondents, the mean for the sample is 54.2 years and the smallest group are workers above 65 years of age which represents on average only 1.4 percent of the population. Institutional aspects of the Dutch pension system are behind the small size of this group. Until 2013 the statutory retirement age in the Netherlands has been 65 and the average retirement age in 2011 was 63.1. In consequence most of the individuals are already retired at this age, hence, excluded from the sample.

4.2 Descriptive Analysis of the ERA

In the LISS survey retirement expectations are measured by the survey question "At what age do you expect to retire or take early retirement (e.g. flexible pension or early retirement schemes, Dutch: VUT or FPU), or to stop working?" and are therefore expressed as point estimates (Coppola and Wilke, 2010). Previous works (e.g. Disney and Tanner, 1999 and Haider and Stephens, 2007) have evidenced that the usage of point estimates for the study of retirement expectations is appropriate and that expectations are accurate predictors of actual retirement age. The objective of this subsection is to give an overview of some relevant statistics about the ERA, the outcome variable of the present study.

Firstly, Figure 1 exhibits that on average the ERA increases over time for both male and female workers. It is also observed that men expect to retire on average year and a half later than women. Besides the increase of the ERA of women in 2010, the increase in the slope of the curve is slightly more pronounced for women making the gap between both genders smaller over time. On average, while the increase of the ERA from 2008 to 2012 is of 2.7 percent for women, for men it is of 2.4 percent.

Figure 1. ERA over time by Gender

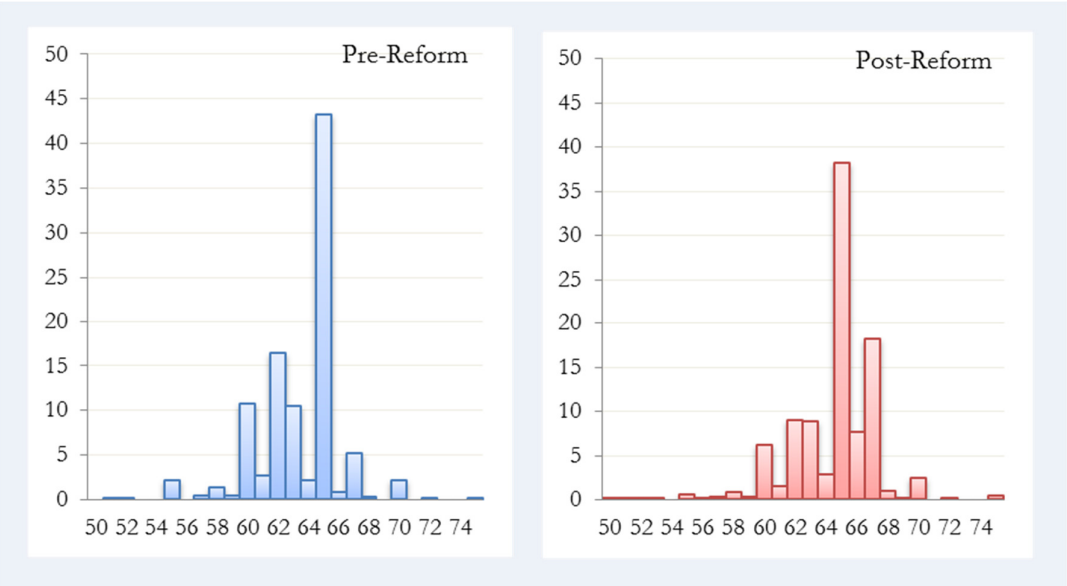


Source: LISS panel

Comparing the distribution of the ERA before and after the introduction of the doorwerkbonus (Figure 2) a spike is noticeable in both periods at the age of 65. Despite the fact that the percentage of respondents who report an ERA of 65 decreases when the two periods are compared, the peak remains at the same age. This should not come as a surprise as it is the legal age at which individuals are allowed to claim the full Social Security benefits. Moreover, the histograms show that in 2008-2009 the distribution of the subjective expectations is more concentrated between the ages of 60 and 64, while in the period 2010-2012 the percentage of people expecting to retire at the age of 66 and 67 augments. Before the reform, on average, 16.4 and 10.4 percent of individuals expected to retire at the age of 62 and 63 respectively. However, after the reform these percentages declined to 8.9 and 8.8, and the percentage of workers with an ERA of 66 and 67 increased from 0.9 and 5.3 percent to 7.6 and 18.2 respectively. The observable peak at the age of 67 might be explained by the fact that in 2010 a new reform that increases the statutory retirement age was approved and received huge media coverage. Even if the reform came into effect in 2013, individuals were already aware of this change in 2010, and in consequence already

changed their expectations towards retirement. The reform is described and analyzed in more detail in Section 6.2.

Figure 2. Distribution of the ERA before and after the Pension Reform



Source: LISS panel

To simplify the histograms and their subsequent comparison twenty five observations for each period (1.5 percent of the sample) were not included in the graphs. All of them correspond to individuals that expect to retire after 75 and represent therefore the right tails of the distributions[13]. These high values for the ERA are usually explained by the occupation of the respondents. Table 3 offers a summary of the ERA by occupation and sector and shows that employees in permanent employment, almost the 90 percent of the sample, report on average the lowest ERA. On the other hand, independent professionals, directors of limited liability and private companies and majority shareholder directors representing less than 4 percent of the sample expect to retire on average at the age of 66-67, being the standard deviations 8.87 and 8.57. This explicates therefore the values on the long right tails of the distributions.

Table 3. ERA by Sector and Occupation

Occupation	% of the sample	ERA (Mean)	ERA (Std. Dev.)
Employee in permanent employment	87.97	64.13	2.75
Employee in temporary employment	2.82	65.14	3.97
On-call employee	0.15	65.00	1.87
Temp-staffer	0.50	63.82	3.66
Self-employed / Freelancer	5.05	65.06	5.91
Independent Profesisonal	1.23	66.43	8.87
Director of a limited liability or private limited company	0.50	66.24	5.47
Majority Shareholder Director	1.79	67.07	8.57
Sector*			
Public/Semi-Public Sector	45.66	63.95	2.65
Private	54.34	64.58	3.91

*Statistics for specific sectors are detailed in Table A2 of the Appendix
Source: LISS panel

[13] Complete histograms are included in the Appendix (Figures A1, A2 and A3).

Furthermore, a topic that has received special attention during the last years is the "don't know" responses. In the clean sample the percentage of "don't know" answers is relatively low, only 5.4 percent of the individuals reported not knowing at which age they expect to retire. It could be assumed that this percentage is related with the knowledge individuals have about how much will be their income when they turn 65. However, comparing the trends of both variables no correlation is observed.

5. Difference-in-Differences (DiD) Approach

The primary goal of the thesis is to compare over time the changes in retirement expectations of workers who have been immediately affected by the introduction of the work-continuation bonus (treatment group) with those individuals whose conditions have not been directly altered due to this change in the legal framework (control group). When analyzing the differences over time other factors besides the reform itself are influencing the subjective expectations. Therefore, in order to single out the impact of the reform and to quantify its effect a difference-in-differences (DiD) approach is employed. Once the model is controlled for all the possible individual characteristics that might be leading to a difference in the ERA, the remaining difference in the outcome variable is caused by the reform.

