A Delayed Retirement Policy and Male Labor Supply: Evidence from the Entire Dutch Population

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February, 2016

Abstract

This paper studies the labor supply effects of a national delayed retirement policy introduced in 2009 in the Netherlands. The policy offers a reduction in taxes on labor income over each year in which retirement is delayed after the age of 62. I estimate the average effect of the policy on male labor supply as well as its responsiveness to the size of the incentive. Comparing differentially affected birth cohorts suggests that labor force participation increased by about 3.8 to 5.5 percentage points in the three years after introduction for cohorts that were eligible before the normal retirement age. I also find that a higher bonus induces a greater increase in participation and in the number of hours supplied by those working.

Keywords: Retirement Policy, Labor Supply

JEL Classification Numbers: J14, J22, J26.

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I thank the NBER Pre-Doctoral Fellowship Program on the Economics of an Aging Workforce for their generous financial support. I am very grateful to my advisors, David Jaeger, Michael Grossman, Sanders Korenman, Ted Joyce and Frank Heiland, for their continuous support and advice. I thank the participants of the brownbag seminar at the economics department of The Graduate Center, CUNY, and seminar participants at the CUNY Institute for Demographic Research and at the Baruch College - School of Public Affairs for their useful comments. I thank Mauro Mastrogiacomo, Netspar funding through the project "A second and half Pillar for the self-employed", De Nederlandsche Bank as well as Michael Grossman for their instrumental help in getting access to the data. I thank Maarten Lindeboom and Jochem Zweerink for data-related advice.

1 Introduction

Over the past several decades, low labor supply of older workers and population aging have become a growing concern for the Netherlands and many other countries (Gruber & Wise, 1997; 2004). The Netherlands has had very low labor force participation (LFP) among individuals aged 60 and older since the 1980s and 90s (Gruber & Wise, 1999; Kapteyn & De Vos, 1999). In 2006, only 34.6% of Dutch men between ages 60 and 64 were working, compared to 52.2% of males in the OECD countries (OECD, 2015). As a result of a pronounced baby boom after WWII followed by a stark decline in fertility, the Dutch old-age dependency ratio increased from 17 to 26 between 1975 and 2013, and is projected rise to 42 in 2050 (World Bank, 2015; United Nations, 2013).[1] The combination of fewer workers to support retirees, rising life expectancy, and a status quo of early retirement (i.e., short working lives) threatens the fiscal balance and long-term solvency of the social security system in the Netherlands, as it does in many other countries (Gruber & Wise, 1999; 2004; 2007).

The Netherlands has implemented reforms to social security in attempts to improve fiscal sustainability. Like other countries, e.g., the United States, Germany and France, the Netherlands increased the normal retirement age (NRA), the age at which workers become fully eligible for social security (or the equivalent state pension), starting in 2013.[2] Raising the NRA increases the incentive to retire at a later age.[3] In this paper, I evaluate the impact of a Dutch delayed retirement policy, the "Doorwerkbonus"(DWB) on the labor supply of older male workers.[4]

The DWB was implemented in January 2009 to increase labor supply among those aged 62 and older, providing a fiscal bonus of 1% to 10% of annual labor income between €8,860 and €54,776 (in 2009) for work at those ages.[5] Because the DWB is an individual earnings credit, providing a fiscal discount on income taxes over the year in which work is continued, it is, in effect, a wage increase for that period. This paper contributes to the literature that evaluates the effects of these types of retirement policies, reviewed below.

To study the effect of the DWB on male labor supply, I use detailed, high quality administrative data from the Netherlands to estimate the average effect of the policy on LFP as

[1]The old age dependency ratio is defined as the ratio of people older than 64 to those aged 15-64. Population aging in the Netherlands has been more rapid than in the United States, where the ratio increased more slowly, from 16.2 to 20.4 between 1975 and 2013 and is projected to rise to 34 in 2050.

[2]Starting in 2013 the Netherlands increased the NRA by 1-3 months per birth cohort, and it is scheduled to be 66 in 2018 and 67 in 2021.

[3] In the United States, retirement (exit from the labor force) and claiming Social Security Benefits are distinct events; therefore, delayed claiming does not necessarily imply delayed exit from the labor force. In the Netherlands this is not the case. The next section provides more detail on the case of the Netherlands.

[4]The direct translation of "Doorwerkbonus" in English is continued work bonus.

[5]See p.10 for a more detailed description.

well as how labor supply responds to the size of the incentive. To my knowledge, this is the first paper to study the relationship between the DWB and labor supply using longitudinal administrative data for the entire Dutch population.

A related literature studies how changing the nature of the Delayed Retirement Credit (DRC) in the United States, which increases lifetime Social Security benefits when retirement is delayed beyond NRA, would affect labor supply and the timing of claiming. Orszag (2001) suggests that a lump sum DRC might boost labor supply more than an adjustment in the monthly benefit because, depending on time preferences, people are more responsive to a lump sum payment than to an equivalent annuity payment. Chai, Maurer, Mitchell & Rogalla (2013) explore theoretically whether a lump sum as a reward for delayed retirement might delay retirement more than an increase in lifetime benefits. Their results suggest that a lump sum DRC option would increase the average retirement age by 1.5-2 years.[6] Building on the work of Chai et al., Maurer, Mitchell, Rogalla & Schimetschek (2014) surveyed respondents about delaying retirement when offered a lump sum payment instead of increased lifetime benefits. Respondents indicated that they would claim about a half year later if a lump sum were paid for claiming any time after the Early Retirement Age (ERA), or two-thirds of a year later if paid for claiming after NRA. Furthermore, they find that people would work one-third to one-half additional months if they were offered the option of a lump-sum payment.

Because the DWB has a similar feature of a direct reward (in the following year), the findings of Maurer et al. (2014) suggest that the DWB could increase LFP. However, the size of the amounts analyzed were much larger than the DWB, so it is difficult to make inferences about the size of the effects of the DWB on labor supply based on their results. Moreover, in the US setting, a lump sum DRC would replace an existing DRC that increases lifetime benefits, whereas the DWB was introduced into a setting without an existing delayed-retirement policy.

Two papers have analyzed European policies aimed at increasing labor supply among older workers. Novella (2012) studies the Belgian "Pensioenbonus" introduced in 2007 to provide incentives for work among persons aged 62 and older. She finds that the Belgian policy had a limited impact on the probability of a male worker remaining in the labor force. However, Novella concludes that the "Pensioenbonus" had limited effects because LFP had already risen as a result of an earlier increase in the number of years of work required to claim social security benefits.

Using survey data from the *Longitudinal Internet Studies for the Social Sciences*, Da Silva Soca (2013) studies the effect of the DWB on the expected retirement age in the Nether-

[6] Chai et al (2013) assume that people claim benefits and move to full leisure at the same age.

lands. Using a difference-in-differences analysis that compares individuals eligible for the bonus (aged 62 and older) to younger people before and after introduction of the policy, she finds that the policy increased the age at which older workers expected to retire by one year and seven months. These results suggest that the policy should also have had an effect on actual LFP.

The introduction of the DWB provides a natural experiment to study how a direct bonus, a feature of the lump sum payment suggested by Orszag (2001), Chai et al. (2013) and Maurer et al. (2014), affects labor supply. In this paper, I extend the work by Da Silva Soca (2013) by studying the effect of the DWB on actual male LFP (rather than self-reported expectations of labor supply), as well as the responsiveness of male labor supply to the size of the DWB. I use administrative data from the entire Dutch population to provide accurate estimates of labor supply, and compare the behavior of cohorts at the same ages (in different years), instead of older to younger people.

The structure of the policy and the context in which it was introduced create some challenges for an analysis of its impact on labor supply. Specifically, it was introduced several years after the implementation of other law changes intended to reduce early retirement incentives, some of which were sector specific. This creates some challenges for disentangling the policy's effects, which I address by carefully setting up my difference-in-differences model and by including age, year and sector dummies as well as controlling for individual fixed effects when appropriate.

Due to the continued prevalence of early exit from the labor force and the ongoing debate on the sustainability of social security systems, an understanding of the effect of the DWB on labor supply as well its responsiveness to the size of the bonus is relevant not only to policy makers in the Netherlands, but to those in other countries considering policy reforms to stimulate labor supply. This paper builds on and extends the literature on the effects of retirement policies to the case of the Netherlands, by studying the impact of a policy that raises the effective annual wage for some period when delaying retirement.

2 Institutional Background

Pension System in The Netherlands

The Dutch pension system consists of three pillars. The first is the state-provided pay-as-you-go pension called the Algemene Ouderdomswet (AOW), established in 1957. The eligibility age (NRA) is 65, for those born before 1948, and has been scheduled to increase gradually by several months per birth cohort starting in 2013.[7] The AOW provides an equal basic income linked to the statutory minimum wage for everyone above the NRA. A single person receives 70% of minimum wage (about €1,000), while couples receive 50% of minimum wage per person (about €700 each). It is not possible to claim early or to delay claiming and enrollment is practically automatic.[8] Every person who has lived or worked in the Netherlands for 50 years receives the full state pension benefits at NRA.[9] Receiving the AOW does not require retiring from the labor force. Compared to other countries, however, the state pension provides only a small portion of retirement income in the Netherlands. At the end of 2007, 2.7 million people received Dutch state pension benefits.

The second pillar, which is very important to income in retirement in the Netherlands, consists of collective, employer-provided pensions. They are managed by a pension fund or insurance company that is a separate legal entity from the employer and therefore are not affected if the employer gets into financial difficulty. Moreover, these pension funds are run as non-profit organizations financed by past contributions from members and from asset returns.[10] Although no law requires individuals to join pension funds, the government can make a pension scheme mandatory for an industry or profession if the representatives of the employers and employees (e.g., unions) within the sector or profession decide to provide a pension scheme for employees. As a result, over 90% of employees take part in a collective pension scheme. Currently, the majority are (hybrid) defined benefit schemes, meaning that there is risk sharing among all parties involved (employer, employees, and current pensioners). At the end of 2008, pension funds in the Netherlands managed an invested capital of about €700 billion. In comparison, the Dutch GNP in 2008 was approximately €600 billion.

The third pillar consists of private individual pension products. The self-employed and employees in sectors without a collective pension scheme build up their pensions with private individual pension products, but anyone can purchase a product in the third pillar. All Dutch citizens will receive retirement income from the first pillar when they reach NRA, and depending on their personal situation, they could also receive income from the second and/or third pillars.

[7] The NRA will be 66 in 2019 and 67 in 2023, After 2024, it will be linked to life expectancy and will be fixed 5 years ahead of time.

[8] The Employee Insurance Agency invites people to apply for benefits 6 months before a person reaches NRA via a simple online process. In case an application is filed late, benefits will be paid retroactively up to 12 months later, and in certain cases more.

[9] People that do not work accumulate equal pension rights, but benefits are reduced by 1/50 for each year that a person lived outside of the Netherlands.

[10] Three different types of pension funds exist in the Netherlands: industry-wide pension funds, corporate pension funds, and pension funds for the self-employed

Labor Force Participation in The Netherlands

LFP among older workers in the Netherlands has been low since the 1980s and 90s (Gruber & Wise, 1999; Kapteyn & De Vos, 1999). In 2006, only 34.6% of Dutch men and 19.8% of Dutch women between ages 60 and 64 were working (OECD, 2015). The low LFP in the Netherlands has been attributed to the introduction of early retirement plans.[11] These schemes, intended to create employment opportunities for younger workers, made it possible for older workers to claim pensions and retire early, until they reached an age when their pension income would be supplemented by AOW benefits, i.e. social security (Euwals, Van Vuuren & Wolthoff, 2010). Moreover, Dutch regulations facilitated the use of disability insurance (DI) and unemployment insurance (UI) as pathways to early retirement (Kapteyn & De Vos, 1999; Kerkhofs et al, 1999; Lindeboom, 1998).

