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Job search requirements for older unemployed: transitions to employment, early retirement and disability benefits

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Abstract

We use a recent policy change in the Netherlands to study how changes in search requirements for the older unemployed affect their transition rates to employment, early retirement and sickness/disability benefits. The reform, becoming effective on January 1st 2004, requires the elderly to formally report their job search efforts to the employment office in order to avoid a (temporary) cut in benefits. Before the new law was passed, unemployed individuals were allowed to stop all search activity at the moment they turned 57.5. Estimating various duration models using difference-in-difference and regression discontinuity approaches, we find that for several groups of individuals who are affected by the policy change, the stricter search requirements significantly increases their entry rate into employment. However, we also find evidence of a higher outflow to sickness/disability insurance schemes, a presumably unwanted side-effect of the policy change.

Keywords: Duration Analysis, Policy Evaluation, Search Effort, Substitution

JEL classification: C41, J26, J64, J68

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1 Introduction

How can policy raise the labour market participation rate of older workers? The combination of a low participation rate of older workers and population aging puts a strain on public finances. Raising the official retirement age to 67 and beyond has been brought forward as part of the solution in many countries. However, increasing the retirement age will only be effective when the opportunity to retire early is limited.

Not only early retirement pension payments, but also other social benefits such as disability insurance (DI) and unemployment insurance (UI) have been used as early retirement pathways. These benefit schemes have some features that make them especially attractive for older workers. First, the potential benefit duration is usually increasing in age. Second, older workers who receive unemployment benefits often do not need to report any job search effort to the unemployment office in order to retain their benefit payments. Little is known about the effect of such policies on the inflow into unemployment and the subsequent outflow to employment. The longer potential benefit duration and exemption of search requirements might very well contribute to the fact that the duration of unemployment for older workers is longer on average (Chan and Stevens, 2001; de Graaf-Zijl and Hop, 2007).

Intentionally or unintentionally, the policy to exempt older unemployed from job search can create an "unemployment tunnel" in which individuals receive benefit payments until they reach the official retirement age. In 2006, there were many countries in which older unemployed were not obliged to look for jobs, including Belgium, Finland, France, Germany and the United Kingdom. In other countries such as Sweden, there is no formal exemption from job search for the older unemployed. However, job search requirements are not strictly enforced on them either (OECD, 2006). In recent years many governments have raised the age from which older unemployed are exempted from job search. Some countries even equalized job search requirements for all unemployed, young or old. In Belgium, the minimum age was increased from 50 to 58 between 2002 and 2004 (Bollens, 2011). In France older unemployed are no longer exempted from the requirement to look for jobs as from January 2012.

The Netherlands also used to exempt their older unemployed (defined as being at least 57.5 years old) from the requirement to actively search for a job in order to receive full UI benefits. This situation changed on January 1st 2004. From that date, the 57.5+ year olds faced the same regulations as other age groups and needed to report their (formal) search behaviour to the unemployment office. This paper exploits this policy change to examine how search requirements for the older unemployed affect the number of individuals who experience a transition to employment. Because a reduction in unemployment only raises labour force participation when early retirement benefits and disability benefits are not used as substitutes to UI, we also examine the effect of the policy change on transitions to disability payments and early retirement.

To study labour market transitions of older workers, access to a dataset with a large cross sectional dimension is needed. Labour market surveys are usually based on a representative sample of the entire working age population such that only a tiny fraction of older unemployed individuals is observed, precluding meaningful analyses of transition behaviour for this group. The present paper contributes to the existing

literature by using a large administrative database covering all registered benefit and wage receipts in the Netherlands, including UI benefits. The data provides very precise information on income and labour market status, giving us a large enough sample to analyze labour market transitions of the older unemployed in the years 2001 to 2005.

There exists a large strand of literature examining the effects of changes in the UI benefit system on unemployment duration. Most of these papers are concerned with effects of sanctions or training programs (Abbring et al. (2005), van den Berg et al. (2004), van den Berg and van der Klaauw (2006)), changes in potential unemployment benefit duration (Caliendo et al. (2009), Card and Levine (2000), Kyrrä and Ollikainen (2008), Lalive et al. (2006), Lalive (2008), van Ours and Vodopivec (2006)) or the level of unemployment benefits (Carling et. al. (2001), Røed and Zhang (2003)). Studies examining a tightening of search requirements are less common. Manning (2009) finds large flows out of claimant status upon a tightening of search requirements in the U.K. but does not find an effect on search intensity. Petrongolo (2009), studying the same U.K. reform, concludes that unemployment duration decreases, but the transition rate to disability insurance benefits increases. Our paper is closest in spirit to Heyma and van Ours (2005), who examine the effect of the same discontinuity in UI eligibility criteria for Dutch older workers. They find a substantially lower outflow to jobs for individuals that turn 57.5 and are no longer required to actively search for a job. In contrast to Heyma and van Ours (2005), our dataset follows individuals both before and after the policy change. Making use not only of variation in age, but also of variation over time, we are able to estimate treatment effects for various groups of treated individuals. Moreover, instead of focussing exclusively on unemployment to employment transitions, we also shed light on substitution between various social insurance programs by considering both DI receipt and early retirement as competing risks for the exit out of unemployment. One of the desired consequences of imposing stricter requirements for receiving UI benefits is to save on government spending by decreasing the number of individuals eligible for receipt of these benefits. This can be done directly by excluding individuals from receiving UI benefits if they do not comply with the new rules, or by making the receipt of UI benefits so unattractive that individuals start to look for alternatives themselves. However, the alternative that the government has in mind (paid employment) might not be the most attractive alternative from the point of view of the individual. The unemployed worker can instead substitute towards other benefit types, such as disability benefits or, in case of the older workers, early retirement benefits (provided that eligibility conditions for such schemes can be met). Since costly substitution between programs that insure different risks should be avoided, spill-over effects among these government programs are an important aspect of policy evaluation. In this paper, we are able to furnish empirical evidence on the importance of the various substituting pathways.