The regression takes the following form:

$$\mathrm{ERA}_{\mathrm{it}} = \alpha + \beta.Treat_i + \gamma.Post_t + \delta(Treat_i * Post_t) + \theta X_{it} + \varepsilon_i \quad (3)$$

where $\mathrm{ERA}_{\mathrm{it}}$ denotes the ERA for individual i in period t, $Treat_i$ is a dummy variable which equals unity if the observation belongs to the treatment group and represents the differences between the treated and the control group that affect the ERA irrespective of time, and $Post_t$ is a post treatment dummy that captures the factors that influences the outcome variable over time in the same way for both groups. The main term of interest is the interaction between the above mentioned variables, $Treat_i$ and $Post_t$. The coefficient δ represents the DiD estimate and quantifies the relative change in the outcome variable among individuals of the treatment group, after the reform was implemented. It is defined as:

$$\delta = \left(\mathrm{ERA}_{\mathrm{Treat,Post}} - \mathrm{ERA}_{\mathrm{Treat,Pre}}\right) - \left(\mathrm{ERA}_{Control,\mathrm{Post}} - \mathrm{ERA}_{Control,\mathrm{Pre}}\right) \quad (4)$$

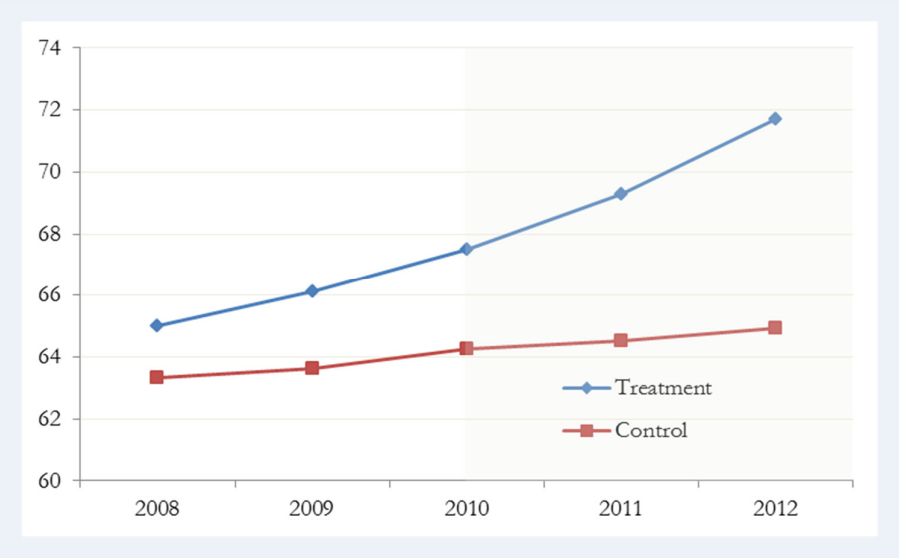
Lastly, X_{it} is a vector of control variables that describe individuals' main characteristics. In addition to the traditional socio-demographic factors, such as age, gender, marital status, children, grandchildren and educational leve; health, sectors, annual net income, knowledge about future income, and the subjective survival probability are also included as control variables. ε_i is the error term of the regression.

The treated population comprises the workers who had already reached 61 years of age before January 2009, i.e. those born in 1947 or before. On the other hand, the control group is defined as the workers that were younger than 61 before January 2009. Although the expectations of the latter could also be affected in the future by the reform, the objective of the study is to analyze the behavior of the first group of workers that received the doorwerkbonus. Furthermore, the fact that the working bonus was cancelled and replaced as of January 2013 cannot be ignored. The cancellation leads to a reduction of a group that could be originally affected by the scheme. Alternative specifications of the control group will be defined later on, aiming to check the robustness of the model.

Figure 3 offers preliminary evidence on the impact of the reform by comparing the ERA of both groups over time. Before 2010 the series have a similar slope, but after receiving their first bonus the ERA increased differentially among the workers above 62 years old compared to the younger group. The figure suggests that in the absence of the work-continuation bonus expectations towards retirement age increased similarly among both groups, but much of the increase after the reform seems to be attributable

to its introduction. According to this graph the so-called common trends assumption holds. This is the key assumption for the validity of the DiD strategy and it refers to the fact that the outcome in the treatment and control group follows the same trend over time in the absence of the treatment, in this case the reform of 2009. Since this assumption is difficult to verify, i.e. there is no formal test for it, pre-treatment data is used to show that trends are parallel. In this case graphical analysis is used for such purpose.

Figure 3. ERA over time by Treatment and Control Group



Source: LISS panel

Despite these findings there is an evident lag between the implementation of the reform in 2009 and the differential increase of the ERA among the two groups. This delay of the response might be explained by the specifics of Dutch tax filing procedures. The tax systems in the Netherlands works in such a way that the income tax files must be handed in by the 1st of April of the following year. In consequence individuals might be not aware of the reform until they effectively receive the tax deduction, and their expectations changed as of 2010. This is where the cut-off point for the analysis is selected, meaning that the periods "before" and "after" that define the dummy variable $Post_t$ are 2008-2009 and 2010-2012 respectively.

In addition, for the DiD estimate to be unbiased it is assumed that, conditional on the variables that are included in the model, the expected value of the error term ε_i is zero ($E(\varepsilon_i) = 0$) and the error term is uncorrelated with the variables in the equation.

Furthermore, the composition of the treatment and control group should remain unchanged from 2008 to 2012. Table 4 provides an overview of the main attributes of the both groups. Despite some minor differences, usually for the treatment group in 2012, the main characteristics of each group seem to be fairly stable over time. Differences for 2012 are explained by the small size of the treated group for this year. Since this group involves individuals born in 1947 or before, in 2012 these workers are closer to their 65 or older, therefore most of them are already retired, hence discarded from the sample. In addition, it is observed for this group that the percentage of widowed as well as the percentage of individuals with grandchildren increases over time, a fact also explained by the age of the respondents.

Comparing the characteristics of both groups, the percentage of males is higher for the treatment group. This might be due to the fact that usually men are retiring later than women (OECD, 2011), meaning that

the percentage of men in the group aged above 62 is higher. Concerning family composition, the percentage of individuals with children is similar for both groups, while the percentage of grandchildren is significantly higher for the older workers due to obvious reasons. In terms of education attainment the levels are quite similar with slight differences; the percentage of workers with a low level of education is higher for the treatment group, whereas the percentage with a medium level is higher for the control group. Lastly, regarding income levels the older group reports higher values than the younger one. Overall, these mentioned differences between the two groups are mainly due to age effects.