Over the last few decades, the Netherlands introduced policies to address the low LFP of older workers. In 2002, retirement through DI and UI was made more difficult. In 2006, laws governing early retirement reduced the generosity of plans for cohorts born after 1950. And since 2013, the age at which workers become eligible for AOW was increased. However, precise retirement rules of collective pension funds are negotiated between unions and employer organizations and eligibility rules may differ by pension fund.

The "Doorwerkbonus"

The "Doorwerkbonus" (DWB) was implemented in the Netherlands in January 2009 to stimulate labor supply at age 62 and above. In effect, it provides a discount on taxes on labor income, between an income cap and floor, for work after age 62 defined as:

$$D = \begin{cases} p(c-f), & \text{if } w > c. \\ p(w-f), & c \geq w \geq f. \\ 0, & w < f. \end{cases} \tag{1}$$

where D is the size of the discount, c is the labor income cap, p is the bonus percentage, w

[11] The early retirement plans, called "VUT" schemes, which stands for "Vervroegde Uittreding en Pre-pensioe'n', early exit and pre-pension in English, are part of the second pillar.

is before-tax labor income and f is the floor.[12] Table 1. shows the (claimable) tax credit scheme and maximum bonus amounts by age in the top section and shows the labor income cap and floor in the bottom section. A person aged 62 is eligible for a credit of 5% of taxable income, up to a maximum amount of $p(c - f)$, which was €2,296 in 2009.[13] The DWB percentage increases with age until 64, and decreases thereafter, to 1% for ages 67 and older. The bonus percentage scheme remained the same from 2009 through 2011, but was amended in 2012. The policy was repealed in 2013 and replaced by a less generous bonus aimed at people aged 61 through 64.

Labor Force Participation and Unemployment in the Netherlands

Figure 1a, shows male LFP rates by year and age. LFP rates increased steadily from 2003 through 2011 for all ages. Participation shows a distinct upturn for ages 61 through 64 after 2006, reflecting two changes in that year: the final implementation of DI restrictions (De Jong, 2008;Van Sonsbeek, 2010), as well a law change that reduced generosity of early retirement schemes for cohorts born after 1950. Even though this law change itself was aimed at cohorts that were not eligible for the DWB in the period of interest and started affecting LFP only after 2012, in 2007, in anticipation of the change, some smaller pension funds introduced a phased reduction of generosity for cohorts born between 1946 and 1950. Although no distinct jump in labor supply is visible immediately after the introduction of the DWB in 2009, there is a slight steepening of the LFP curves for all ages.
Figure 1b, shows male LFP by year and by cohort. After 2006, the LFP curves become more concave for younger cohorts born after 1944, reflecting the same changes mentioned earlier. After the introduction of the DWB only a slight divergence between the youngest cohorts is discernable. In Figure 1c, showing LFP by age and by cohort, we see that LFP has shifted up across cohorts (after 1944, which is likely at least partly attributable to the 2006 DI restrictions and the phased reduction of generosity of early retirement schemes) and that the slope of the LFP curves has flattened for the younger cohorts. There is little difference in LFP between the cohorts at the older ages even after introduction of the DWB. However,

[12] Assuming a fixed tax rate for simplicity gives after tax wages :

$$w^* = \begin{cases} w(1-t) + p(c-f), & \text{if } w \leq c. \\ w(1-t+p) - pf, & c \geq w \geq f. \\ w(1-t), & w < f. \end{cases} \tag{2}$$

[13] The Dutch Tax Administration applies the DWB bonus automatically to everyone who is eligible when tax returns are filed in the next year.

for the younger cohorts, each subsequent cohort that was eligible for the DWB was more likely than the previous cohort to work at each age, suggesting that, with time, the DWB may have induced greater participation.

The “Great Recession” of the late 2000s could also have affected labor supply, although it is likely to be less of a concern in the Netherlands than in other settings. While unemployment rates in many countries started peaking in 2009, figure 2 shows that the Dutch unemployment rate for males aged 55 through 65 was relatively stable between 2003 and 2011, at an average around 5.2 percent. The rate only started rising steeply after 2011 reaching 8.5 percent in 2013, but remained below early 2006 levels until spring 2012.

3 Empirical Strategy

Data

To study the effect of the DWB on the labor supply of Dutch older workers, I use the highly restricted administrative microdata collected by Statistics Netherlands for all Dutch residents from various administrative sources such as the population registry, the Employee Insurance Agency (the administrative authority that handles AOW, DI, UI, and other social benefits), the tax administration, and other sources for the years 1999-2011. For the current analyses, I use the datasets containing information on labor, income (only available from 2003), pension benefits, social security benefits and demographic data for the entire population of the Netherlands (16.7 million people in 2009), which can be linked together by a personal identifier.[14]

Regression Framework

I study how eligibility for the DWB policy affects LFP and how responsive labor supply is to the size of the bonus. To study the effects of DWB eligibility, I use a difference-in-differences approach that exploits the panel nature of the data, and the fact that the introduction of the DWB can be seen as a natural experiment, to analyze the effects of a temporary increase in wages on labor supply. The diff-in-diff model is a workhorse of the policy-evaluation literature on retirement measures (Gruber and Orszag, 2000; Song and Manchester, 2007; Haider and Loughran, 2008; Novella, 2012). To estimate the responsiveness of participation to the size of the bonus, I estimate an OLS model

[14] To gain access to the data, I traveled to the Netherlands to be fingerprinted. The data is accessible via VPN, through a fingerprint secured network, which requests verification every 20 minutes.

(linear probability model) and to estimate the responsiveness of hours worked I estimate OLS models with and without individual fixed effects. Here identification comes from both between-cohort and within-cohort-variation in the size of the bonus. In the models with individual fixed effects, identification comes entirely from within-cohort (and within-person) variation in the bonus percentage.

The Effect of DWB Eligibility on Labor Force Participation

To study the effects of DWB eligibility on participation, I consider the rollout of the program across cohorts. I consider becoming eligible for the DWB as the "treatment", and compare the LFP of cohorts who were eligible to those who were not at the same ages. However, a person turning 63 in 2010 will have been eligible for the DWB for two years, while a person turning 63 in 2009 will only have been eligible for one year. To take these duration differences in eligibility into account and to model cumulative exposure, I pool "exposed" ages from treatment cohorts to form treatment groups and create appropriate comparison groups from control cohorts, thus studying cohorts who were exposed to different "doses" during the period of eligibility.

Table 2a shows the matched control and treatment pairs for eight diff-in-diffs from the eight distinct "age pools" in my data.[15] For example, the first difference for "age pool" 1, with a treatment cohort born in 1942 and a control cohort born in 1939, is given by the change in LFP from the treatment-before period (2006-2008) to the treatment-after period (2009-2011), when the treatment group is aged 67, 68 and 69 and the policy is in effect. The second difference is given by the change in LFP from the control-before period (2003-2005) to the control-after period (2006-2008), when the control group is aged 67, 68, and 69. The treatment effect associated with DWB eligibility for "age pool" 1 is given by the difference in these differences. [16] For notational ease, I define the 2003-2005 years as period I, years 2006-2008 as period II, and years 2009-2011 as period III.

I estimate the following linear probability diff-in-diff model:

$$Working_{it} = \alpha_0 + X_{it}'\beta + \sum_{k=1939}^{1946} \lambda_k (C^k Y^I) + \sum_{m=1939}^{1949} \pi_m (C^m Y^{II}) + \sum_{n=1942}^{1949} \rho_n (C^n Y^{III}) + \delta A_{it} + \phi Y_t + \xi S_{it} + \epsilon_{it}$$

[15] The treatment cohort for pool 1 is eligible at ages 67, 68 and 69, for pool 2 at ages 66, 67 and 68, for pool 3 at ages 65, 66 and 67, for pool 4 at ages 64, 65 and 66, for pool 5 at ages 63, 64 and 65, for pool 6 at ages 62, 63 and 64. Even though the treated cohort in age pool 7 and 8 were also only eligible from the age of 62, they were aware that they would soon become eligible, therefore I include the entire post-2009 period for these two pools.

[16] For cohorts born between 1942-1946 the 2006-2008 period serves as a control-after period for one "age pool" and as a treatment-before period for another "age-pool".

where $Working_{it}$ is an indicator variable for whether or not person i was working at time t, X_{it} is a vector of controls for marital status, A_{it}, Y_t and S_{it} are full sets of age, year and sector dummy variables.[17] C^kY^I, C^mY^{II} and C^nY^{III} are interactions of cohort dummies and indicators for period I, II and III.[18] The coefficients λ_k, pi_n and ρ_m give the mean LFP for cohort k in period I, cohort m in period II and cohort n in period III respectively.[19]

Continuing with the example for "age pool" 1, the first difference given by $\rho_{1942} - \pi_{1942}$ gives the change in LFP from the before to the after period for the treatment cohort born in 1942, while the second difference given by $\pi_{1939} - \lambda_{1939}$ gives the change in LFP from the before to after period for the matched control cohort born in 1939. The treatment effect for "age pool" 1, the average change in LFP associated with DWB eligibility is given by$\overline{\Delta LPF_{Pool1}} = (\rho_{1942} - \pi_{1942}) - (\pi_{1939} - \lambda_{1939})$.[20] Traditional differences-in-differences models include dummy variables for each treatment group, which control for time-invariant differences between the groups. Here it is not possible to include cohort dummies due to multicollinearity with the age and year dummies. I argue, however, that the key difference between the treatment and the control cohorts is that they reach the specific ages in different years, and that the year dummies control for this difference. This model is estimated using a sample that includes birth cohorts 1939 through 1959, observed from 1999 through 2011.[21] I estimate the model using OLS, with robust standard errors to correct for potential heteroskedasticity in the error terms and cluster the standard errors at the cohort level to correct for serial correlation of the error terms within cohorts.[22]

[17] S_it is the sector person i works in in period t, or the last known sector. I drop the observations after 2008 for the cohorts born in 1939, 1940 and 1941 from the sample I use to estimate the eligibility model, when these cohorts are also eligible for the DWB. Therefore the superscript m on variable C^n only goes from 1942 through 1949. I do not estimate the treatment effects of these older cohorts, since these cohorts hit their 70s after 2009 at ages when LFP rates are very low, and are therefore not likely to be affected by the policy.

[18] Cohort interactions with period I are only included for cohorts 1939 through 1946 and interactions with period III are only included for cohorts born after 1941.

[19] The cohort dummies and the period indicators are not included as main effects.

[20] The treatment effects of the other eight "age pools" are given by $\overline{\Delta LPF_{Pool2}} = (\rho_{1943} - \pi_{1943}) - (\pi_{1940} - \lambda_{1940})$, $\overline{\Delta LPF_{Pool3}} = (\rho_{1944} - \pi_{1944}) - (\pi_{1941} - \lambda_{1941})$, $\overline{\Delta LPF_{Pool4}} = (\rho_{1945} - \pi_{1945}) - (\pi_{1942} - \lambda_{1942})$, $\overline{\Delta LPF_{Pool5}} = (\rho_{1946} - \pi_{1946}) - (\pi_{1943} - \lambda_{1943})$, $\overline{\Delta LPF_{Pool6}} = (\rho_{1947} - \pi_{1947}) - (\pi_{1944} - \lambda_{1944})$, $\overline{\Delta LPF_{Pool7}} = (\rho_{1948} - \pi_{1948}) - (\pi_{1945} - \lambda_{1945})$, $\overline{\Delta LPF_{Pool8}} = (\rho_{1949} - \pi_{1949}) - (\pi_{1946} - \lambda_{1946})$.

[21] I estimate the three-year average effects of the DWB at those older ages, I would need to form control groups from cohorts born before 1939. Since these cohorts reach their 70s after 2009 at ages when LFP rates are very low, they are not likely to be affected much by the DWB.