We estimate flexible form competing risks duration models using difference-in-difference and regression discontinuity approaches and identify the causal effect of the policy change on observed labour market transitions. We show that for several groups of individuals, the stricter search requirements strongly and significantly increase the number of individuals that find a job after a maximum of two years in unemploy-

ment. For instance, unemployed males aged 57.5-59.5 have a more than 20 percent (6.5 percentage points) higher probability of finding a job within 24 months (37.8% instead of 31.3%) due to imposition of the new rules. Previous results for the Netherlands show that working individuals substitute between UI and DI benefits (Heyma, 2005; Euwals e.a. 2011; Koning and van Vuuren 2007, 2010; Vos e.a. 2011). We find evidence that substitutability of UI and DI is also relevant for unemployed individuals. A higher number of unemployed individuals receive disability benefits when search requirements are enacted, a presumably unwanted side-effect of the policy change. In contrast, no significant substitution from UI benefits towards early retirement benefits is found.

The remainder of the paper is set up as follows. Section 2 presents some important aspects of the Dutch UI system, with a focus on changes in the system aimed at the older unemployed. It also gives a brief description of the sickness/disability insurance benefit and early retirement systems and changes therein. Theoretical effects of an increase in search requirements are considered in Section 3. The empirical analysis starts out in Section 4 with a description of the data and the selection of treatment and control groups for analysis. Section 5 presents the estimation strategy and some descriptive evidence, before continuing to estimation results given in Sections 6 and 7. Section 8 reports on post-unemployment job characteristics. Finally, Section 9 concludes.

2 Institutional Context

This section gives an overview of the UI benefit system in the Netherlands and reports important policy changes aimed at older workers. It also considers changes in the DI and early retirement system that could possibly affect the inflow in these social insurance schemes for older unemployed workers. Our focus is on the years 2001-2005, as the data available to us are informative on this time period.

2.1 The Dutch Unemployment Insurance System and Developments from 2001-2005

2.1.1 The Dutch Unemployment Insurance System

In the Netherlands, three types of UI benefits can be received: short-term benefits, wage-related benefits and extended benefits. In order to be eligible for short-term benefits, an individual needs to have worked at least 26 weeks out of the last 39 weeks before becoming unemployed (the 26-out-of-39 requirement) and be ‘available for work’ (for example, an individual is not allowed to live abroad or join an educational program). Short-term benefits can be received for at most six months and are set to 70% of the prevailing minimum wage or 70% of average last-earned wage, whichever one is less. Wage-related benefits are paid when the claimant fulfills the 26-out-of-39 requirement and in addition worked for 52 days or more in at least four out of the five (calendar) years before he became unemployed. The benefits are set to 70% of the average wage earned at the last employer, with a maximum of about €29,000 (net) a year in 2003. Extended benefits can be received after the maximum duration of wage-related benefits has expired, and have the same level as short-term benefits. An overview of the system is given in Table 1.

Table 1. ELIGIBILITY REQUIREMENTS, DURATION AND HEIGHT OF UI BENEFITS 2001-2005

type of UI benefit	eligibility requirements	duration	payment
short-term benefits	26-out-of-39 weeks requirement	6 months	70% of minimum wage or 70% of previous wage whichever is lower
wage-related benefits	26-out-of-39 weeks requirement + 4-out-of-5 years requirement	6 months to 5 years, depending on age	70% of previous wage
extended benefits	26-out-of-39 weeks requirement + 4-out-of-5 years requirement	2 years if <57.5 at time of unemployment, otherwise 3.5 years	70% of minimum wage or 70% of previous wage whichever is lower

Note: benefits are granted to a maximum (about 29.000 euro per year in 2003)

In order to be eligible for UI benefits, an unemployed job seeker needs to comply with the unemployment insurance procedure. On the first day following unemployment, an unemployed job seeker is expected to register at the unemployment office. During this first intake, the unemployment office assesses the employability of the individual. Based on characteristics such as profession, labour market experience, education,

age, and the impression by the caseworker during the intake, the individual is classified to a certain ‘phase’. Phase 1 individuals are assumed to be able to find work within six months without any further assistance. Other individuals (phases 2, 3 and 4) receive job search assistance and can be assigned to active labour market programs by the unemployment office.