Table 4. Sample Characteristics for the Treatment and Control Group[14]

	Treatment					Control				
	2008	**2009**	**2010**	**2011**	**2012**	**2008**	**2009**	**2010**	**2011**	**2012**
Personal Characteristics										
Male	71.2%	65.2%	66.0%	66.7%	60.0%	59.5%	58.4%	58.3%	58.9%	58.8%
Female	28.8%	34.8%	34.0%	33.3%	40.0%	40.5%	41.6%	41.7%	41.1%	41.2%
Children (1=yes)	84.6%	89.1%	91.5%	95.8%	80.0%	81.7%	80.6%	78.3%	78.8%	79.7%
Grandchildren (1=yes)	59.6%	73.9%	80.9%	87.5%	70.0%	13.9%	15.4%	18.3%	18.7%	18.5%
Married (1=yes)	78.8%	76.1%	70.2%	75.0%	70.0%	73.9%	73.8%	70.0%	70.3%	72.3%
Divorced (1=yes)	11.5%	13.0%	10.6%	12.5%	10.0%	13.6%	12.8%	14.9%	14.4%	14.9%
Widowed (1=yes)	5.8%	8.7%	12.8%	12.5%	20.0%	1.9%	2.2%	2.0%	2.2%	1.5%
Educational Level										
Low	34.6%	39.1%	25.5%	33.3%	20.0%	22.8%	21.6%	21.0%	18.3%	17.8%
Medium	21.2%	17.4%	21.3%	20.8%	30.0%	32.4%	30.9%	31.0%	30.6%	34.5%
Medium-High	30.8%	28.3%	34.0%	33.3%	20.0%	31.3%	32.4%	33.3%	35.5%	33.0%
High	13.5%	15.2%	19.1%	12.5%	30.0%	13.6%	15.0%	14.7%	15.6%	14.7%
Annual Net Income										
EUR 10,000 or less	9.6%	10.9%	10.6%	8.3%	20.0%	16.5%	15.0%	12.2%	11.2%	13.0%
EUR 10,001 to EUR 20,000	21.2%	19.6%	14.9%	20.8%	0.0%	29.5%	28.7%	28.4%	27.0%	24.5%
EUR 20,001 to EUR 30,000	44.2%	43.5%	44.7%	37.5%	60.0%	35.9%	36.0%	39.5%	40.4%	40.9%
EUR 30,001 to EUR 40,000	11.5%	13.0%	12.8%	20.8%	0.0%	12.3%	14.2%	14.6%	14.6%	14.9%
More than EUR 40,000	13.5%	13.0%	17.0%	12.5%	20.0%	5.8%	6.1%	5.3%	6.8%	6.7%
Future Income										
Knowledge about Future Income (1=Yes)	51.9%	39.1%	42.6%	41.7%	0.0%	38.3%	34.8%	33.8%	35.8%	34.0%
Poor Health										
Subjective Measure (1=Yes)	38.5%	43.5%	31.9%	33.3%	20.0%	34.1%	39.7%	38.6%	34.0%	33.9%
Objective Measure (1=Yes)	42.3%	39.1%	42.6%	54.2%	50.0%	37.0%	43.6%	47.8%	46.3%	46.0%
Subjective Survival Probability										
Low	12.2%	10.3%	13.2%	29.4%	0.0%	17.5%	16.0%	15.8%	47.2%	15.9%
Moderate	30.6%	28.2%	23.7%	64.7%	50.0%	27.6%	31.1%	29.2%	46.7%	27.6%
High	30.6%	35.9%	39.5%	5.9%	33.3%	34.6%	33.8%	30.3%	6.1%	35.5%
Very High	26.5%	25.6%	23.7%	0.0%	16.7%	20.4%	19.1%	24.6%	0.0%	21.0%
Retirement Expectations										
Expected Retirement Age	65.0	66.1	67.5	69.3	71.7	63.3	63.6	64.3	64.5	64.9

Source: LISS panel

Moreover, as previously observed in Figure 3 the table documents that on average the individuals in the treatment group expect to retire at later ages. While the expected age of retirement for the older cohorts is on average 66.9, the younger workers expected to retire on average at 64.1 years of age. This behavior is due to the fact that the respondents are already 61 years of age and above when answering the survey so their ERA is obviously higher than the expected ages reported by younger workers. Furthermore the high values of the ERA in 2011 and 2012 for the treated group could draw the attention of the reader. These figures might be partially explained by the high expected age of retirement of certain sub-groups contained in this sub-sample. If we analyze its composition by occupation (see Table A3 in the Appendix) self-

[14] Ibid. 12, page 9.

employed and freelancers and majority shareholder directors, whose respective ERAs are 68.6 and 73.3, represent 9.5 and 10.1 percent of the treatment group. Additionally, other subgroups such as independent professionals (3.9 percent) and directors of limited liability and private companies (3.4 percent) also report ERAs above 70.

Finally, preliminary calculations of the impact of the reform are presented in Table 5. As it has been previously defined, years 2008-2009 are considered the pre-reform period and years 2010-2012 the post-reform period. Between these two periods, the ERA for the treatment group increased by more than three years, while the individuals of the control group expect to leave the labor force more than one year later than prior to the reform. As a result, the DiD estimate is 1.92 years, i.e. one year and eleven months.

Table 5. DiD Calculations

	Treatment	Control	Difference
Pre-reform (2008-2009)	65.54	63.47	2.07
Post-reform (2010-2012)	68.56	64.56	3.99
Difference	3.01	1.09	**1.92**

Source: LISS panel

However, when making this simple calculation other factors besides the reform itself are influencing the reported expectations. In order to single out the effect of the reform and to quantify its impact, as mentioned in the previous subsection, control variables are introduced to the model estimation.

6. Results

6.1. Alternative Model Specifications

Three different model specifications are presented in Table 6. In all the cases, the DiD estimate is greater than zero and statistically significant at the 1 percent level providing support for the fact that the introduction of the doorwerkbonus positively affects the ERA of older workers. Results show that after 2009 the increase in the ERA of the individuals from the treated population in excess of the increase of those in the control group is on average one year and eight months, similar figure to the one calculated on Table 5. There is also significant evidence to confirm differences in the ERA between the treated and controlled group prior to the implementation of the reform. On average workers born in 1947 or before expect to retire two years and more than four months later than the individuals belonging to the control group. The positive sign is not surprising given the age differences between both groups. Workers belonging to the treatment group are already 61 years of age or above in January 2009. This implies individuals that remain in the sample in the period 2009-2012, i.e. not retired yet, are already willing to work longer, and are therefore expecting to retire at later ages. Additionally, it is noticed that the variable *Post* is also statistically significant suggesting that other factors besides the reform influence the ERA over time in the same way for both groups.

Different variables are included in each of the alternative models exposed in Table 6. Model 1 contains annual net income as a control variable while in Model 2 this variable is replaced by the individuals' knowledge about their future income. The estimated coefficients for each variable have different interpretation. In the first model it is observed that the ERA increases with the annual net income. Conversely, similar studies (Bottazzi, Jappelli and Padula, 2006; Coppola and Wilke, 2010) find evidence that a higher income reduces the ERA. The reason that could be underlying this positive relationship and the low significance of the estimated coefficient is that the group with the highest income level expects on average to retire later than the other groups (see Figure A4 in the Appendix). In addition, individuals with a higher income are also older and therefore present a higher ERA.