[22] Due to the large size of my dataset, I choose to estimate linear probability models (OLS) instead of logit models in the interest of reducing estimation run-time. Furthermore, linear probability model coefficients have the advantage of easy interpretation and are the parameters of interest (probability derivatives). My sample has 21 clusters, which is considered a moderate number of clusters according to Bertrand, Duflo, Mullainathan (2004). Their results show that clustering in a finite sample with 20 clusters works quite well in correcting for autocorrelation. They also show that over-rejection due to serial correlation goes down as the number of time periods go down. My sample contains 13 time periods, which would be considered a moderate number of periods according to their results. The combination of my moderate number of

The Effect of the Size of the Bonus on Labor Supply

To estimate the responsiveness of labor supply to the size of the bonus, I estimate the following model.

$$Z_{it} = \alpha_0 + X'_{it}\beta + \gamma DWB_{it} + \delta A_{it} + \phi Y_t + \xi S_{it} + \epsilon_{it}$$

where DWB_{it} is the size of the bonus a person is eligible for, and Z_{it} is a binary variable indicating whether person i worked in year t or a continuous variable of the log average hours worked per week in year t; all other variables as defined for equation (1).[23] The coefficient γ gives the percentage point increase in LFP or the percent increase in hours worked for a 1-percentage point increase in the DWB. I also estimate a model with an additional control for whether a person's potential gross annual labor income, would reach the capped amount over which a bonus is paid out, as well as an interaction of the capped variable with the treatment and control variables of each age pool. Because someone who does not work has no income, I use the last known hourly wage to calculate what potential gross annual income would be, if they were to work the median number of hours worked among those in the labor force, and use this to determine whether their potential gross labor income would reach the cap. The sample that I use to estimate the bonus size models again includes birth cohorts 1939 through 1949.[24] I estimate the participation model, where the dependent variable indicates whether someone worked or not, using OLS and the labor supply model, where the dependent variable is log hours, using OLS with and without individual fixed effects, to control for unobserved time-invariant characteristics. All estimations use robust standard errors to correct for heteroskedasticity in the error terms and I cluster the standard errors at the cohort level to correct for serial correlation of the error terms within cohorts.[25]

4 Results

Eligibility: Summary Statistics

periods and the clustering works well on 20 clusters leads me to believe that I have sufficiently taken care of potential serial correlation in my error terms.

[23] DWB is measured in percentage point units, from 1-100.

[24] For this model all observations after 2008 are kept in the sample for all cohorts.

[25] In this sample I only have 11 clusters. Bertrand et al. (2004) show that clustering standard errors on 10 clusters goes a long way in correcting for serial correlation, but may not do so sufficiently.

Table 3a shows descriptive statistics for the control-before and -after period, 2003-2005 and 2006-2008 respectively, and the treatment-before and -after period, 2006-2008 and 2009-2011 respectively, for the eight “age pools” in my eligibility model. The bottom two rows shows the unadjusted change in the average LFP from the before to the after period, and the unadjusted difference-in-differences for the eight “age pools”. There is an increase in unadjusted LFP at DWB eligible ages for the treatment cohorts relative the matched control cohorts for “age pool” 5, 6, 7 and 8. The older “age pools”, for whom the treated cohorts were DWB eligible at or after NRA, we see that there was a slight decrease in unadjusted LFP.

About 80% of the sample is married among the older cohorts and slightly less for the younger cohorts, about 9% to 13% is divorced, about 2% to 5% is widowed. The table also shows descriptive statistics for binary variables indicating whether they receive pension, welfare, UI, DI or other social benefits. In the younger “age pools”, pools 6, 7 and 8, the proportion receiving a pension is lower in the treatment-after period than in the matched control-after periods. About 4-6% of those in age pools below normal retirement age receive unemployment benefits, and 19-25% receive disability benefits. Note that people are only eligible for UI and DI until age 65, therefore no one in the after-periods in “age pools” 1 and 2 receive these benefits.

Bonus Size Model: Summary Statistics

Table 3b shows the descriptive statistics for the sample used to estimate the effect of the bonus size, by DWB percentage eligibility category. As expected, LFP and hours worked are decreasing with age, while widowhood increases with age, starting with the 5% bonus recipients (62 year olds), followed by the 7% recipients (63 year olds), 10% bonus recipients (64 year olds), 2% bonus recipients (65 and 66 year olds) and finally the 1% bonus recipients (67 year olds). The 0% category includes men of all ages in the period before 2009 as well as at the younger ages that were not eligible after 2009.

The percentages married and divorced are similar across all groups, about 80% and 8-10 percent, respectively.

The proportion receiving a pension rises with age. People are eligible for UI and DI until age 65; therefore, no one in the 1% bonus group (age 67 and older) receives these benefits.

Eligibility: Regression results

Table 4 summarizes results from the eligibility model (full model results are shown in

Appendix Table 1). Row 1 of Table 4 shows the average change in LFP, the average treatment effect associated with DWB eligibility, for each age pool, from the base specification that only controls for marital status, and includes full sets of dummies for age, year and sector. First focusing on the younger cohorts, pools 5 through 8, who have not reached NRA at the time of the introduction of the DWB, the results suggest that DWB eligibility was associated with an average three-year increase in LFP of 0.3 percentage points for age pool 5, which was eligible at ages 63 through 65, although not statistically significant. For those in age pool 6, who were eligible at ages 62 through 64, LFP increased by an average of 4.8 percentage points over the three years following the introduction of the policy. For age pool 7, exposed to the bonus at ages 61, 62 through 63, LFP increased by 7.4 percentage points; and for age pool 8, exposed at ages 60, 61 and 62, by 6.3 percentage points. The cohorts in age pools 1 through 4 were aged 64 through 69 at the introduction of the DWB, when almost everyone receives public and private pensions and when LFP is lower than 30%. The results suggest that there was a reduction in average LFP of 1.6 to 2.9 percentage points for age pools 1 through 4. I discuss potential explanations in the limitations section. The estimates for all pools are statistically significant, except for pool 5.

I run the model with additional controls for whether an individual receives a pension, welfare, UI, DI or other social benefits. Even though these covariates might be endogenous, I am interested in how their inclusion affects the estimates of my treatment effect.[26] Row 2 in table 4 shows the treatment effects for each age pool. Including these additional controls reduces the negative treatment effect for the oldest age pools 1 through 4 by about half (full results are shown in column 2 of Appendix Table 1). The results for the younger age pools 6 through 8 become slightly smaller, but seem fairly robust to the inclusion of these additional controls. The estimates for all pools are statistically significant, except for pool 5.

The treatment effects are not directly comparable across age pools, because they represent average effects at different ages. Therefore, I decompose the results to make them comparable. Specifically, I decompose the average treatment effect $\overline{\Delta LPF_p}$ for age pool p into ΔLPF_{pa}, the treatment effect at each age a in each pool p.[27] Figure 4 shows the decomposition results for the model that controls for pension receipt and social benefits (the full results are shown in Appendix Table 2).[28] Figure 3 shows that generally, when

[26] I also estimated models that additionally included gross total personal income at time t and head of household status, but these did not affect the estimates by much. Results are available upon request.

[27] $\Delta LPF_{pa} = DWB_{pa}\frac{\overline{\Delta LPF_p}}{\overline{DWB_p}}$, where DWB_{pa} is the DWB percentage that people are eligible for at age a in pool p, and $\overline{DWB_p}$ is the (arithmetic) mean of the DWB percentages that people are eligible for in age pool p.

[28] Decomposition results for the base model are available upon request.

comparing pool 1 through 8, each younger cohort showed a greater increase in LFP at each age, suggesting that the policy had a greater impact on people who had more time to take the DWB into account when planning their retirement. The men in age pool 8, born in 1949, who were only exposed at age 62 (in 2011), increased LFP by 4.2 percentage points, however, which is a similar increase and slightly less than those exposed at age 62 in 2009.[29] I discuss a possible explanation for this result in the limitations section.

I also ran a falsification test, where I assign DWB eligibility to younger cohorts born between 1950 and 1960, which, in reality, were not eligible, and create eight parallel treatment and control groups. Table 2b shows the treatment and control groups for the falsification test for the eligibility model. I should find no effect of the policy on these age pools. Table 5 summarizes the treatment effects. (The full results are shown in Appendix Table 3.) The results from the base model that only controls for marital status, and includes full sets of age, year and sector dummies, suggest that there was little effect for age pools 4 through 8. The results suggest that there was a small increase in LFP for the oldest age groups, who were nearing their 60s, of 1 to 1.9 percentage points over the 3 years after the introduction of the policy. This might be explained by the anticipation of soon becoming eligible for the DWB. After controlling for receiving a pension, UI, DI or other social benefits, the effects reduce to practically zero for most age pools but the eldest age pool, which shows an effect of 1.4 percentage points. All the estimated effects from my falsification test are smaller than those found in my main results.

Bonus Size: Regression Results

Table 6a shows the results from the model that estimates the effect of the size of the DWB (that a person is eligible for) on LFP. The coefficient of interest is the coefficient on DWB percentage, where the unit of measurement is in percentage points. Column 1 shows the results from the base model that controls for marital status and includes full sets of age, year and sector dummies. The results suggest that a 1-percentage point increase in the bonus increased male LFP by 0.4 percentage points, although not statistically significant.

Adding controls for pension receipt and social benefits does not change the size of the coefficient of interest, but it is now significant at the 5% level. Additionally including an indicator for whether potential annual gross labor income would reach the cap and an interaction of the DWB percentage and the cap indicator in column 3 suggests that a 1-ppt

[29] The decomposition results for pool 7 and 8 treats the treatment effect as two and one year averages. This gives more conservative decomposition results than treating it as a 3 year average where the DWB percentage was 0% age the ages before 62.

increase in the bonus increased male LFP by 0.2 percentage points. The results in column 3 suggest that men whose bonus is capped are more likely to work and are more responsive to the DWB. This may sound counterintuitive, but reflects an expected substitution effect of earning a higher wage, and could additionally reflect that higher educated people have more job satisfaction and therefore a stronger labor force attachment, since I am not able to control for education.

Table 6b shows the results from the bonus size model that estimates the effect of the size of the bonus at the intensive margin, where the outcome is the log of hours worked. The coefficient of interest is again the coefficient on the DWB percentage, measured in percentage points. The OLS results in column 1 suggest that a 1- ppt. increase in the bonus increased hours worked by 1.1 percent, although not statistically significant. After controlling for individual fixed effects, an increase in the size of the bonus by 1-percentage points is associated with an increase in hours worked of 0.6 percent. Including additional controls for pension receipt and social benefits does not affect the size of the point estimates much, but the fixed effect results are now statistically significant. After controlling for whether an individual's potential annual gross labor income would reach the cap and after including an interaction of the capped indicator with the DWB percentage, the results from my fixed effects model suggest that a 1 percentage point increase in the size of the bonus increases labor supply by .3 percent. The coefficient on the capped variable in the OLS model suggests that men with potential gross income above the cap are more likely to work relative to men with income below the cap, reflecting a substitution effect and potentially greater job market attachment of the higher educated, although not statistically significant. The negative sign on the capped variable in the FE model, suggests that when a person's potential gross income hits the cap they are likely to reduce hours.

My results are slightly higher than wage elasticities of labor supply for prime-age men in the Netherlands, which is 0.1 based on a meta-analysis of empirical estimates in the literature (Evers, De Mooij & Van Vuuren, 2008), but are in line with Mastrogiacomo, Bosch, Gielen & Jongen's (2010) findings that labor supply elasticities are higher for the elder Dutch in their sample, although the oldest in their sample are aged 58. The literature for the United States, (Wise and Gruber 1999, Laitner and Silverman, 2012) and for France and the UK, (Blundell, Bozio and Laroque 2011) has also found that labor supply elasticities tend to be more responsive closer to retirement, as those people are more likely than the overall population to adjust their labor force status. Even though, the size of my results from my preferred estimates are in the range found in the literature, my results suggest a similar response at both the intensive and the extensive margin, even though the general consensus in the literature is that elasticities at the extensive margin are higher (e.g.