Within a maximum of eight days following the intake the individual again needs to report at the unemployment office. During this meeting, the unemployed is informed about his rights and duties. Specifically, he is informed about the procedures regarding job search requirements. An individual needs to apply to a minimum of four ‘suitable’ jobs per four weeks. In the first six months of unemployment, a job is considered suitable when all of the following apply: (i) the level of education required for the job is the maximum level the individual obtained¹, (ii) earnings are not significantly below earnings in the previous job, and (iii) travel time per day is not more than 2 hours. An individual is also expected to consult a public vacancy information system. Moreover, he needs to accept any suitable jobs offered to him by the unemployment office. Apart from these job search and job acceptance requirements, an individual is expected to participate in the advised active labour market programs (if any).

In the weeks following the second intake, an individual needs to report to his caseworker at the unemployment office every four to six weeks. These meetings are primarily meant to check whether the individual complies with the job search requirements. In case the caseworker suspects that an individual did not submit enough job applications, an official at the unemployment office is informed. The official decides whether a sanction will be imposed, of which the individual is notified. The unemployed is then given the opportunity to defend his case. If it is decided that the individual is responsible for the lack of job applications, he is sent a letter in which it is explained when and with what amount his benefits will be cut. The maximum cut for a first violation corresponds to a decrease in benefits by 20 percentage points for 16 consecutive weeks (i.e. from 70% to 50% of previous wage/minimum wage) or 10 percentage points when the individual is to blame only partially. The percentage point cut is the same regardless of whether the individual receives short-term, wage-related, or extended benefits. In case of recidivism within two years, the benefit cut can be as high as 30 percentage points.²

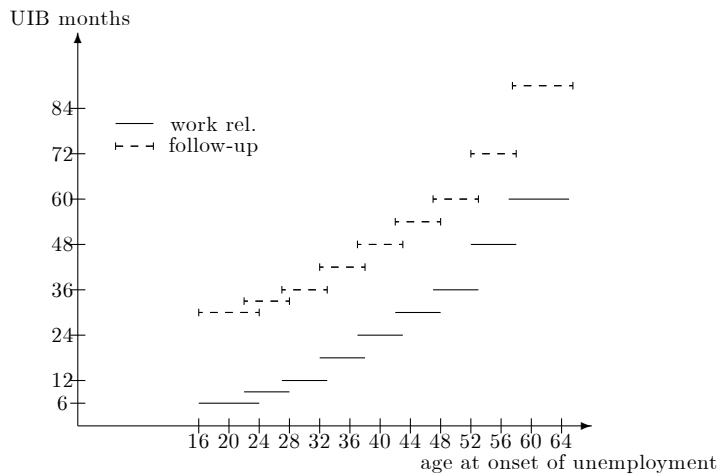
The maximum duration of wage-related benefits is a step-wise function of age. A potential employment history is calculated by adding (i) the number of years from the age of 18 until five years before unemployment starts and (ii) the four (or five) years that an individual worked just before becoming unemployed. For example, an individual who turned 18 in 1960 and becomes unemployed in 2000, would have 39 or 40 years of potential employment history: (i) 35 (1995-1960) plus (ii) four or five. A longer potential employment history implies a longer UI eligibility, with a maximum of five years for wage-related benefits. For most individuals, maximum duration for extended benefits is two years. However, if a worker aged 57.5 or above

¹Individuals with a master degree also need to accept work on the bachelor level.

²Table B.1 shows that huge cuts in benefits indeed take place in practice: noncompliers are punished with an average of 20 percentage points cut in benefits (from 70 to 50 percent of previous/minimum wage) for 14 consecutive weeks. The average duration is shorter than 16 weeks since there are some individuals who start working before the end of the sanction spell.

loses his job, extended benefits can be received for up to 3.5 years. A graphical representation of potential benefit durations for wage-related and extended UI benefits and their relation to age at unemployment is given in Figure 1.

Figure 1. POTENTIAL UI BENEFIT DURATION



2.1.2 Developments in the Dutch Unemployment Insurance System 2001-2005

In the period under study, a number of reforms in the UI system took place. Here we present an overview of reforms specifically aimed at (increasing the participation rate of) older unemployed.

First, from May 11th 2001 onwards employers are obliged to pay part of the UI benefits if they fire an employee aged 57.5 or above.³ Second, for individuals becoming unemployed on or after August 11th 2003, extended benefits are abolished. Instead, those aged 50+ when becoming unemployed fall under the so-called IOAW scheme with payments that provide the household with an income of 70% of minimum wage after expiration of wage-related UI benefits. This is the same level of benefits previously provided for by extended benefits. Both extended benefits and IOAW benefits are not means-tested. The only difference between extended benefits and IOAW benefits is that IOAW benefits are tested against the income of the spouse. Finally, starting from the 1st of January 2005, potential duration of wage-related benefits for new UI recipients is made (partly) dependent on actual employment history instead of merely on age. An employment history is calculated by adding the number of years actually worked between 1998 and the calendar year preceding unemployment to the number of years potentially worked before 1998 (1998-18- year of birth). The individuals selected for our analysis all become unemployed before the 1st of January 2005 and are

³The contribution to benefit payments depends on the size of the firm, with a maximum of 30% of gross UI payments for companies with more than 50 employees. An extra restriction is that a maximum of 3% of total wages in the company may be paid as UI benefits to older ex-workers. In Section 7 we show that this 2001 policy change does not interfere with our main results: either selecting individuals who become unemployed in the years 2002-2004 or selecting those becoming unemployed in the years 2001-2004 gives the same results on all estimated treatment effects.

therefore unaffected by this new regulation. An overview of the developments aimed at older unemployed can be found in Table 2.