Table 6. Determinants of the ERA (Standard Errors in Parentheses)

Variables	Model 1 Annual Net Income	Model 2 Kowledge about Future Income	Model 3 Subjective Survival Probabilities
Treat	2.3975***	2.3788***	2.3560***
	(.3640)	(.3611)	(.3612)
Post	1.1148***	1.0866***	1.1141***
	(.1189)	(.1181)	(.1192)
Treat*Post	1.7322***	1.6472***	1.6293***
	(.5011)	(.4978)	(.4977)
Age	-.0332**	-.0197	-.0216
	(.0135)	(.0135)	(.0136)
Gender (Male=1)	.2828**	.4939***	.5118***
	(.1242)	(.1169)	(.1174)
Married (Yes=1)	-.2445	-.2375	-.2652
	(.1950)	(.1935)	(.1939)
Widowed (Yes=1)	1.8805***	1.9134***	1.9085***
	(.4150)	(.4121)	(.4125)
Divorced (Yes=1)	.2936	.3051	.3017
	(.2345)	(.2329)	(.2331)
Children (Yes=1)	.3928**	.4070***	.4020***
	(.1531)	(.1521)	(.1522)
Grandchildren (Yes=1)	-.2980*	-.3028*	-.3011*
	(.1617)	(.1606)	(.1606)
Medium Level of Education	.0002	.0885	.0812
	(.1596)	(.1575)	(.1577)
Medium-High Level of Education	.1657	.4153***	.3814**
	(.1674)	(.1613)	(.1627)
High Level of Education	.8141***	1.1432***	1.1253***
	(.2077)	(.1942)	(.1950)
Poor Health_subjective measure	-.3123***	-.3568***	-.3210***
	(.1199)	(.1188)	(.1201)
Poor Health_objective measure	.1408	.1412	.1626
	(.1175)	(.1166)	(.1173)
Sector (Public=1)	-.5713***	-.5184***	-.5135***
	(.1164)	(.1158)	(.1158)
Annual Net Income	.1159*		
	(.0615)		
Knowledge about Future Income		-.8569***	-.8546***
		(.1205)	(.1205)
SSP_Low			-.3095*
			(.1826)
SSP_Moderate			-.3498**
			(.1640)
SSP_High			-.1635
			(.1658)
Constant	64.7290***	64.3289***	64.6445***
	(.7377)	(.7310)	(.7493)
R-squared	.1020	.1142	.1156
Adj R-squared	.0975	.1098	.1104
Sample	3,408	3,408	3,408

* Significance at 0.10 level.
** Significance at 0.05 level
*** Significance at 0.01 level

In the second model, income is replaced by "knowledge about the income level after 65 years of age". The negative and strongly significant coefficient indicates that having some knowledge about future income is associated with an earlier retirement. The reason behind this negative relationship could lie in the fact that people who expect to retire earlier are more active in finding out how high will be their future income, and

therefore know more about it. Another explanation could be that Dutch workers are pessimistic concerning their retirement income, therefore as soon as they are aware that their income will be higher than expected, they realize they need to save less for retirement and in consequence they expect to retire earlier than people who have less information about their future income. In fact, individuals with knowledge about their future should be more likely to form accurate expectations about their future retirement date.

The third regression adds to the variables of Model 2 the expected survival probability. The coefficients for low and moderate SSP are negatively significant at 10 and 5 percent level respectively, implying that individuals that expect to live shorter will retire earlier than individuals with a higher subjective life expectancy, i.e. they have to save less in order to finance a shorter period of retirement. The R-squared for this regression is the highest among the three models.

On the whole, the estimated coefficients are quite similar for the three regressions. Men expect to retire on average five months later than women. Concerning family composition, the ERA is considerably higher (one year and eleven months) for widowed workers and for individuals who have children (five months). Having grandchildren is significant at the 10 percent level and decreases the ERA. On the other hand, medium and high levels of education have a positive effect on the choice of retirement age, i.e. individuals with higher vocational education and university degrees expect to retire later. According to the life-cycle model this is explained by the fact that individuals who invest in human capital plan to work more over their lifetime, thus, intend to retire later (Hall and Johnson, 1980). Educational attainment could also be considered a "crude proxy" for financial literacy (Fouarge, de Grip and Montizaan, 2013). Individuals that reach higher levels of education have the necessary knowledge to understand how the reform is affecting their particular situation, and in consequence, are more capable to form precise expectations about future retirement. Furthermore, the negative coefficient for the variable *public* evidences that workers from private companies report higher ERAs than those from the public (or semi-public) sector. Lastly, results reveal that the effects of self-reported health are significant at the 1 percent level even if more objective measures are added to the regression. The negative coefficient implies that people with poor health expect to leave the workforce almost four months earlier than individuals in better conditions. The "justification bias" hypothesis is therefore not an important problem in this study mainly because the sample used only contains workers. In fact, this issue is more important for samples of individuals that have already left the labor force, especially for those on disability.

Additionally, a fourth model (not included in Table 6) is estimated containing disaggregated sectors as additional control variables[15]. Only four out of the nine sectors present significant coefficients. For the sector "Government services and public administration" results match the ones obtained in previous models for the variable *public*. There is evidence to support that workers from the public sector expect to retire earlier than people from private companies. The estimated coefficients for the construction and industrial production sector are also negative. In other words, workers expect to retire on average around nine to ten months earlier than individuals from other sectors. This behavior could be explicated by the fact that these jobs usually imply manual work combined with poor working conditions, hence, workers are retiring earlier than workers from other sectors. Results are displayed in Table A5 of the Appendix.

Finally, with the same specifications of Model 2 two additional regressions are run for the samples of males and females separately. Results are presented in Table A6 of the Appendix. The regressions yield similar results for the variables *Treat*, *Post* and the interaction term, including their significance level. However, for the sample of men variables related with family composition such as *widowed*, *divorced*, *children* and *grandchildren* are not significant, contrary to what happens for the sample of women. It is

[15] The reference sector is "Sector 10 – Others", which contains the smallest sectors of the economy and represents the 11.9 percent of the sample.

deduced therefore that women are more likely to form their retirement expectations based on their family composition, while other factors seem to be influencing retirement behavior of men. In addition, the R-squared for the sample of males is lower (9.4 percent) and higher for females (17.5 percent) compared to Model 2 (11.4 percent). This implies that the variables included in the model are able to explain a higher share of variation in the ERA for women, and that other variables not included in the regression are important determinants of the ERA of men.

In contrast, education seems to play a more important role for men than for women in forming their expectations about retirement. However, attaining a high level of education appears to have a strong and significant impact for women. Their ERA is one year and nine months higher if they have a university degree than if they completed a lower education level. The relevance of the job sector is also different for each group. For men the significance of the variable is higher and the impact stronger than for women, but the sign of the coefficient remains negative for both samples. Concerning health status and knowledge about their future income, results are similar for both samples in spite of minor differences.