Heckman, 1993). However, my results cannot directly be compared to typical labor supply estimates, because the independent variable in my specifications is the bonus percentage people are eligible for instead of log wages. Moreover, these are not results from structural models. My results are an estimate of the average effect of the size of the bonus on labor supply.

Limitations

I have argued that the "Great Recession" did not affect labor supply behavior in the Netherlands for the years I study, because Dutch unemployment only started rising after 2011. I include year fixed effects in my models to control for business cycle effects, but it is possible that different cohorts were affected differentially. Even though the average unemployment rate is the same in the period in which the control group is observed (2003 - 2008) as in the period the treatment group is observed (2006 - 2011), figure 2 shows that unemployment fell in the control-after period relative to the control-before period, while it rose slightly in the treatment-after period relative to the treatment-before period. This means that labor market conditions likely were slightly more favorable for the control group, than the treatment group, which could explain the unexpected sign on treatment effects for the oldest age pools in my eligibility model. Moreover, worldwide implications of the recession were apparent before Dutch unemployment rose in 2012. This could also explain why the decomposition results suggest that the youngest cohort, only eligible for the DWB at age 62 (in 2011), increased LFP by less than earlier cohorts, as changing conditions could have made it less attractive for this youngest group to delay retirement.[30] Both these phenomena could have biased my estimated effects of the DWB downwards.

The final implementation of policies aimed to reduce DI use in the Netherlands (Burkhauser & Daly, 2001; De Jong, 2008; Van Sonsbeek, 2010) might also affect my identification strategies. However, DI entry was already drastically reduced in 2002, and a two-year waiting period for entry was introduced in January 2004, more than five years prior to implementation of the DWB. Therefore, both the control and treatment group faced similar challenges to exiting the labor force through DI.

The law change in 2006, aimed at reducing the generosity of early pension plans for cohorts born after 1950, should theoretically not affect my results. However, some of the

[30] Dutch GDP growth fell over 2008 and 2009, and was slow in 2010, while debt-to-GDP ratios have been rising since 2009.
Source: http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/countries/NL?display=graph and OECD (2010), "OECD Economic Outlook No.88", OECD Economic Outlook: Statistics and Projections (database), doi: 10.1787/data-00533-en. (Last accessed on April 20th, 2015)

smaller pension funds took the law change as an opportunity to reduce generosity of benefits for older cohorts. In the eligibility models, it was not possible to control for cohort effects or individual fixed effects, due to multicollinearity with the treatment and control indicators. I include a full set of sector dummies to control for changes in pension funds as well as a full set of year dummies in the model to control for sector effects, like the early pension reforms. But because I can not observe whether someone participated in one of these smaller pension plans that made changes, there could still be uncontrolled differences between the cohorts in this setup, and this should be taken into consideration when interpreting the results.

Furthermore, the results from my falsification analyses in table 5 suggests that my results were not driven by the periods selected for my difference-in-differences model, because parallel diff-in-diffs for younger cohorts who were not eligible, show very little effects. I argue that the larger effects found for the older cohorts in the falsification set up, can be attributed to anticipation for DWB eligibility, as they were approaching their 60s. For a more conservative interpretation, I would argue that that my estimates may overstate the true effect of the DWB by about 1-1.5 percentage points, but that they are not fully driven by period effects that affected older and younger cohorts differentially.

In my bonus size models I am able to control for possible cohort differences by including individual fixed effects, which control for unobserved time-invariant cohort characteristics as well as well as unobserved time-invariant individual characteristics. I have addressed serial correlation of the error terms by clustering the standard errors at the cohort level. However, results from Bertrand et al. (2004) suggest that the 11 clusters in the bonus size model may not sufficiently correct this issue, and that care should be taken when making inferences.[31]

Figure 1c shows that LFP at 62 increased by 18 percentage points between the 1949 cohort and the 1944 cohort (and before). My current best estimate is that about 1/4 of that increase is due to the introduction of the DWB and the rest is due to other changes.

5 Conclusion

This paper studies two aspects of the Dutch “Doorwerkbonus” (DWB). First, it examines the effect of DWB eligibility on male labor force participation. Second, it explores the responsiveness of labor supply to the size of the DWB. To my knowledge this paper is the first paper to assess the effect of the reform on labor supply of older Dutch men using ad-

[31] I intend to explore the wild cluster bootstrap t procedure suggested by Cameron, Gelbach and Miller (2008).

ministrative data.

In my eligibility model, I compare cohorts and look at the effect in the three-year period after introduction. The results from my preferred estimation suggest that the three cohorts that had the opportunity to take up the benefit at the youngest eligibility age, 62, saw the greatest increase in LFP. As a result of the policy, participation for these cohorts increased by 3.8 to 5.5 percentage points in the three years following the introduction of the policy. The next oldest age pool, which still became eligible for the DWB before reaching NRA, showed an increase in LFP of 0.7 percentage points. As expected the DWB did not induce the oldest four age pools that were already at or above NRA to increase LFP. Decomposing the results by age shows that, with each successive cohort, the take up of the bonus tends to increase at each age, suggesting that the DWB had a greater effect on those who had more time to take it into account when planning their retirement.

The results from the bonus size model suggest that after controlling for pension and social benefits receipt, a 1-percentage point increase in the size of the DWB increased participation by 0.4 percentage points (the extensive margin). Results from a model that also controls for individual fixed effects suggests that a 1-percentage point increase in the size of the bonus increased the hours worked by 0.6 percent (intensive margin). My estimates are not directly comparable to estimates of labor supply elasticities, because they do not represent responses to increases in wages, but increases in the DWB bonus that a person is eligible for. My results are an estimate of the average effect of the size of the bonus on labor supply.

This paper extends earlier work (e.g., Da Silva Soca, 2013), by estimating the effects of the DWB on LFP, by providing more precise estimates using administrative data for the entire population, and by comparing people of the same ages. In future work, I intend to study how the DWB affects spousal retirement behavior as well as female LFP.

Since the debate about increasing labor supply among older workers continues, an understanding of the effects of the DWB on labor supply is relevant to policy makers in the Netherlands and to those in other countries that are actively seeking ways to achieve this goal.

References

Benitez-Silva, H. & Heiland (2008), F. 'Early Retirement, Labor Supply, and Benefit Withholding: The Role of the Social Security Earnings Test', Michigan Retirement Research Center, Working Paper 2008-183.

Bertrand, M., Duflo, E. & Mullainathan, S. (2004), 'How Much Should We Trust Differences-in-Differences Estimates?'. The Quarterly Journal of Economics, Vol. 119, No. 1 (Feb., 2004), pp. 249-275

Bovenberg, A. and A. Meijdam (2001), 'The Dutch Pension System'. in: A.H. Borsch-Supan and M. Miegel (eds.), Pension Reform in Six Countries: What Can We Learn from Each Other?' Berlin, Springer.

Bosch, N., Deelen, A. & Euwals, R. (2008), 'Is part-time employment here to stay? Evidence from the Dutch Labour Force Survey 1992-2005'. IZA discussion paper 3367

Burkhauser, R. V., & Daly, M. (2011). 'The declining work and welfare of people with disabilities: What went wrong and a strategy for change', Washington, DC: AEI Press.

Cameron, A. C., Gelbach, J.B. & Miller, D.L. (2008), 'Bootstrap-Based Improvements for Inference with Clustered Errors', The Review of Economics and Statistics, Vol. 90, No. 3 (Aug., 2008), pp. 414-427.

Chai, J., Maurer, R., Mitchel, O.S., Rogalla, R. (2013), 'Exchanging Delayed Social Security Benefits for Lump Sums: Could This incentivize longer Work Careers?' NBER Working Paper Series, Working Paper No. 19032.

Da Silva Soca, M.L (2013), 'Tax Incentives to Promote Active Aging- The Introduction of the Doorwerkbonus', Netspar-Masters Thesis-Tilburg University.

De Vos, K., & Kapteyn, A. (2004). Incentives and exit routes to retirement in the Netherlands. In J. Gruber & D. Wise (Eds.), Social security programs and retirement around the world - micro estimation (pp.461 - 498). Chicago: National Bureau of Economic Research.

De Jong, P. (2008). 'Recent changes in Dutch disability policy' Working paper, Amsterdam: University of Amsterdam.

Diamond, P., & Gruber, J. (1999). 'Social Security and retirement in the United States.' In 'Social Security and retirement around the world', ed. Jonathan Gruber and David A. Wise, 437 - 73. Chicago: University of Chicago Press.

Dutch Association of Industry-wide Pension Funds (VB) (2010), Dutch Association of Company Pension Funds: 'The Dutch Pension System an overview of the key aspects.'

Evers, M., R. de Mooij and D. van Vuuren (2008), 'The Wage Elasticity Of Labour Supply: A Synthesis Of Empirical Estimates', De Economist 156, No 1, 2008.

Euwals, R., D. van Vuuren, and R. Wolthoff (2010), 'Early retirement behaviour in the Netherlands; Evidence from a policy reform', De Economist 158, No 3, 2010.

Feldstein, M and J. Liebman (2002). Social Security. In: Auerback, A.J., Feldstein, M (Eds.), The Handbook of Public Economics, vol. 4. Chapter 32. Elsevier.

Fernandes, M.,E. Meijer and Zamarro, G. (2008), 'Labor Force Participation and Retirement' in: Brsch-Supan et al., eds., First Results from the Survey of Health, Ageing and Retirement in Europe (2004 - 2007): Starting the Longitudinal Dimension, Mannheim, Germany: Mannheim Research Institute for the Economics of Aging (MEA) pp. 48 - 55.

Friedberg, L. (2000), 'The Labor Supply Effects of the Social Security Earnings Test', Review of Economics and Statistics, Vol. 82, no. 1 (February 2000): 48 - 63.

Gruber J. & Orszag P. (2000), 'Does the Social Security Earnings Test affect labor supply and benefits receipt?', National Bureau of Economic Research, Working Paper 7923.

Gruber, J., & Poterba. J. (1994), 'Tax Incentives and the Decision to Purchase Health Insurance: Evidence from the Self-Employed', Quarterly Journal of Economics, CIX (August 1994), 701 - 33.

Gruber, J. & Wise, D.A. 'Social Security and Retirement around the World' Published in January 1999 by University of Chicago Press ©1999 by the National Bureau of Economic Research

Gruber, J & Milligan, K. & Wise, D.A. (2009). 'Social Security Programs and Retirement Around the World: The Relationship to Youth Employment, Introduction and Summary', NBER Working Papers 14647, National Bureau of Economic Research, Inc.

Gruber, J. & Wise, D.A. (2005). 'Social Security Programs and Retirement around the World: Fiscal Implications, Introduction and Summary', NBER Working Papers 11290, National Bureau of Economic Research, Inc.

Gruber, J. & Wise, D.A. (2004). 'Social Security Programs and Retirement around the World: Micro-Estimation,' NBER Books, National Bureau of Economic Research, Inc, number grub04-1.

Gruber, J. & Wise, D.A.(1997). 'Social Security Programs and Retirement Around the World: Introduction and Summary of Papers by..,' NBER Working Papers 6134, National Bureau of Economic Research, Inc.

Gustman, A.L. and Steinmeier, T.L. (1985), 'The 1983 Social Security Reforms and Labor Supply Adjustments of Older Individuals in the Long Run', Journal of Labor Economics, Vol. 3, No. 2 (Apr., 1985), pp. 237-253

Haider S. J. and Loughran, D.S. (2008), 'The effect of the Social Security Earnings Test on male labor supply: New evidence from survey and administrative data', The Journal of Human Resources, 43(1):57-87.

Heckman, J.J (1993), 'What Has Been Learned About Labor Supply In The Past Twenty Years', Papers and Proceedings of the Hundred and Fifth Annual Meeting of the American Economic Association, The American Economic Review, 83(2):116-121.

Hurd, M.D. & M. Boskin. (1984). 'The effect of social security on retirement in the early 1970s', Quarterly Journal of Economics, 99(4): 767-790.