Table 2. OVERVIEW OF CHANGES IN THE UI-SYSTEM AIMED AT THE ELDERLY, 2001-2005

Date	Policy Change
2001, May 11th	employers pay part of UI-benefits for 57.5+ year olds
2003, Aug 11th	extended benefits cancelled
2004, Jan 1st	57.5+ year olds are (also) required to search actively
2005, Jan 1st	max. UI duration determined partly by employment history
2006, Oct 1st	max. UI duration reduced from 60 to 38 months payments increased from 70% to 75% in first two months 26-out-of-39 becomes 26-out-of-36

Focus of the present paper is a reform which became effective from January 1st 2004. Post-reform, older (57.5+) job seekers lose their special status in terms of search requirements. They are treated in the same way as all other unemployed, including regular meetings at the unemployment office to check whether they apply to at least four jobs every four weeks. Descriptive evidence on the actual imposition of sanctions on the older workers can be found in Table B.2 in Appendix B. In 2004 there is an increase of five percentage points in the share of total sanctions that is due to non-compliance with the search requirement, suggesting that sanctions are indeed also levied on older individuals (five percent of the UI population consists of older ex-employees). In the data, we unfortunately do not observe when and whether sanctions have been imposed, nor do we observe the actual search effort of individuals. Instead, we focus directly on the relevant policy outcome: do older individuals find jobs when they are confronted with an official requirement to search for jobs?

Not only newly unemployed are affected by this change in search requirements. For older workers that are already unemployed, a transitional arrangement is in place: the search requirement is activated on January 1st 2004 for all individuals that are unemployed for less than one year at December 31st 2003 and are less than 62 years and 2 months old at the 1st of January 2004. Moreover, all individuals that do not reach the age of 57.5 before the 31st of December 2003 also need to continue searching when turning 57.5, even if they are unemployed for more than a year. Exceptions to the obligation to search are made, among others, for individuals aged 64 or above on their first day of unemployment, for individuals starting up their own business or taking part in an educational program which is considered necessary for re-integration, and for individuals aged 57.5 or above at the 31st of December 2003 who receive DI benefits right before entering UI.

2.2 The Dutch Disability Insurance System

Individuals who have a positive probability to be considered eligible for DI benefits have an opportunity to substitute their UI payments with DI payments. Autor and Duggan (2003) find that DI is used as

a substitute for UI in the U.S., whereas Larsson (2006) documents that sick reports in Sweden increase as the UI benefit expiration date approaches. Although there is some evidence that in Germany UI and DI are not used as exchangeable pathways (Riphahn, 1997), studies for the Netherlands usually do find significant substitution: Koning and van Vuuren (2007) find that 3% of all dismissals takes place via the DI scheme. Related, Borghans et al. (2010) find that when individuals are confronted with stricter DI entrance criteria and a reduction in the replacement rate, many individuals leave DI and take up other forms of social assistance. These findings strongly suggest that individuals can to some extent choose to enter DI, and therefore adjustments in the UI system may trigger a change in DI inflow. Yet, instead of being ‘pushed’ from UI into DI (as is the case when search requirements for eligibility of UI increase) individuals can also be ‘pulled’ into DI upon modification of the latter system. To be able to better judge the relative attractiveness of receiving DI versus receiving UI benefits, we present an overview of the Dutch DI system. Since nearly all policy changes from 2001-2005 are aimed at employers and are irrelevant to the unemployed, we defer an overview of major adjustments in the DI system to Appendix A.

In 2001 the Dutch DI System consists of two main Acts: the Sickness Act (SA) and the Disability Act (DA). The SA provides an income floor to any citizen (including UI benefit recipients) in case of sickness or disability. In most cases, UI benefit recipients who become ill or otherwise disabled receive 70% of their former wage for up to one year. Subsequently, an individual enters the Disability Act. After medical examination, a worker who is considered at least partially disabled becomes eligible for DI payments of up to 70% of last earned wage, depending on the degree of disability. Individuals aged 58 and older receive wage-related DI benefits for a maximum of six years, and individuals in the age range 53-57 for three years. After wage-related DI benefits have expired, individuals can receive an extended benefit. The extended benefit also depends on age and previous wage and can be received for as long as the disability lasts.