Overall, using alternative control variables, the results of the presented models provide evidence to confirm that the policy change affects positively the retirement expectations of older workers.

6.2 Alternative Samples

In this section two different models with alternative specifications of the data are displayed in Table 7. For the first model (Model 4) individuals affected by the reform of 2010 are dropped from the original sample. As it was already mentioned, in June 2010 a new pension agreement that gradually increases the eligibility age for the state pension was approved. This change implies an increase from the current statutory retirement age of 65 to 66 in 2020 for individuals born after 1954, and to 67 in 2025 affecting those born after 1959. The approval of this reform received huge media coverage in 2010 (Fouarge, de Grip and Montizaan, 2013). Therefore, an increase of the ERA would be expected after the announcement, even if the law only came into force in January 2013. In order to set aside the effects of this reform, an alternative sample was defined excluding the individuals whose expectations could be affected by the increase of the statutory retirement age. This new sample is restricted to individuals born before 1955. The results of the regression are shown in the first column of Table 7 (Model 4).

It is noted that despite the fact that the coefficients for *Treat* and *Post* are not significant anymore, the DiD estimate is still significant and even higher than in the previous models. These results imply that there is not significant evidence to confirm the existence of differences in the ERA between the treated and controlled group before the introduction of the reform and that no other factors besides the reform are affecting the ERA over time in the same way for both groups. However it seems that after the reform individuals belonging to the treatment group expect to retire more than two years later than the workers from the control group. The higher value of the DiD estimate is not surprising. The sample is now excluding individuals from the control group that will be affected by the reform of 2010 and that are already expecting to retire later. After the reform of 2009, while the average ERA of the original control group is 64.6, individuals from the restricted control group expect to retire, on average, at the age of 63.9, explaining the higher coefficient for the interaction term. On the other hand, the restricted control group is closer to age at which they can apply for the doorwerkbonus, a valid reason to expect a smaller difference between these two groups. However, according to the results, the first effect dominates.

Concerning the other regressors included in the model, results remain very similar to Model 2. Some variables like *gender* are not significant in this case showing that there is no evidence of a difference in the ERA between men and women. Having attained a medium level of education is now positively significant, suggesting that not only high levels of schooling are influencing retirement expectations. Lastly, despite

self-reported measures of health not being significant anymore, being diagnosed with a disease has a slight positive effect on the ERA.

Table 7. Determinants of the ERA - Results with Alternative Control Groups (Standard Errors in Parentheses)

Variables	**Model 4** Sample not affected by the reform of 2010	**Model 5** Control Group: Individuals who are not entitled to the doorwerkbonus
Treat	.2878	.7880*
	(.3836)	(.4431)
Post	-.2429	.9539***
	(.1849)	(.1917)
Treat*Post	2.0271***	1.4417**
	(.4532)	(.5961)
Age	.3314***	.1245***
	(.0394)	(.0197)
Gender (Male=1)	.0968	.6685***
	(.1614)	(.1868)
Married (Yes=1)	-.3509	-.8319**
	(.2875)	(.3487)
Widowed (Yes=1)	1.9766***	2.4661***
	(.4712)	(.5892)
Divorced (Yes=1)	.4130	.1529
	(.3332)	(.4197)
Children (Yes=1)	.5944***	.3711
	(.2064)	(.2711)
Grandchildren (Yes=1)	-.4013**	-.4909**
	(.1734)	(.2456)
Medium Level of Education	.7441***	.9281***
	(.2096)	(.2191)
Medium-High Level of Education	.8156***	.9536***
	(.2118)	(.2444)
High Level of Education	1.8496***	2.1844***
	(.2435)	(.3529)
Poor Health_subjective measure	-.2560	-.1684
	(.1587)	(.1865)
Poor Health_objective measure	.3008**	.0550
	(.1563)	(.1868)
Sector (Public=1)	-.6704***	-.7436***
	(.1571)	(.1971)
Knowledge about Future Income	-1.0123***	-1.2905***
	(.1567)	(.2305)
Constant	44.2466***	57.1016***
	(2.2456)	(1.0795)
R-squared	.2690	.1628
Adj R-squared	.2602	.1547
Sample	1,426	1,780

* Significance at 0.10 level.
** Significance at 0.05 level
*** Significance at 0.01 level

For the second model (Model 5), in order to further check the robustness of the results, the original control group is redefined. Instead of consisting of workers younger than 61 before January 2009 as in the original sample, the control group now contains the individuals that were dropped from the initial sample because their annual gross income was below the minimum required to be entitled for the

doorwerkbonus (EUR 8,860). The treatment group remains the same as in the original models, i.e. workers born in 1947 or before with an annual gross income above the minimum required, and the reference group contains now those individuals that, regardless of their age, do not reach this minimum. A summary of the regression results are presented in the second column of Table 7 (Model 5).

In general results are quite similar in comparison to the ones obtained in the Model 2. The DiD estimate is still significant and positive, leaving the main conclusions of the study unaffected. However, the difference in ERA between control and treatment group before the reform is significant but only at the 10 percent level and the value is lower. Individuals belonging to the treatment group expect to retire nine months and a half later. This might be explained by the fact that the control group contains now a percentage of workers born in 1947 or before (5.5 percent) that makes both groups more similar in terms of age composition. Results for education attainment, as observed in Model 4, are strongly significant for all the educational levels included in the regression, but the effects on the ERA are higher. For example, individuals with university degrees expect to leave the workforce two years and two months later than individuals with lower educational levels.

Finally, the R-squared of both models presented above are higher than in the original models, meaning variables are able to explain a higher share of variation in the ERA.

6.3 Selection Bias and the Heckman Selection Model

In Ordinary Least Squares (OLS) models the misspecification leads to biased estimates of the parameters. If model is not correctly specified the DiD estimate, the coefficient of interest in the regression, would be also biased. Therefore, in this last section a two-step Heckman selection model is performed to test and correct for selection bias due to unobserved factors.

In effect, there could be unobserved factors related with the ERA that are influencing the treatment and control group. For example, workers that expect to retire early might enter the control group but not the treatment group because they are already retired. Therefore, relevant factors for the analysis could be affecting the employment probability without affecting the ERA. In fact, to define whether or not selection is a problem for the estimations, as a first step an exclusion restriction is defined including variables that affect employment probability without having a direct impact on the ERA. Thus, the probability of having a paid job is estimated as a function of the variables included in Model 2 and one additional variable, hours worked per week in the current or last job. Variables that refer specifically to people with a paid job are excluded from the probit[16] specification because they would be biasing the sample toward this specific group. From the estimation of this model a new variable, commonly known as the inverse Mills ratio, is calculated and included in the main model[17] as an additional control variable (*lambda*). The inclusion of the inverse Mills ratio in the regression removes any bias in the estimated coefficients due to sample selection. The limilation for this correction model is that despite the efforts to include additional variables to the probit regression it is hard to find factors that influence employment probability wihout affecting the ERA of individuals. Table 8 reports the result with and without the correction for unobserved factors.