Imbens G.W. & Wooldridge J. M. (2009), 'Econometrics of Program Evaluation, Journal of Economic Literature', Vol. XLVII.

Song J. and Manchester, J. (2007), 'Have people delayed claiming retirement benefits? Responses to changes in social security rules', Social Security Bulletin, Vol. 67, n2.

Kapteyn, A. and K. de Vos (1999), 'Social Security and Retirement in the Netherlands'. in: J. Gruber and D. Wise (eds.), Social Security Programs and Retirement Around the World, Chicago, University of Chicago Press, pp. 269?303.

Kerkhofs, M., M. Lindeboom and J. Theeuwes (1999), 'Retirement, Financial Incentives and Health'. Labour Economics, 6, pp. 203?227

Krueger, A. and J. Pischke (1992), 'The Effect of Social Security on Labor Supply: A Cohort Analysis of the Notch Generation'. Journal of Labor Economics, 10, pp. 412?437.

Laitner, J. and Dan Silverman (2013), 'Consumption, retirement and social security: Evaluating the efficiency of reform that encourages longer careers', Journal of Public Economics, 96 (78):615 ? 634, 2012.

Lindeboom, M. (1998), Microeconometric analysis of the retirement decision: The Netherlands, OECD Economics Department Working Paper 107, Paris, OECD.

Mastrogiacomo, M., Bosch, N., Gielen, M. & Jongen, E.L.W. (2011). Estimating labour supply responses in the Netherlands using structural models. (Working Paper). The Hague: CPB.

Myers, R.J & Schobel (1990), B.D. ‘Early-Retirement Reduction and delayed-Retirement Increase Factors under U.S. Social Security Law’ Transactions, Society of Actuaries 42:295-320

Mitchell, O. (1987), Social Security Reforms And Poverty Among Older Dual-Earner Couples. NBER Working Paper Series, Working Paper No. 2382

Novella, M.L. (2012), ‘Analysing the impact of eligibility and financial measures aiming at delaying early retirement in Belgium: a ?difference-in-differences? approach using panel data’, Federal Planning Bureau, Working Paper 14-12, November 2012

OECD (2015), OECD Stat. LFS by sex and age ? indicators Retrieved April 10, 2015 from https://stats.oecd.org/Index.aspx?DataSetCode=LFS_SEXAGE_I_R#

Orszag, P.R. (2001). Should a Lump-Sum Payment Replace Social Security Delayed Retirement Credit? Issue Brief No. 6 Apri 2001, Center for Retirement Research at Boston College.

Pingle, J.F. (2006), ’Social Security’s Delayed Retirement Credit and the Labor Supply of Older Men’, Finance and Economics Discussion Series, Divisions of Research & Statistics and Monetary Affairs Federal Reserve Board, Washington, D.C.

Van Sonsbeek, J.M. (2010, August). ‘Estimating the effect of recent disability reforms in the Netherlands’. Working paper Amsterdam: University of Amsterdam.

World Bank (2015), World Development Indicators. Age dependency ratio, old (% of working-age population). Retrieved April 10, 2015 from http://data.worldbank.org/indicator/SP.POP.DPND.OL

United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2012 Revision, New York, 2013. Retrieved April 10, 2015, from http://data.un.org/Data.aspx?d=PopDiv&f=variableID%3A44

Figure 1a. Unconditional Male LFP by Year and Age

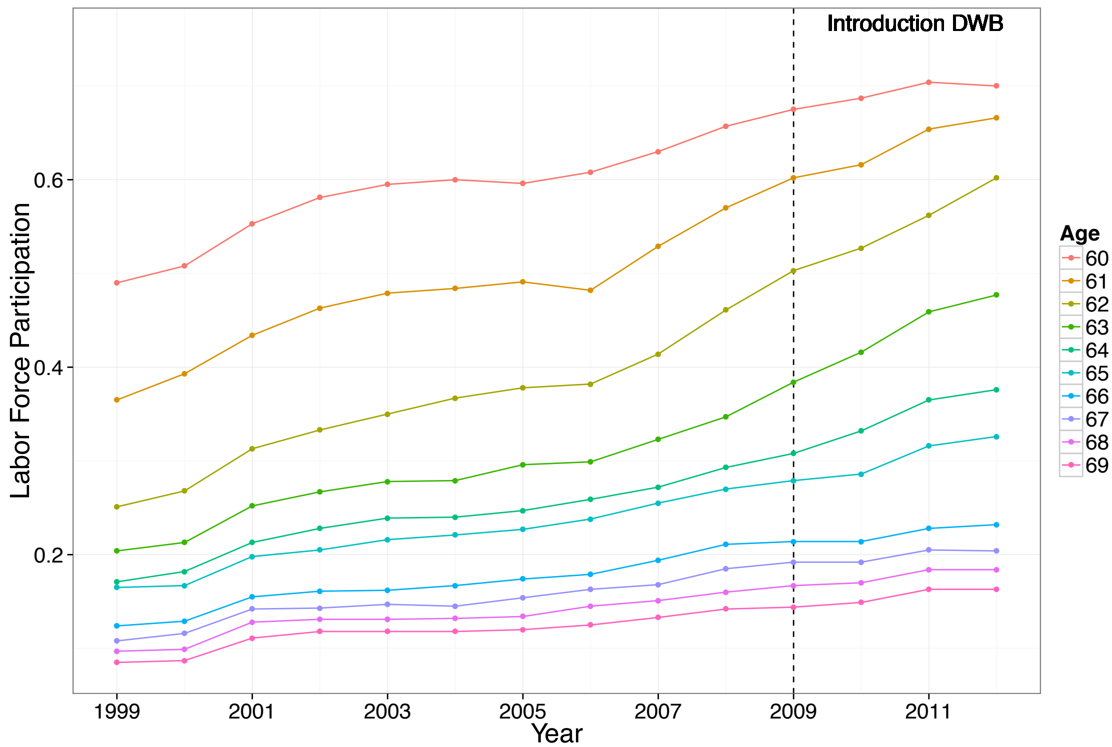


Figure 1b. Unconditional Male LFP by Year and Cohort

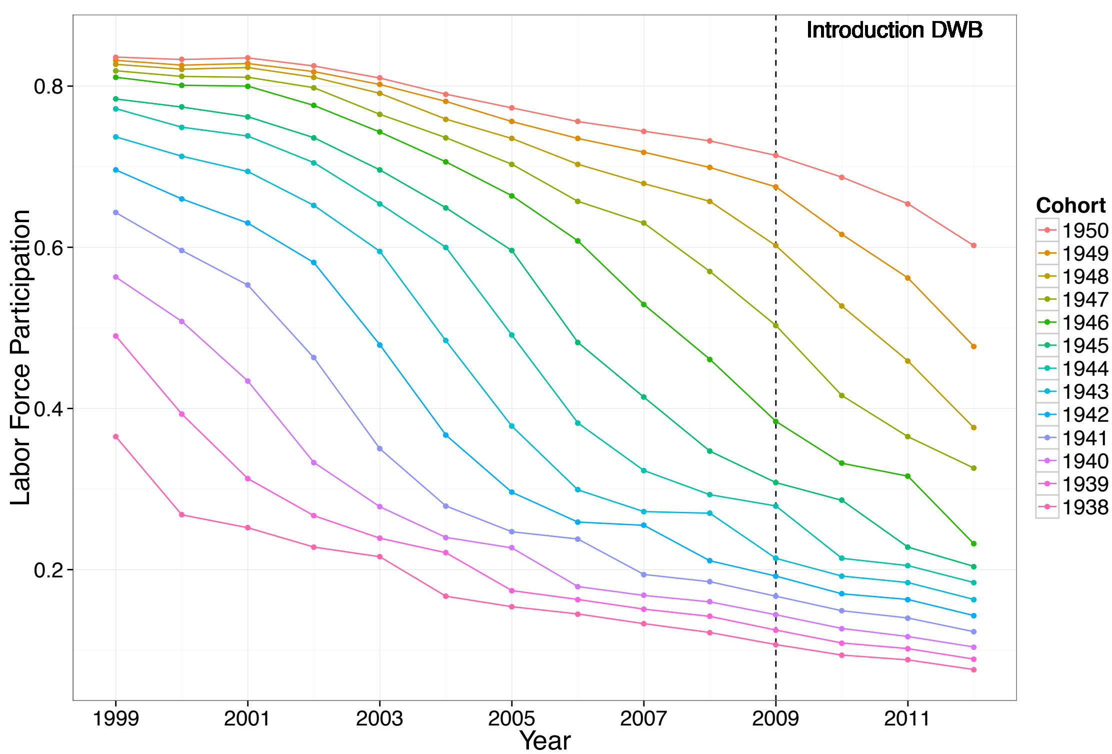


Figure 1c. Unconditional Male LFP by Age and Cohort

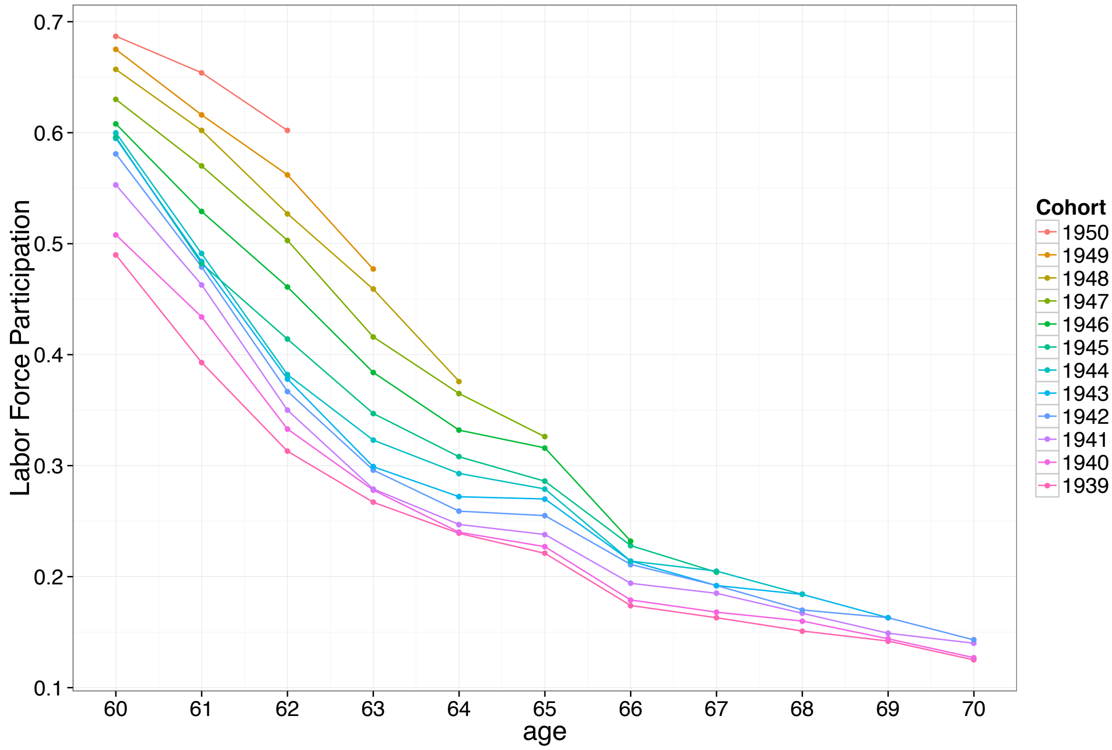


Figure 2. Dutch Male Unemployment Rates (Age 55-65)