2.3 The Dutch Early Retirement System

In the Netherlands, it is possible to retire before the statutory old-age pension age of 65. The exact rules for early retirement are determined on a sectoral level by negotiations between unions and employer organisations. Up until the late 1990s most sectoral schemes encouraged individuals to retire at a focal early retirement age (usually age 59, 60 or 61, depending on the sector in which the individual was employed). Early retirement pension payments used to be a fixed percentage of last earned wage, thereby eliminating the financial incentive to continue working until age 65. From 1997, the sector for civil servants was the first to adjust their early retirement regulations. The PAYG system featuring a fixed replacement rate was replaced by an actuarially fair system. The new system also greatly reduced the replacement rate of early retirement pensions for civil servants (from 80% to 70% of last earned wage at the standard retirement age). Other sectors of industry made the transfer from a PAYG to a less generous capital funded system in the late 1990s and early 2000s. More detailed information on the sectoral-specific transitions can be found in Euwals et al. (2010). These authors examine this change in early retirement regulations and find that the

shift to an actuarially fair system with lower pension wealth induced individuals to retire later.

Within the old PAYG system, early retirees kept accruing pension rights. The switch to a capital-funded scheme implied that early retirees no longer accrued any pension rights. In contrast, individuals who are at least 40 years old at the time they become unemployed continue to build up their old-age pension rights as long as they receive wage-related UI benefits. Moreover, for individuals who are at least 57.5 years of age when they become unemployed, ‘free’ building up of pension rights continued until they reached the legal retirement age of 65. The introduction of the capital-funded early retirement system therefore discouraged UI benefit recipients to enter early retirement.

3 Theoretical considerations

A general theory cannot predict whether search requirements will lead to an increase or a decrease of the number of individuals finding jobs. In a standard job search model in which individuals are either employed or unemployed, an increase in search requirements affects the amount of job search both directly and indirectly. First, individuals who search less than the minimum requirement run the risk of a penalty, leading to a decrease in the value of unemployment and therefore an increase in the (marginal) benefits of searching up to the minimum requirement. Individuals who in the past searched less than the newly defined threshold will therefore be induced to *increase* their search effort. On the other hand, the cost of each job application rises when an unemployed individual needs to record all search effort (such that an unemployed person can prove to the unemployment office that job search is undertaken). Increasing (marginal) costs of search (i) *decreases* search effort for individuals already conforming to the new search requirements, (ii) decreases the value of unemployment and thereby decreases reservation wages and *increases* search effort, (iii) by decreasing the value of unemployment the value of the subsequent job also diminishes and search effort *decreases* (the so-called ‘entitlement effect’, Mortensen (1977)). For older workers the ‘entitlement effect’ is small: a possible new spell of UI benefits can only comprise a limited number of years, since from the age of 65 onwards they will receive pension payments instead. Search requirements may therefore raise the search effort of older workers substantially.

On the worker demand side, the job offer probability for the older unemployed might decrease as a result of enforcing minimum job search requirements: formal search requirements could lead to fake applications by the older workers, thereby stigmatizing job applications of older workers such that employers will be less willing to hire them. Moreover, an increase in the required amount of search effort can lead to a changing average productivity of applicants: assuming that initially only the most motivated individuals with good labour market prospects are engaged in active job search, average productivity of the applicant pool decreases when search requirements are introduced, again leading to a lower job offer probability for older unemployed. In conclusion: it is unclear from theory whether introducing formal job search as a condition for UI benefit receipt will increase the job finding rate of older workers.

Now consider a search model which adds the option to collect a type of benefit other than UI. Since

formal search requirements reduce the value of receiving UI benefits, whereas the value of receiving other benefits (such as DI and early retirement pensions) remain constant, individuals can decide to forgo UI benefits and collect those other benefits instead (that is, if eligibility conditions can be met). Naturally, the substitution to another type of benefit is more likely the higher the value of receiving those benefits. The expected value of applying for DI benefits is high: the possible duration of DI benefits is six years for individuals aged 58 and older. This is longer than the maximum of five years for wage-related UI benefits. Furthermore, the total potential benefit duration of UI benefit receipt is not reduced by an intermittent spell of sickness/disability, which provides individuals with a rationale to substitute to DI (if only temporarily). A change in UI search requirements could therefore just make the required difference for DI to be a worthwhile alternative.⁴ In contrast, early retirement pension payments have become less attractive over time. Since in the old early retirement pension system, retirement benefits did not increase from age 59 onwards (or 60, or 61, depending on the sector of previous employment), there used to be a high incentive to switch to receipt of early retirement pensions at that age. Since with the new capital-funded scheme the old age pension replacement rate continues to increase with retirement age until an age of 65, the incentive to switch from UI to early retirement at relatively young ages is greatly reduced.

4 Data and Selection of Treatment/Control Groups

We make use of administrative data obtained from Statistics Netherlands. The so-called SSB (Social Statistical Files) data is obtained from municipalities, tax authorities and social insurance administrations. It contains high quality, detailed information on income variables and beginning- and enddate of benefit and wage payments for all individuals living in the Netherlands. Using this information, we can determine the status of an individual for the years 1999-2005 with daily precision. The states that we distinguish include full-time and part-time employment, being unemployed (receiving UI benefits), being ill/disabled (receiving sickness or disability benefits) and entering (early) retirement (receiving pension payments). We do not observe the number of times that an individual applies for jobs or whether a sanction is levied.