As can be seen in the table below, the estimated coefficient for lambda is statistically significant and positively signed, thereby suggesting that the error terms in the selection equation and in the main model are positively correlated and that unobserved factors are associated with a higher ERA. The estimated coefficient for the interaction term is now smaller than in the previous models, indicating that the selection was biasing the effect of the reform upwards, i.e. the effect becomes smaller once the model is

[16] Results for the probit model are presented in Table A7 of the Appendix.
[17] As can be seen in Table 8, the main model includes only the variables that were significant in Model 2.

adjusted. In fact, while the simple OLS model reveals that after the reform individuals from the treatment group expect to retire one year and almost seven months later than workers from the treatment group, the Heckman models suggests that their ERA is on average one year and almost one month higher. The significance of the DiD also decreases due to the Heckman correction. Concerning the other coefficients of the regression, all of them remain significant at the 10 percent level and almost all of them are smaller after adjusting the regression for unobserved factors, meaning that the effect of the variables on the ERA is lower. Overall, despite certain changes in the results induced by the inclusion of the inverse Mills ratio in the regression, conclusions remain unaltered.

Table 8. Determinants of the ERA – With and without Adjustments for Selection Bias (Standard Errors in Parentheses)

Variables	Simple OLS Model	Heckman Model
Treat	2.2506***	1.5305***
	(.3204)	(.3667)
Post	1.0817***	1.1045***
	(.1107)	(.1097)
Treat*Post	1.5547***	1.0698**
	(.4781)	(.4900)
Gender (Male=1)	.4439***	.3223***
	(.1118)	(.1082)
Widowed (Yes=1)	1.9608***	1.7591***
	(.3591)	(.3429)
Children (Yes=1)	.3346**	.3923***
	(.1344)	(.1301)
Grandchildren (Yes=1)	-.3438**	-.6206***
	(.1445)	(.1462)
Medium-High Level of Education	.4275***	.3346***
	(.1229)	(.1195)
High Level of Education	1.0921***	1.1179***
	(.1590)	(.1597)
Poor Health_subjective measure	-.2546**	-.2670**
	(.1101)	(.1067)
Sector (Public=1)	-.4980***	-.4909***
	(.1111)	(.1080)
Knowledge about Future Income	-.8492***	-.8505***
	(.1144)	(.1115)
Lambda (Inverse Mills ratio)		1.1916***
		(.3830)
Constant	63.2617***	63.2433 ***
	(.1750)	(.17010)
R-squared	.1071	.1176
Adj R-squared	.1042	.1139
Sample	3,696	3,189

* Significance at 0.10 level.
** Significance at 0.05 level
*** Significance at 0.01 level
The differences in the number of observations are due to missing values

7. Concluding Remarks and Limitations

Retirement expectations play a crucial role in predicting future individual behavior but also in determining current choices. During the last years, their analysis has become an increasingly important topic in the field of economics of ageing. Several studies have already estimated the determinants of the ERA but little is known about the effect of pension reforms. The aim of this thesis has been therefore to contribute to the scarce literature that analyzes the impact of policy changes on the ERA.

Using pooled cross-section data obtained from the LISS household panel and applying a DiD approach, it has been examined to which extent expectations of older workers are sensitive to the introduction of a work-continuation bonus that seeks to extend their working lives. More specifically, this thesis considers the reform of 2009 that introduces tax incentives for workers aged 62 or above, whose annual gross income exceeds EUR 8,860. Different models using alternative control variables and data specifications have been estimated in order to single out and quantify the effect of this change. To complete the analysis a Heckman two-step model has been employed to test and correct for possible selection bias, particularly to adjust the model for unobserved factors.

The study provides extensive evidence on the positive effects of the introduction of the doorwerkbonus. Following the reform, the ERA of older workers shows significantly higher values as compared to their younger peers. On average, after the reform older workers expect to retire approximately one year and seven month later than younger workers. When the model is controlled for unobserved factors, the DiD estimate is much smaller; the increase in the ERA of the treated population relative to the control group becomes only one year. Overall, despite the differences in the results the main conclusions of the research study remain unchanged.

Even though the results are statistically significant, the economic significance could be questionable. Since the bonus is quite high, reaching 10 percent when individuals turn 64 years of age, the reader could expect even higher increase of the ERA. Nevertheless, the "small" effect might be explained by the fact that older workers are closer to their retirement, and in consequence their ERA is more stable over time (Coppola and Wilke, 2010). Younger workers face more uncertainty towards retirement decisions because they still have many years before leaving the workforce that are subject to possibly life-changing events. Therefore, if this reform would be applied to young individuals, probably the increase of the ERA would be higher because their expectations are more flexible and sensitive to changes.

On the other hand, this analysis faces some limitations. The first one is related to the size of the treated population. The objective of the present study is to examine the expectations of a very specific group of workers, i.e. born in 1947 or before. Since individuals are in the last stage of their working lives, many of them that could be included within the treatment group are already retired, hence, excluded from the sample. In addition, individuals belonging to this group are already 61 years of age in January 2009 leading to a decrease in the size of the group over time due to retirement, becoming extremely small in 2012. The small size of the group makes it more sensitive to the individual characteristics of the persons that belongs to it (e.g. age, gender, occupation) and could therefore be biasing the results of the study. The solution to this problem would be to develop a survey focused on retirement behavior and expectations of older workers in order to work with a larger treatment group. A second limitation concerns the retirement behavior of older workers. Because they are close to retirement the treated sub-sample becomes biased towards individuals who are more likely to work longer and report in consequence higher ERAs.

Further research could be carried-out examining retirement expectations and behavior of older and younger workers. Firstly, it would be interesting to analyze the reform of 2009 with a larger sample of older workers in order to further check if the small sample is not biasing the results of the study. On the

other hand, an attractive study would be to analyze a reform that affects both groups in the same direction in order to compare the increase of their ERA. A higher increase of the ERA would be expected for younger workers since their expectations are more sensitive to changes. Alternatively, it would also be appealing to analyze in more detail the expectations of younger workers and the role played by uncertainty or the limited knowledge they usually have about the future and also about pension systems, using measures of financial literacy as well.