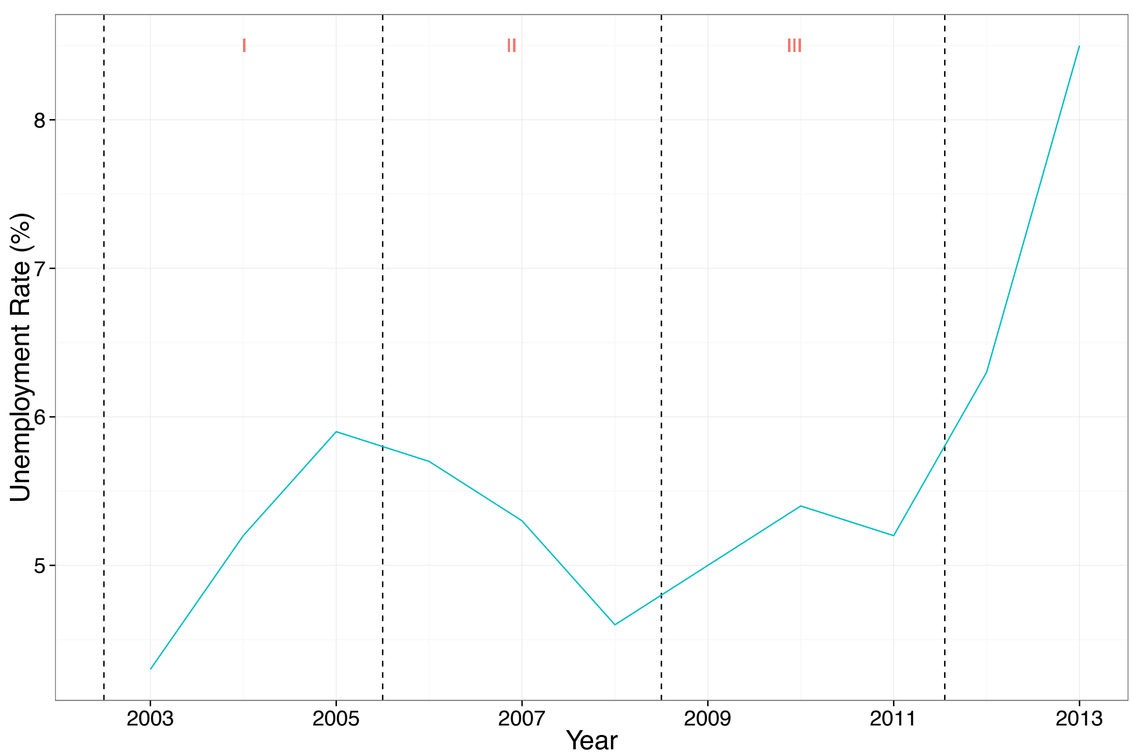
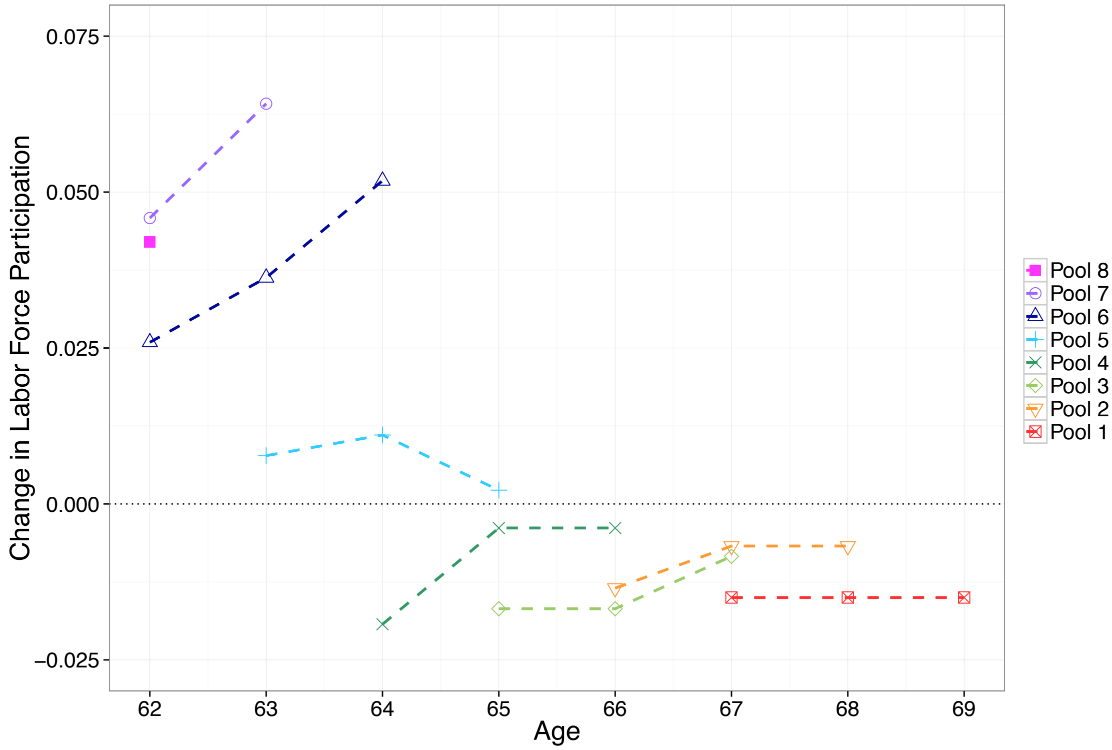


Figure 3 Decomposing the Treatment Effect by Age



Note: This figure shows results from a decomposition of the treatment effects from the eligibility model that includes controls for pension receipt and social benefits (Appendix table 2).

Table 1. The "Doorwerkbonus" (DWB): age (bonus %) maximum bonus

	2009			2010			2011		
Birth Cohort	**Age**	**Bonus**	**Maximum**	**Age**	**Bonus**	**Maximum**	**Age**	**Bonus**	**Maximum**
1939	70	1%	€459	71	1%	€468	72	1%	€471
1939	70	1%	€459	71	1%	€468	72	1%	€471
1940	69	1%	€459	70	1%	€468	71	1%	€471
1941	68	1%	€459	69	1%	€468	70	1%	€471
1942	67	1%	€459	68	1%	€468	69	1%	€471
1943	66	1%	€918	67	1%	€468	68	1%	€471
1944	65	2%	€918	66	1%	€936	67	1%	€471
1945	64	10%	€4,592	65	2%	€936	66	1%	€942
1946	63	7%	€3,214	64	10%	€4,679	65	2%	€942
1947	62	5%	€2,296	63	7%	€3,276	64	10%	€4,708
1948	-	-	-	62	5%	€2,340	63	7%	€3,295
1949	-	-	-	-	-	-	62	5%	€2,354
Income Cap	**€54,776**			**€55,831**			**€56,280**		
Income Floor	**€8,860**			**€9,041**			**€9,209**		

Table 2a. Treatment and Control Groups for Eligibility Model

					I			II			DWB Policy in Effect III		
					Control								
					Before			After					
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1939	60	61	62	63	64	65	66	67	68	69			
1940	59	60	61	62	63	64	65	66	67	68			
1941	58	59	60	61	62	63	64	65	66	67			
1942	57	58	59	60	61	62	63	64	65	66	67	68	69
1943	56	57	58	59	60	61	62	63	64	65	66	67	68
1944	55	56	57	58	59	60	61	62	63	64	65	66	67
1945	54	55	56	57	58	59	60	61	62	63	64	65	66
1946	53	54	55	56	57	58	59	60	61	62	63	64	65
1947	52	53	54	55	56	57	58	59	60	61	62	63	64
1948	51	52	53	54	55	56	57	58	59	60	61	62	63
1949	50	51	52	53	54	55	56	57	58	59	60	61	62
1950	49	50	51	52	53	54	55	56	57	58	59	60	61
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1959	40	41	42	43	44	45	46	47	48	49	51	52	53
								Treatment					
								Before			After		

Pool	Group	Cohort
Pool 1	Treatment	1942
	Control	1939
Pool 2	Treatment	1943
	Control	1940
Pool 3	Treatment	1944
	Control	1941
Pool 4	Treatment	1945
	Control	1942
Pool 5	Treatment	1946
	Control	1943
Pool 6	Treatment	1947
	Control	1944
Pool 7	Treatment	1948
	Control	1945
Pool 8	Treatment	1949
	Control	1946

Table 2b. Treatment and Control Groups for Eligibility Model: Falsification Test

											PLACEBO POLICY		
					I			II			III		
					Control								
					Before			After					
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1950	49	50	51	52	53	54	55	56	57	58			
1951	48	49	50	51	52	53	54	55	56	57			
1952	47	48	49	50	51	52	53	54	55	56			
1953	46	47	48	49	50	51	52	53	54	55	56	57	58
1954	45	46	47	48	49	50	51	52	53	54	55	56	57
1955	44	45	46	47	48	49	50	51	52	53	54	55	56
1956	43	44	45	46	47	48	49	50	51	52	53	54	55
1957	42	43	44	45	46	47	48	49	50	51	52	53	54
1958	41	42	43	44	45	46	47	48	49	50	51	52	53
1959	40	41	42	43	44	45	46	47	48	49	50	51	52
1960	39	40	41	42	43	44	45	46	47	48	49	50	51
1961	38	39	40	41	42	43	44	45	46	47	48	49	50
	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1969	31	32	33	34	35	36	37	38	39	40	41	42	43
								Treatment					
								Before			After		

Pool 1	Treatment	1953	Pool 3	Treatment	1955	Pool 5	Treatment	1957	Pool 7	Treatment	1959
	Control	1950		Control	1952		Control	1954		Control	1956
Pool 2	Treatment	1954	Pool 4	Treatment	1956	Pool 6	Treatment	1958	Pool 8	Treatment	1960
	Control	1951		Control	1953		Control	1955		Control	1957

Table 3a. Eligibility Model: Descriptive Statistics
Sample means (SD) and Proportions

	Pool 1				Pool 2				Pool 3				Pool 4			
Ages	64, 65, 66	67, 68, 69	64, 65, 66	67, 68, 69	63, 64, 65	66, 67, 68	63, 64, 65	66, 67, 68	62, 63, 64	65, 66, 67	62, 63, 64	65, 66, 67	61, 62, 63	64, 65, 66	61, 62, 63	64, 65, 66
Period	Control		Treatment		Control		Treatment		Control		Treatment		Control		Treatment	
Birth Year	1939		1942		1940		1943		1941		1944		1942		1945	
Period	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Working	0.211	0.152	0.242	0.175	0.249	0.169	0.290	0.197	0.292	0.206	0.333	0.233	0.381	0.242	0.414	0.274
Hours Worked	4.52	2.53	4.75	2.77	5.71	2.82	6.20	3.10	7.22	3.66	8.24	4.13	10.75	4.75	11.56	5.56
	(10.11)	(6.18)	(10.14)	(6.6)	(11.62)	(6.75)	(11.98)	(7.18)	(13.23)	(8.36)	(13.91)	(9.02)	(15.86)	(10.14)	(16.05)	(11.03)
DWB [%]	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.33	0.00	0.00	0.00	1.67	0.00	0.00	0.00	4.67
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0.47)	(0)	(0)	(0)	(0.47)	(0)	(0)	(0)	(3.77)
Age	65.00	68.00	65.00	68.00	64.00	67.00	64.00	67.00	63.00	66.00	63.00	66.00	62.00	65.00	62.00	65.00
	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)
Married	0.80	0.79	0.80	0.79	0.80	0.79	0.80	0.79	0.80	0.80	0.79	0.79	0.80	0.80	0.79	0.78
Divorced	0.09	0.09	0.10	0.10	0.10	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11
Widowed	0.04	0.05	0.04	0.05	0.04	0.05	0.04	0.05	0.04	0.05	0.04	0.04	0.03	0.04	0.03	0.04
Receiving Pension	0.73	1.00	0.77	1.00	0.59	1.00	0.65	1.00	0.57	0.88	0.61	0.90	0.50	0.77	0.51	0.78
Receiving UI Benefits	0.04	0.00	0.04	0.00	0.06	0.00	0.06	0.00	0.06	0.02	0.06	0.02	0.06	0.04	0.06	0.03
Receiving DI Benefits	0.19	0.00	0.19	0.00	0.29	0.00	0.26	0.00	0.28	0.09	0.24	0.08	0.27	0.19	0.24	0.16
Receiving Welfare	0.03	0.02	0.03	0.02	0.04	0.02	0.03	0.02	0.04	0.02	0.03	0.02	0.03	0.03	0.03	0.02
Receiving Other Social Benefits	0.09	0.02	0.05	0.01	0.10	0.02	0.06	0.01	0.09	0.04	0.05	0.02	0.07	0.05	0.05	0.04
Person Years	248,886	248,886	269,799	269,799	260,394	260,394	292,674	292,674	255,765	255,765	307,560	307,560	269,799	269,799	294,792	294,792
Unadj. Δ working (After-Before)	*-0.059*		*-0.067*		*-0.080*		*-0.093*		*-0.086*		*-0.100*		*-0.139*		*-0.140*	
Unadjusted DD	*-0.008*				*-0.013*				*-0.014*				*-0.001*			

Note: This table shows the means of each variable by before and after period for the treatment and control groups for each age pool. Means are three year averages. Age, hours worked and are continues variables, all other variables are binary variables. The sample includes men born between 1939 and 1959 the period from 1999 through 2011. For the cohorts that only serve as controls (cohorts 1939, 1940, 1941) the observations after 2008 are not included in the sample. The means for cohorts 1950 through 1959, that are neither in the control nor the treatment groups are not shown here, but are available upon request.