The information in the SSB is merged with information on education available from the unemployment office. Since the data on education is only available as from 2001, information on education is missing for the short-term unemployed that became unemployed in the years 1999 or 2000 and for whom we observe only one spell of employment. Since this group is likely to be selective, individuals becoming unemployed before the year 2001 are excluded.

To examine the policy change, we select groups of older individuals (55.5-59.5 at the time of inflow) becoming unemployed in 2001, 2003 and 2004. Table 3 shows the search requirements for all treatment and control groups. It also shows eligibility for and level of extended benefits. The 2001 inflow serves as a control

⁴Note also that following an increase in compulsory search, the higher burden put on the elderly could cause an actual deterioration in health for some, thereby increasing the probability of receiving DI benefits directly and making substitution more likely.

group.⁵ Individuals entering unemployment *before* the year 2003 are unaffected by the policy change as long as they are older than 57.5 on the 1st of January 2004. Since only individuals with an age at inflow of 55.5 years or older are selected for analysis, the selected unemployment spells starting in 2001 are unaffected by the change in policy. They are subject to the initial regulation: they are required to search for a job until the age of 57.5. However, if they are still unemployed when they turn 57.5, they can quit searching without consequences for their UI eligibility. Individuals that are 57.5 years or older at the time of inflow never need to report any search activities.

Table 3. SEARCH REQUIREMENTS FOR TREATMENT AND CONTROL GROUPS

Year of inflow	Age at inflow	Required to search for UI?	Level extended benefit	Entitlement extended benefit
2001 (control)	55.5-57.5	Until age 57.5	70% of minimum wage first 2 years; 0-70% of minimum wage afterwards (70% if no partner with income)	2.5-5.5 years until age 65
2001 (control)	57.5-59.5	No	70% of minimum wage	0.5-3.5 years until age 65
2003 (treatment)	57.5-59.5	From 01-01-04	70% of minimum wage	0.5-3.5 years until age 65
2004 (treatment)	55.5-57.5	Yes	0-70% of minimum wage (70% if no partner with income)	2.5-5.5 years until age 65
2004 (treatment)	57.5-59.5	Yes	0-70% of minimum wage (70% if no partner with income)	0.5-3.5 years until age 65

Extended benefits capture both extended UI benefits and IOAW benefits (which an older unemployed individual can receive up to age 65)

The first treatment group consists of individuals entering the UI benefit system in the year 2004. Unemployed aged 57.5+ and entering unemployment in 2004 need to actively search for new employment, allowing us to study the effect of *being required to search from the start of the unemployment spell* versus never being required to search. Those younger than 57.5 at time of inflow need to continue searching at the age of 57.5. Therefore we can also examine the effect of needing to *continue searching at age 57.5* versus being allowed to stop searching at that age.

The second treatment group consists of individuals entering the UI benefit system in the year 2003. The 2003 inflow is affected in a way that is different from the individuals that enter unemployment in 2004. The group of individuals aged 57.5 and over at the time they start their unemployment spell at first instance did not need to search for a job. However, when they are still unemployed on the 1st of January 2004, they are required to start searching. We drop individuals that became unemployed from the 11th of August onwards, such that the 2003 inflow sample is not affected by a cancellation of extended benefits (see Section 2.1.2). Using the 2003 treatment group, we can investigate the effect of needing to *search formally after being unemployed for 5-12 months*, versus not being required to search at all.

⁵In Section 7 we conduct a sensitivity analysis using 56.5-58.5 year olds becoming unemployed in 2002 as an alternative control group. This does not affect our results.

To sum up, we select a control group (inflow in 2001), a ‘partly’ treated group (inflow in 2003) and a ‘fully’ treated group (inflow in 2004) for analysis. Being able to study multiple treatment effects using different sources of variation in the data generated by the same policy change makes a strong case for identification of the sign and magnitude of the effect of search requirements on the number of individuals finding jobs.

We drop less than 1% of the individuals because of unobserved covariates (mainly education). Search requirements did not apply to individuals that receive DI benefits before flowing into the UI system. We therefore select only individuals that come from private sector jobs.⁶ Inspecting the distribution of states of origin for the various years of inflow, we find no evidence of selectivity. The origin states for the various years of inflow can be found in Table B.3.⁷ The final sample comprises 26,279 observations for analysis.

5 Methodology and Descriptive Statistics

5.1 Regression Specifications

We specify hazard models for the exit rate to a job, disability benefits and early retirement payments and adopt regression discontinuity and difference-in-difference approaches as the main identification strategies.

Let τ be calendar time and t spell duration. Then τ^I is the calendar year of inflow and a^I the age at inflow. Moreover, a_t denotes a time-varying variable indicating the age of an individual after t months of unemployment. The transition rates from unemployment to some exit state x are affected by a vector of observable characteristics X at the time an individual starts his or her unemployment spell. We assume that exit to any state can be described by a flexible proportional hazard model including piecewise constant duration dependence.