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Appendix

A1. Tables

Table A1. Work-Continuation Bonus (2012)

Age	Born in	Tax Deduction
62	1947	1.5%
63	1946	6%
64	1945	8.5%
65	1944	2%
66	1943	2%
67+	1942 or before	1%

Source: Belastingdienst (Dutch Tax Administration)

Table A2. ERA by Specific Sector

Sector	% of the sample	ERA
Agriculture/Forestry/Fishery/Hunting/Mining	1.14	65.59
Industrial production/Utilities production, distribution	12.85	64.01
Contruction	3.84	64.42
Environmental services, culture, recreation/Catering	9.30	64.75
Transport	4.25	64.39
Financial/Business services (including real estate)	9.48	64.71
Government services, public administration	17.22	63.94
Education	11.68	63.87
Healthcare and welfare	18.28	64.09
Others	11.94	64.96

Source: LISS panel

Table A3. ERA by Occupation and Groups

	Treatment Group		Control Group	
Occupation	**%**	**ERA**	**%**	**ERA**
Employee in permanent employment	69.3%	64.9	89.0%	64.1
Employee in temporary employment	3.9%	71.4	2.8%	64.6
On-call employee	0.0%	.	0.2%	65.0
Temp-staffer	0.0%	.	0.5%	63.8
Self-employed / Freelancer	9.5%	68.6	4.8%	64.7
Independent Profesisonal	3.9%	74.0	1.1%	64.9
Director of a limited liability or private limited company	3.4%	70.8	0.3%	63.7
Majority Shareholder Director	10.1%	73.3	1.3%	64.5

Source: LISS panel

Table A4. Variable Definitions

Variable	Description
Gender	1 if respondent is male, 0 otherwise
Marital Status	
Married	1 if respondent is married, 0 otherwise
Widowed	1 if respondent is widowed, 0 otherwise
Divorced	1 if respondent is divorced, 0 otherwise
Other	1 if respondent has other marrital status, 0 otherwise
Children	
children	1 if respondent has children, 0 otherwise
gchildren	1 if respondent has grandchildren, 0 otherwise
Education	
Low Level of Education	1 if No Education, Primary School and VMBO, 0 otherwise
Medium Level of Education	1 if HAVO/VWO (Higher Secondary Education) and MBO (Intermediate Vocational Education), 0 otherwise
Medium-High Level of Education	1 if HBO (Higher Vocational Education), 0 otherwise
High Level of Education	1 if WO (University), 0 otherwise
Income	
Annual Net Income	Annual Net Income (EUR 10,000 or less=1/EUR 10,001 to EUR 20,000=2/EUR 20,001 to EUR 30,000=3/EUR 30,001 to EUR 40,000=4/More than EUR 40,000=5
Knowledge about Future Income	1 if respondent knows how high his total income will be when he turns 65, 0 otherwise
Health Status	
Poor Health_Subjective Measure	Equals 1 if respondent´s physical health or emotional problems hinder his work over the past month, 0 otherwise
Poor Health_Objective Measure	Equals 1 if a physician told the respondent during the last year that he suffer from a disease, 0 otherwise
Subjective Survival Expectations - 75 years old	
SSP_Low	1 if Low Survival Probability (0-50%), 0 otherwise
SSP_Moderate	1 if Moderate Survival Probability (60-70%), 0 otherwise
SSP_High	1 if High Survival Probability (80%), 0 otherwise
SSP_Very High	1 if Very High Survival Probability (90-100%), 0 otherwise
Sector	
public	1 if respondent is from the public (or semi-public) sector, 0 if he is working on the private sector
sector_1	Agriculture/Forestry/Fishery/Hunting/Mining=1, 0 otherwise
sector_2	Industrial production/Utilities production, distribution, 0 otherwise
sector_3	Contruction, 0 otherwise
sector_4	Environmental services, culture, recreation/Catering, 0 otherwise
sector_5	Transport, 0 otherwise
sector_6	Financial/Business services (including real estate), 0 otherwise
sector_7	Government services, public administration, 0 otherwise
sector_8	Education, 0 otherwise
sector_9	Healthcare and welfare, 0 otherwise
sector_10	Others, 0 otherwise

Table A5. Alternative Model including Sectors (Standard Errors in Parentheses)

Variables	Model A1 Sectors
Treat	2.3809***
	(.3607)
Post	1.0851***
	(.1179)
Treat*Post	1.5982***
	(.4972)
Age	-.0168
	(.0136)
Gender (Male=1)	.5660***
	(.1252)
Married (Yes=1)	-.2503
	(.1935)
Widowed (Yes=1)	1.7721***
	(.4140)
Divorced (Yes=1)	.2574
	(.2334)
Children (Yes=1)	.4377***
	(.1526)
Grandchildren (Yes=1)	-.3108*
	(.1608)
Medium Level of Education	.0651
	(.1580)
Medium-High Level of Education	.4453***
	(.1679)
High Level of Education	1.1348***
	(.1991)
Poor Health_subjective measure	-.3137***
	(.1191)
Poor Health_objective measure	.1282
	(.1167)
Knowledge about Future Income (Yes=1)	-.8519***
	(.1208)
Sector 1 - Agriculture/Forestry/Fishery/Hunting/Mining	.3743
	(.5435)
Sector 2 - Industrial production/Utilities production, distribution	-.8776***
	(.2256)
Sector 3 - Contruction	-.7519**
	(.3270)
Sector 4 - Environmental services, culture, recreation/Catering	-.1641
	(.2411)
Sector 5 - Transport	-.5068
	(.3136)
Sector 6 - Financial/Business services (including real estate)	-.3401
	(.2428)
Sector 7 - Government services, public administration	-.4736*
	(.2531)
Sector 8 - Education	-.7143***
	(.2774)
Sector 9 - Healthcare and welfare	-.3542
	(.2285)
Constant	64.5198***
	(.7460)
R-squared	.1206
Adj R-squared	.1138
Sample	3,408

* Significance at 0.10 level.
** Significance at 0.05 level
*** Significance at 0.01 level

Table A6. Regression Models for the Samples of Males and Females (Standard Errors in Parentheses)

Variables	Model A2 Males	Model A3 Females
Treat	2.2528***	2.4971***
	(.4520)	(.6066)
Post	1.0436***	1.0948***
	(.1568)	(.1770)
Treat*Post	1.6158***	1.7530**
	(.6243)	(.8211)
Age	-.0504***	.0306
	(.0178)	(.0209)
Married (Yes=1)	.0148	-.3949
	(.2682)	(.2769)
Widowed (Yes=1)	.6830	2.2853***
	(.7043)	(.5061)
Divorced (Yes=1)	.1629	.6394**
	(.3278)	(.3262)
Children (Yes=1)	.0885	.7868***
	(.2067)	(.2234)
Grandchildren (Yes=1)	-.2539	-.4060*
	(.2201)	(.2333)
Medium Level of Education	.1923	-.0541
	(.2156)	(.2287)
Medium-High Level of Education	.6891***	.0410
	(.2198)	(.2357)
High Level of Education	.9302***	1.7690***
	(.2483)	(.3252)
Poor Health_subjective measure	-.3639**	-.2964*
	(.1595)	(.1757)
Poor Health_objective measure	.2377	.0549
	(.1571)	(.1736)
Sector (Public=1)	-.6402***	-.2964*
	(.1545)	(.1739)
Knowledge about Future Income	-.8583***	-.8814***
	(.1549)	(.1924)
Constant	66.5439***	61.3761***
	(.9487)	(1.1553)
R-squared	.0914	.1746
Adj R-squared	.0841	.1650
Sample	2,018	1,390

* Significance at 0.10 level.
** Significance at 0.05 level
*** Significance at 0.01 level