Table 3a (Continued). Eligibility Model: Descriptive Statistics

Sample means (SD) and Proportions

	Pool 5				Pool 6				Pool 7				Pool 8			
Ages	60, 61,62	63, 64, 65	60, 61,62	63, 64, 65	59. 60, 61	62, 63, 64	59. 60, 61	62, 63, 64	58, 59, 60	61, 62, 63	58, 59, 60	61, 62, 63	57, 58, 59	60, 61, 62	57, 58, 59	60, 61, 62
Period	Control		Treatment		Control		Treatment		Control		Treatment		Control		Treatment	
Birth Year	1943		1946		1944		1947		1945		1948		1946		1949	
Period	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Working	0.485	0.290	0.533	0.344	0.582	0.333	0.619	0.428	0.647	0.414	0.680	0.530	0.704	0.533	0.717	0.618
Hours Worked	15.30	6.20	16.85	8.30	19.58	8.24	20.77	11.78	22.59	11.56	23.76	16.38	25.24	16.85	25.53	20.62
	(17.8)	(11.98)	(17.91)	(13.82)	(18.5)	(13.91)	(18.25)	(16.06)	(18.44)	(16.05)	(18.05)	(17.7)	(18)	(17.91)	(17.65)	(18.21)
DWB [%]	0.00	0.00	0.00	6.33	0.00	0.00	0.00	7.33	0.00	0.00	0.00	4.00	0.00	0.00	0.00	1.67
	(0)	(0)	(0)	(3.3)	(0)	(0)	(0)	(2.06)	(0)	(0)	(0)	(2.94)	(0)	(0)	(0)	(2.36)
Age	61.00	64.00	61.00	64.00	60.00	63.00	60.00	63.00	59.00	62.00	59.00	62.00	58.00	61.00	58.00	61.00
	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)	(0.82)
Married	0.80	0.80	0.78	0.78	0.80	0.79	0.77	0.77	0.79	0.79	0.76	0.76	0.78	0.78	0.75	0.75
Divorced	0.10	0.10	0.11	0.11	0.10	0.10	0.12	0.12	0.11	0.11	0.12	0.12	0.11	0.11	0.13	0.13
Widowed	0.03	0.04	0.03	0.04	0.03	0.04	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.03	0.02	0.03
Receiving Pension	0.39	0.65	0.38	0.65	0.29	0.61	0.26	0.55	0.19	0.51	0.18	0.42	0.15	0.38	0.14	0.29
Receiving UI Benefits	0.07	0.06	0.06	0.04	0.07	0.06	0.06	0.04	0.06	0.06	0.06	0.04	0.05	0.06	0.05	0.05
Receiving DI Benefits	0.26	0.26	0.21	0.21	0.24	0.24	0.21	0.21	0.24	0.24	0.19	0.20	0.21	0.21	0.18	0.19
Receiving Welfare	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Receiving Other Social Benefits	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.05	0.03	0.04
Person Years	292,674	292,674	408,612	408,612	307,560	307,560	394,893	394,893	294,792	294,792	376,803	376,803	408,612	408,612	364,140	364,140
Unadj. Δ working (After-Before)	*-0.195*		*-0.189*		*-0.249*		*-0.191*		*-0.233*		*-0.150*		*-0.171*		*-0.099*	
Unadjusted DD	*0.006*				*0.058*				*0.083*				*0.072*			

Table 3b. Bonus Size Model: Descriptive Statistics
Sample means (SD) and Proportions

DWB Percentage	0%	1%	2%	5%	7%	10%
Working	0.58	0.15	0.26	0.53	0.42	0.34
Working	0.58	0.15	0.26	0.53	0.42	0.34
Hours Worked	16.98	2.51	4.98	16.35	11.34	8.08
	(18.34)	(6.07)	(10.23)	(17.67)	(15.82)	(13.68)
Age	59.05	68.99	65.47	62	63	64
	(4.19)	(1.53)	(0.5)	-	-	-
Married	0.79	0.79	0.78	0.76	0.77	0.77
Divorced	0.11	0.1	0.1	0.12	0.12	0.11
Widowed	0.03	0.06	0.04	0.03	0.03	0.04
Receiving Pension	0.29	1	0.85	0.42	0.57	0.64
Receiving Ul Benefits	0.05	0	0.02	0.04	0.04	0.04
Receiving Dl Benefits	0.2	0	0.12	0.2	0.21	0.22
Receiving Welfare	0.03	0.02	0.02	0.03	0.03	0.03
Receiving Other Social Benefits	0.04	0.01	0.03	0.04	0.04	0.05
Person Years	11,949,421	1,332,480	635,330	378,612	393,436	366,099

Note: This table shows the means for each variable for each DWB percentage eligibility group. The group indicated with 0% consists of people of all ages prior to the reform and of people younger than 62 after the reform. Hours worked and age are continues variables, all other variables are binary variables. The sample includes men born between 1939 and 1949 the period from 1999 through 2011.

Table 4. Treatment Effects (Robust SEs) from the Eligibility Model

		Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Pool 6	Pool 7	Pool 8
	Ages	**67, 68, 69**	**66, 67, 68**	**65, 66, 67**	**64, 65, 66**	**63, 64, 65**	**62, 63, 64**	**61, 62, 63**	**60, 61, 62**
	Treatment Cohort	**1942**	**1943**	**1944**	**1945**	**1946**	**1947**	**1948**	**1949**
	Control Cohort	**1939**	**1940**	**1941**	**1942**	**1943**	**1944**	**1945**	**1946**
	Base Model								
(1)	Treatment Effect	-0.022	-0.02	-0.03	-0.016	0.003	0.048	0.074	0.063
		(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
	Base Model + Controls for Social Benefits								
(2)	Treatment Effect	-0.015	-0.01	-0.014	-0.009	0.007	0.038	0.054	0.042
		(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)

Note: This table shows results from the eligibility model, specified as a linear probability model. The dependent variable is an indicator variable for whether or not a person worked. The treatment effects are defined as the difference in differences between the coefficient on the before and after period indicators of the treatment and control groups for each age pool. Row (1) shows the treatment effect from the base model, which includes controls for marital status and full sets of dummies for age, year and sector. Full results are shown in Appendix Table 1 (column 1). Row (2) shows the results from the model includes controls for marital status, whether someone is receiving pension, welfare, DI, UI, other social benefits, and full sets of dummies for age, year and sector. Full results are shown in Appendix Table 1 (column 2). The standard errors are clustered at the cohort level, 21 clusters in total. The sample includes men born between 1939 and 1959 the period from 1999 through 2011. For the cohorts that only serve as controls (cohorts 1939, 1940, 1941) the observations after 2008 are not included in the sample.

Table 5. Treatment Effects (Robust SEs) from the Eligibility Model - Falsification Test: Cohorts 1950 - 1960

		Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Pool 6	Pool 7	Pool 8
	Ages	**67, 68, 69**	**66, 67, 68**	**65, 66, 67**	**64, 65, 66**	**63, 64, 65**	**62, 63, 64**	**61, 62, 63**	**60, 61, 62**
	Treatment Cohort	**1942**	**1943**	**1944**	**1945**	**1946**	**1947**	**1948**	**1949**
	Control Cohort	**1939**	**1940**	**1941**	**1942**	**1943**	**1944**	**1945**	**1946**
	Base Model								
(1)	Treatment Effect	0.019	0.01	0.009	0.004	0.005	0.003	0.003	0.003
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	Base Model + Controls for Social Benefits								
(2)	Treatment Effect	0.014	0.007	0.006	0.002	0.003	0.002	0.002	0.002
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Note: This table shows results from the eligibility model, specified as a linear probability model. The dependent variable is an indicator variable for whether or not a person worked. The treatment effects are defined as the difference in differences between the coefficient on the before and after period indicators of the treatment and control groups for each age pool. Row (1) shows the treatment effect from the base model, which includes controls for marital status and full sets of dummies for age, year and sector. Full results are shown in Appendix Table 3 (column 1). Row (2) shows the results from the model includes controls for marital status, whether someone is receiving pension, welfare, DI, UI, other social benefits, and full sets of dummies for age, year and sector. Full results are shown in Appendix Table 3 (column 2). The standard errors are clustered at the cohort level, 20 clusters in total. The sample includes men born between 1950 through 1969 the period from 1999 through 2011. For the cohorts that only serve as controls (cohorts 1950, 1951, 1952) the observations after 2008 are not included in the sample.

Table 6a. Coefficients (Robust SEs) from Bonus Size Models: Extensive Margin
Dependent Variable = Working

	(1) OLS	(2) OLS	(3) OLS
DWB Percentage	0.004	0.004	0.002
	(0.000)	(0.000)	(0.000)
Capped * DWB Percentage			0.01
			(0.000)
Capped			0.031
			(0.001)
Married or partnered	0.058	0.061	0.058
	(0.001)	(0.001)	(0.001)
Divorced or separated	0.033	0.036	0.034
	(0.002)	(0.002)	(0.002)
Widowed	0.006	0.108	0.107
	(0.002)	(0.002)	(0.002)
Receiving Pension		-0.4	-0.401
		(0.001)	(0.001)
Receiving Ul Benefits		-0.354	-0.353
		(0.002)	(0.001)
Receiving Dl Benefits		-0.176	-0.173
		(0.001)	(0.001)
Receiving Welfare		-0.488	-0.485
		(0.005)	(0.005)
Receiving Other Social Benefits		-0.178	-0.178
		(0.002)	(0.002)
N	6,855,956	6,855,956	6,855,956

Note: This table shows coefficients from linear probability models. The dependent variable in an indicator variable for whether or not a person worked. The sample includes men born between 1939 and 1949 the period from 1999 through 2011. The standard errors are clustered at the cohort level, 11 clusters in total. DWB percentage is defined in percentage points [1-100].