In a first regression specification, we select individuals becoming unemployed in 2001 (control) and in 2004 (treated). Then the instantaneous probability of leaving unemployment to exit state x , given that the individual is still unemployed at unemployment duration t is given by the hazard rate $\theta^x(t|X, \tau^I, a^I, a_t)$:

$$\theta^x(t) = \lambda(t) \exp \{ X' \beta + \gamma_1 I^{04} + \gamma_2 I[a^I \geq 57.5] + \gamma_3 (I^{04} * I[a^I \geq 57.5]) + \gamma_4 I[a_t \geq 57.5] + \gamma_5 (I^{04} * I[a_t \geq 57.5]) \} \quad (1)$$

where I^{04} is a dummy indicating whether or not the year of inflow was 2004 ($\tau^I = 2004$), $I[a^I \geq 57.5]$ is a dummy indicating whether or not an individual is at least 57.5 years old at inflow into unemployment, and the interaction effect $I^{04} * I[a^I \geq 57.5]$ picks up a first treatment effect: the need to fulfill formal search requirements from the start of unemployment when an individual is at least 57.5 years old at inflow, i.e. an ‘always search’ effect. The indicator $I[a_t \geq 57.5]$ is a time-varying variable equal to 1 from the time an

⁶ Another reason to exclude these individuals is that their latent probabilities to find a job or to enter another DI spell are very different from those of previously employed individuals.

⁷ Inflow from DI benefits is slightly larger in 2001, following the declining trend in the number of DI recipients as a percentage of the labour force in the Netherlands (de Jong, 2008).

individual turns 57.5 and the interaction $I^{04} * I[a_t \geq 57.5]$ picks up a second treatment effect: the need to continue formal search when a person turns 57.5, i.e. a ‘continue search’ effect.

Note that the inclusion of the parameters on this second treatment effect is also needed to correctly estimate the first treatment effect: since we are using individuals aged 55.5-57.5 as the control group to identify the ‘always search’ effect γ_3 (the effect on the 57.5-59.5 year olds) we need to correct for the fact that the younger individuals that became unemployed in 2004 were also treated from the age of 57.5 onwards.

A second regression takes only individuals aged 57.5-59.5, becoming unemployed either in 2003 (treatment group) or in 2001 (control group) to estimate the effect of the policy change for those that did not formally search for a job until being unemployed for 5-12 months:

$$\theta^{x(t)} = \lambda(t) \exp \{X'\beta + \delta_1 I^{03} + \delta_2 I[\tau \geq 1 \text{ Jan } 2004] + \delta_3 (I^{03} * I[\tau \geq 1 \text{ Jan } 2004])\} \quad (2)$$

where I^{03} indicates possibility of treatment if still unemployed on January 1st 2004 (i.e. inflow in 2003), $I[\tau \geq 1 \text{ Jan } 2004]$ is an indicator function equal to 1 from the moment an individual reaches the 1st of January 2004, and the interaction effect $I^{03} * I[\tau \geq 1 \text{ Jan } 2004]$ picks up a third treatment effect: the need to start fulfilling formal search requirements after 5-12 months in unemployment for individuals aged 57.5-59.5 at the start of their unemployment spell, i.e. a ‘start search’ effect.

The baseline hazard $\lambda(t)$ for both empirical models specifies duration dependence in the form of a flexible piecewise constant function:

$$\lambda(t) = \exp \left(\sum_{k=1}^K \lambda_k I_k(t) \right) \quad (3)$$

where $I_k(t)$ is an indicator function taking the value 1 if duration t is in interval k . We specify $K = 7$ duration intervals, defined as durations from 0-1 month, 1-2 months, 2-3 months, 3-6 months, 6-12 months, 12-24 months and 24+ months.⁸ We normalize $\lambda_1 = 0$.

For both regressions, the density of total unemployment duration T for a spell with exit state x can therefore be written as:

$$f_i^x(T|X) = \theta_i^{x(t)}(T|X) \exp \left(- \int_0^T \theta_i^{x(t)}(s|X) ds \right)$$

The loglikelihood adds the contributions of noncensored and censored spells:

$$L^x = \sum_{i \in \{nc\}} \log \theta_i^{x(t)}(T|X) - \sum_i \int_0^T \theta_i^{x(t)}(s|X) ds \quad (4)$$

where $\{nc\}$ denotes the set of noncensored spells: all individuals that are observed to exit to state x . A spell is considered censored when still ongoing at the 31st December 2005 or when an individual is observed to

⁸Our results are not sensitive to the addition of extra intervals

exit to a state other than x . Tables B.4 and B.5 in Appendix B give a schematic overview of the identification of the parameters for both regression specifications.