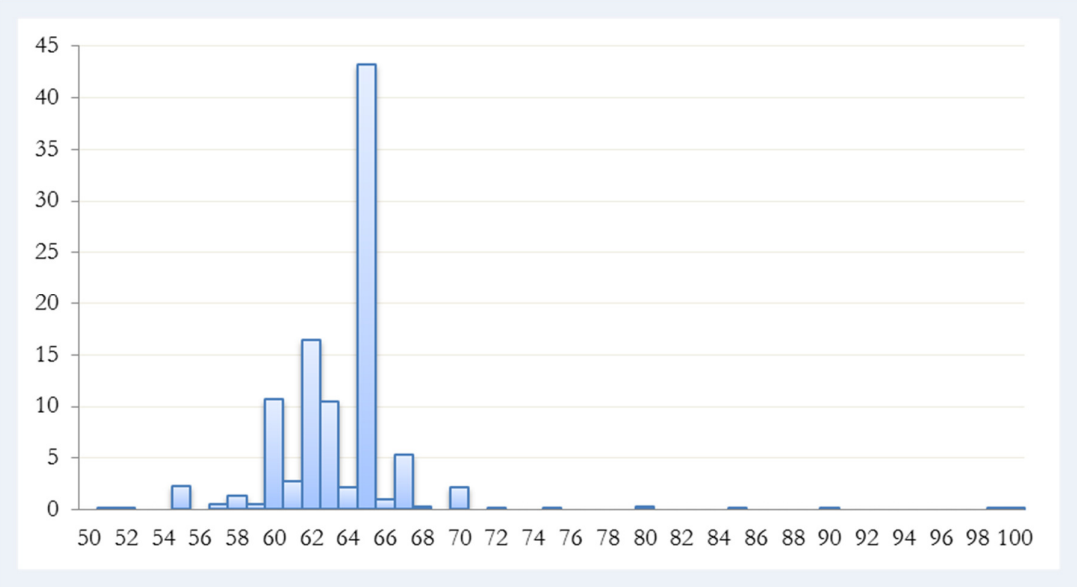
Table A7. Probit Model – Heckman Selection Model (Standard Errors in Parentheses)

Variables	Probit Model
Age	-.0140***
	(.0010)
Married (Yes=1)	-.0176**
	(.0073)
Widowed (Yes=1)	.0011
	(.0127)
Divorced (Yes=1)	-.0075
	(.0121)
Medium Level of Education	.0145***
	(.0051)
Medium-High Level of Education	.0080
	(.0052)
High Level of Education	.0313***
	(.0041)
Poor Health_subjective measure	.0102**
	(.0046)
Poor Health_objective measure	.0016
	(.0047)
Number of Hours Worked per Week	.0002
	(.0002)
Pseudo R2	.4779
Sample	4,562

* Significance at 0.10 level.
** Significance at 0.05 level
*** Significance at 0.01 level

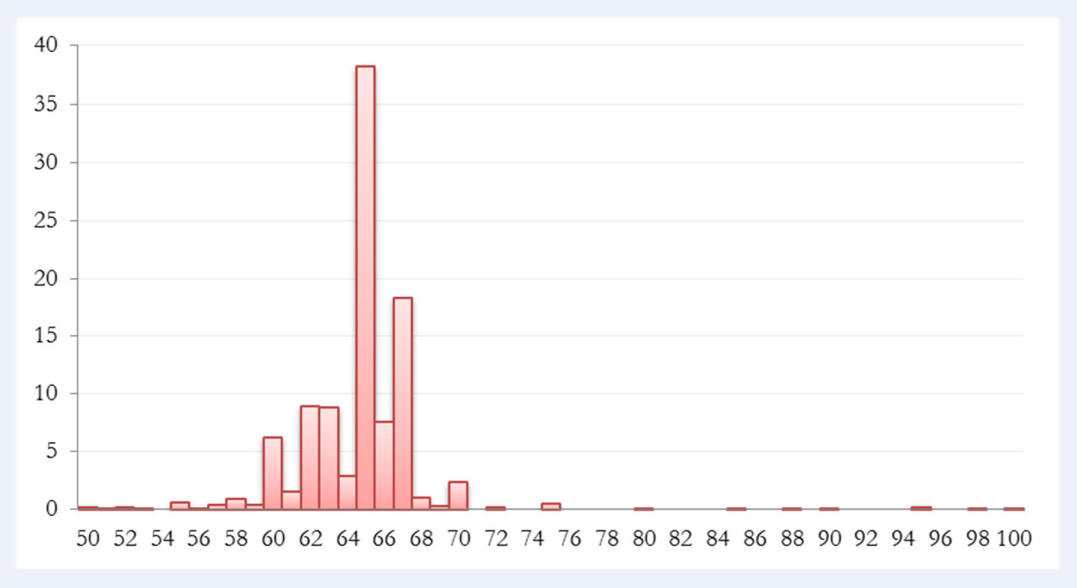
A2. Figures

Figure A1. Distribution of the ERA before the Pension Reform



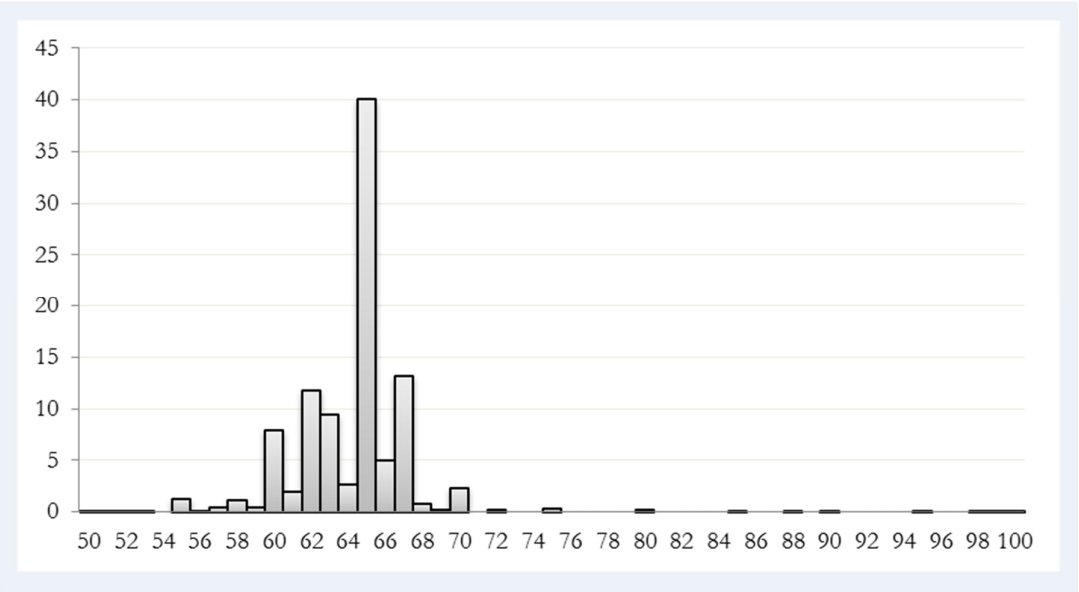
Source: LISS panel

Figure A2. Distribution of the ERA after the Pension Reform



Source: LISS panel

Figure A3. Distribution of the ERA



Source: LISS panel

Figure A4. ERA by Income Group

Source: LISS panel