Table 6b. Coefficients (Robust SEs) from Bonus Size Models: Intensive Margin

Dependent Variable = Log Hours worked per week

	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE
DWB Percentage	0.011	0.006	0.01	0.006	0.005	0.003
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capped * DWB Percentage					0.028	0.025
					(0.001)	(0.001)
Capped					0.029	-0.043
					(0.003)	(0.002)
Married or partnered	0.169	0.01	0.182	0.01	0.178	0.189
	(0.005)	(0.023)	(0.004)	(0.018)	(0.004)	(0.004)
Divorced or separated	0.097	0.024	0.108	0.01	0.105	0.118
	(0.006)	(0.024)	(0.005)	(0.019)	(0.005)	(0.005)
Widowed	0.01	-0.057	0.449	0.217	0.447	0.425
	(0.008)	(0.024)	(0.007)	(0.02)	(0.007)	(0.007)
Receiving Pension			-1.682	-1.808	-1.683	-1.775
			(0.003)	(0.003)	(0.003)	(0.002)
Receiving Ul Benefits			-1.405	-1.21	-1.403	-1.25
			(0.005)	(0.004)	(0.005)	(0.004)
Receiving Dl Benefits			-0.747	-0.67	-0.743	-0.703
			(0.004)	(0.005)	(0.004)	(0.004)
Receiving Welfare			-1.906	-0.891	-1.9	-1.248
			(0.015)	(0.016)	(0.015)	(0.013)
Receiving Other Social Benefits			-0.728	-0.799	-0.728	-0.783
			(0.006)	(0.005)	(0.006)	(0.005)
N	6,584,600	6,584,600	6,584,600	6,584,600	6,584,600	6,584,600

Note: This table shows coefficients from OLS models with and without individual fixed effects. The dependent variable is the log of average hours worked per week. The sample includes men born between 1939 and 1949 the period from 1999 through 2011. The standard errors are clustered at the cohort level, 11 clusters in total. DWB percentage is defined in percentage points [1-100].

Appendix Table 1. Full results: Coefficients (Robust SEs) from the Eligibility Models

	(1)	(2)
Cohort 1939 : Years 2003-2005	0.032	0.017
	(0.019)	(0.014)
Cohort 1939 : Years 2006-2008	0.061	0.036
	(0.021)	(0.016)
Cohort 1440 : Years 2003-2005	0	0
	(0.019)	(0.014)
Cohort 1940 : Years 2006-2008	0.029	0.016
	(0.02)	(0.016)
Cohort 1941 : Years 2003-2005	-0.028	-0.014
	(0.02)	(0.014)
Cohort 1941 : Years 2006-2008	0.004	0.004
	(0.02)	(0.015)
Cohort 1942 : Years 2003-2005	-0.028	-0.009
	(0.021)	(0.015)
Cohort 1942 : Years 2006-2008	-0.01	0.004
	(0.021)	(0.015)
Cohort 1942 : Years 2009-2011	-0.003	0.008
	(0.022)	(0.016)
Cohort 1943 : Years 2003-2005	-0.023	-0.004
	(0.02)	(0.014)
Cohort 1943 : Years 2006-2008	-0.027	-0.008
	(0.02)	(0.015)
Cohort 1943 : Years 2009-2011	-0.018	-0.001
	(0.021)	(0.016)
Cohort 1944 : Years 2003-2005	-0.016	0
	(0.017)	(0.011)
Cohort 1944 : Years 2006-2008	-0.031	-0.011
	(0.021)	(0.015)
Cohort 1944 : Years 2009-2011	-0.028	-0.007
	(0.021)	(0.016)
Cohort 1945 : Years 2003-2005	-0.011	0.001
	(0.011)	(0.007)
Cohort 1945 : Years 2006-2008	-0.024	-0.006
	(0.022)	(0.015)
Cohort 1945 : Years 2009-2011	-0.022	-0.002
	(0.021)	(0.016)
Cohort 1946 : Years 2003-2005	-0.004	0
	(0.006)	(0.004)
Cohort 1946 : Years 2006-2008	-0.032	-0.015
	(0.028)	(0.02)
Cohort 1946 : Years 2009-2011	-0.039	-0.017
	(0.036)	(0.026)
Cohort 1947 : Years 2006-2008	0.008	0.011
	(0.017)	(0.011)
Cohort 1947 : Years 2009-2011	0.041	0.038
	(0.022)	(0.015)
Cohort 1948 : Years 2006-2008	0.009	0.009
	(0.012)	(0.007)
Cohort 1948 : Years 2009-2011	0.07	0.056
	(0.023)	(0.016)
Cohort 1949 : Years 2006-2008	0.008	0.008
	(0.007)	(0.004)
Cohort 1949 : Years 2009-2011	0.072	0.053
	(0.023)	(0.015)

Appendix Table 1 (Continued). Full results: Coefficients (Robust SEs) from the Eligibility Models

	(1)	(2)
Married or partnered	0.15	0.093
	(0.002)	(0.004)
Widowed	0.091	0.155
	(0.003)	(0.006)
Divorced or separated	0.055	0.04
	(0.003)	(0.004)
Pension Receiver		-0.297
		(0.02)
UI Benefits		-0.282
		(0.012)
DI Benefits		-0.33
		(0.005)
Welfare		-0.573
		(0.011)
Other Social Benefits		-0.275
		(0.008)
Constant	0.861	0.976
	(0.007)	(0.007)
Pool 1 Treatment Effect	-0.022	-0.015
	(0.006)	(0.004)
Pool 2 Treatment Effect	-0.02	-0.01
	(0.006)	(0.005)
Pool 3 Treatment Effect	-0.03	-0.014
	(0.006)	(0.004)
Pool 4 Treatment Effect	-0.016	-0.009
	(0.006)	(0.004)
Pool 5 Treatment Effect	0.003	0.007
	(0.006)	(0.004)
Pool 6 Treatment Effect	0.048	0.038
	(0.006)	(0.005)
Pool 7 Treatment Effect	0.074	0.054
	(0.006)	(0.005)
Pool 8 Treatment Effect	0.063	0.042
	(0.006)	(0.005)
Person - Years	29,500,000	28,500,000
Age Dummies	Yes	Yes
Year Dummies	Yes	Yes
Sector Dummies	Yes	Yes

Appendix Table2. Decomposing the Treatment Effect by age

		Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Pool 6	Pool 7	Pool 8	
	Ages	**67, 68, 69**	**66, 67, 68**	**65, 66, 67**	**64, 65, 66**	**63, 64, 65**	**62, 63, 64**	61, **62, 63**	60, 61, **62**	
Treatment Cohort		**1942**	**1943**	**1944**	**1945**	**1946**	**1947**	**1948**	**1949**	
DWB [%]	**Age**									$\overline{\Delta LPF_a}$
0	*60*								.	.
0	*61*							.	.	.
5	62						0.026	0.046	0.042	0.038
7	63					0.008	0.036	0.064		0.036
10	64				-0.019	0.011	0.052			0.015
2	65			-0.017	-0.004	0.002				-0.006
2	66		-0.014	-0.017	-0.004					-0.011
1	67	-0.015	-0.007	-0.008						-0.010
1	68	-0.015	-0.007							-0.011
1	69	-0.015								-0.015
		$\overline{\Delta LPF_{Pool\,1}}$	$\overline{\Delta LPF_{Pool\,2}}$	$\overline{\Delta LPF_{Pool\,3}}$	$\overline{\Delta LPF_{Pool\,4}}$	$\overline{\Delta LPF_{Pool\,5}}$	$\overline{\Delta LPF_{Pool\,6}}$	$\overline{\Delta LPF_{Pool\,7}}$	$\overline{\Delta LPF_{Pool\,8}}$	
		-0.015	-0.009	-0.014	-0.009	0.007	0.038	0.055	0.042	

Note: This table shows results from a decomposition of the treatment effects from the eligibility model that includes controls for pension receipt and social benefits (Row 2 in Table 4 and column 2 in Appendix table 1), also shown in the bottom row. The cells show the change in LFP, the treatment effect, at age a in age pool m, calculated as $\Delta LPF_{ma} = DWBp_{ma} \frac{\overline{\Delta LPF_m}}{\overline{DWBp_m}}$, where $DWBp_{ma}$ is the DWB percentage that people are eligible for at age a in age pool m, and $\overline{DWBp_m}$ is the (arithmetic) mean DWB percentage of age pool m. The decomposition results for pool 7 and 8 treats the treatment effect as two and one year averages. This gives more conservative decomposition results than treating it as a 3-year average with a 0% DWB at the ages before 62.

Appendix Table 3. Full results: Coefficients (Robust SEs) from Falsification Test

	(1)	(2)
Cohort 1950 : Years 2003-2005	-0.003	0.002
	(0.003)	(0.001)
Cohort 1950 : Years 2006-2008	-0.019	-0.012
	(0.003)	(0.001)
Cohort 1951 : Years 2003-2005	0.002	0.004
	(0.002)	(0.001)
Cohort 1951 : Years 2006-2008	-0.005	-0.002
	(0.003)	(0.001)
Cohort 1952 : Years 2003-2005	0.003	0.003
	(0.002)	(0.001)
Cohort 1952 : Years 2006-2008	-0.003	-0.003
	(0.003)	(0.001)
Cohort 1953 : Years 2003-2005	0.003	0.003
	(0.002)	(0.001)
Cohort 1953 : Years 2006-2008	0.000	-0.001
	(0.003)	(0.001)
Cohort 1953 : Years 2009-2011	0.003	-0.001
	(0.003)	(0.001)
Cohort 1954 : Years 2003-2005	0.002	0.003
	(0.002)	(0.001)
Cohort 1954 : Years 2006-2008	-0.001	-0.002
	(0.002)	(0.001)
Cohort 1954 : Years 2009-2011	0.003	-0.002
	(0.003)	(0.001)
Cohort 1955 : Years 2003-2005	0.002	0.003
	(0.002)	(0.001)
Cohort 1955 : Years 2006-2008	0.001	-0.002
	(0.002)	(0.001)
Cohort 1955 : Years 2009-2011	0.005	-0.002
	(0.003)	(0.001)
Cohort 1956 : Years 2003-2005	0.001	0.001
	(0.001)	(0.001)
Cohort 1956 : Years 2006-2008	0.000	-0.004
	(0.002)	(0.001)
Cohort 1956 : Years 2009-2011	0.002	-0.005
	(0.002)	(0.001)
Cohort 1957 : Years 2003-2005	0.004	0.004
	(0.001)	(0.001)
Cohort 1957 : Years 2006-2008	0.003	-0.001
	(0.002)	(0.001)
Cohort 1957 : Years 2009-2011	0.005	-0.003
	(0.002)	(0.001)
Cohort 1958 : Years 2006-2008	0.002	0.000
	(0.001)	(0.001)
Cohort 1958 : Years 2009-2011	0.004	-0.003
	(0.002)	(0.001)
Cohort 1959 : Years 2006-2008	0.003	-0.001
	(0.001)	(0.001)
Cohort 1959 : Years 2009-2011	0.006	-0.003
	(0.002)	(0.001)
Cohort 1960 : Years 2006-2008	-0.003	-0.002
	(0.001)	(0)
Cohort 1960 : Years 2009-2011	-0.001	-0.005
	(0.002)	(0.001)

Appendix Table 3 (Continued). Full results: Coefficients (Robust SEs) from Falsification Test

	(1)	(2)
Married or partnered	0.126	0.063
	(0.004)	(0.003)
Divorced or separated	0.073	0.073
	(0.006)	(0.007)
Widowed	0.039	0.016
	(0.002)	(0.002)
Pension Receiver		-0.086
		(0.007)
Ul Benefits		-0.184
		(0.01)
Dl Benefits		-0.367
		(0.003)
Welfare		-0.565
		(0.008)
Other Social Benefits		-0.315
		(0.004)
Constant		0.973
		(0.001)
Pool 1 Treatment Effect	0.019	0.014
	(0.001)	(0)
Pool 2 Treatment Effect	0.010	0.007
	(0.001)	(0)
Pool 3 Treatment Effect	0.009	0.006
	(0.001)	(0)
Pool 4 Treatment Effect	0.004	0.002
	(0.001)	(0)
Pool 5 Treatment Effect	0.005	0.003
	(0.001)	(0)
Pool 6 Treatment Effect	0.003	0.002
	(0.001)	(0)
Pool 7 Treatment Effect	0.003	0.002
	(0.001)	(0)
Pool 8 Treatment Effect	0.003	0.002
	(0.001)	(0)
Person - Years	34,300,000	32,000,000
Age Dummies	Yes	Yes
Year Dummies	Yes	Yes
Sector Dummies	Yes	Yes