In order to control for observed heterogeneity, we include as background characteristics: age and its square, dummies for marital status, nationality, and whether there are any dependent children in the household. We further control for the level of education in four categories: whether the highest diploma an individual received was primary school, a low level of highschool/the lowest level of higher education, a high level of highschool/a middle level of higher education or higher professional education/university. We also include a regressor on whether the individual is on a spell with a ‘revived’ UI right. A right is considered revived when an unemployment spell is interrupted (for example by a job) and an individual returns to unemployment before having the chance to build up new UI rights. In this case, UI benefits can be received for the remainder of the potential benefit duration and therefore the total potential benefit duration for the individual is shortened. Two other indicators for potential benefit duration give information on whether an individual is on a spell with a long potential benefit duration (i.e. receives wage-related or extended benefits) or a short potential benefit duration (receiving short-term UI benefits for a maximum of six months). We include the quarters of the year as time-varying variables, thereby allowing for seasonal effects on outflow. In regression (1) for exit to early retirement, we include a number of time-varying age-regressors (turning 56, turning 57, turning 58 etc.) and interactions of these age-regressors with the year of inflow in UI. In this way we allow for a discontinuous shift in early retirement behaviour over time, following changes in the pension system described in Section 2.3.

In regression (1) we do not control for the cancellation of extended benefits on the 11th August 2003. If this policy change causes a discontinuous shift in *outflow* (e.g. to a job) for 57.5-59.5 year olds as opposed to 55.5-57.5 year olds, the point estimate on the always search effect γ_3 will be biased. Indeed, Tuit and van Ours (2010^a) find that the *inflow* in UI benefits used to show a pronounced spike around the age of 57.5, which is more moderate after January 2004. They conclude that before the policy change in 2004, high wage workers were more likely to postpone unemployment until reaching the age of 57.5. In this case, our 2001 57.5-59.5 year olds have better characteristics than our 2004 inflow such that the always search effect γ_3 puts a lower bound on the effect of a search requirement change on outflow to jobs. Tuit and van Ours (2010^b) also show that the number of married individuals that postpone unemployment until the age of 57.5 is relatively large. This can be explained by the fact that after UI benefits expire, all individuals aged 50+ at the beginning of unemployment can continue their unemployment spell in a scheme called the IOAW in which the height of the benefits is exactly the same as the extended UI benefits (i.e. 70% of minimum wage - see Table 3) but the receipt of these benefits is conditional on income of the partner. The relabeling of social insurance scheme therefore changes nothing for single individuals. Indeed, we plot the inflow in UI as a function of age (following Tuit and van Ours, 2010^a) but show it separately for married and single individuals. Figure 2a shows that the spike around age 57.5 in the years before 2004 was driven by the

behaviour of married individuals.⁹ In other words, individuals that have a partner (who receives income) have a higher incentive to postpone unemployment and receive UI benefits until age 65. Discontinuation of the extended benefits on the 11th August 2003 therefore makes married individuals aged 57.5 at the start of their unemployment spell disproportionately worse off. To capture this effect, we include an interaction effect of the treatment parameter γ_3 with being married.¹⁰ This specification provides enough flexibility to capture the effect of the abolition of extended benefits: Section 7 shows that estimation on singles only returns similar results.

Figure 2a: INFLOW IN UI 2001-2005

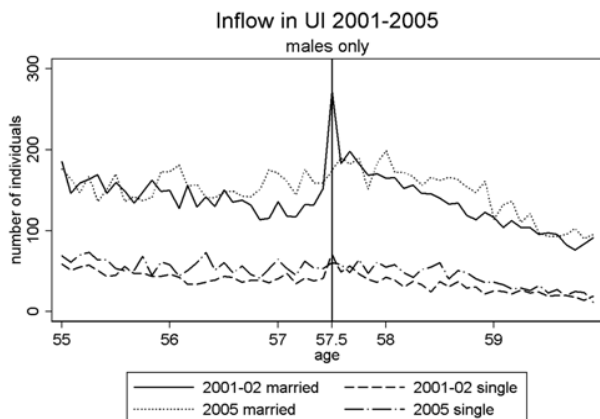
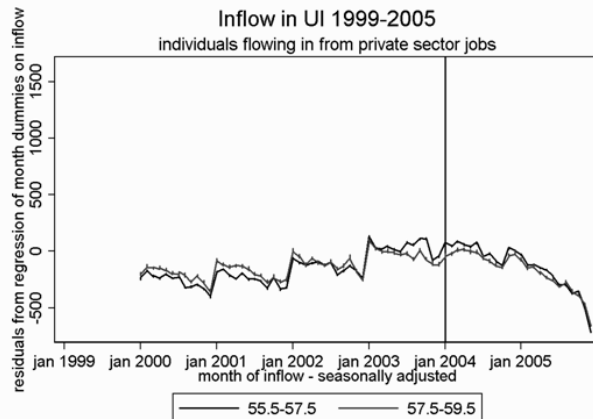


Figure 2b: INFLOW IN UI 1999-2005



5.2 Identification and Descriptive Evidence

Table 4 gives some insight into similarity and dissimilarity of the various treatment and control groups. Note that for an unbiased estimate of the always search effect γ_3 , we assume that there is no change in some relevant characteristic for individuals becoming unemployed in 2001 versus those becoming unemployed in 2004, *that is discontinuous* at an age of 57.5 at inflow. For the continue search effect γ_5 we need a similarly weak condition: in absence of the change in search requirements, there should not be a discontinuous change in the hazard rate into jobs (and other destination states) when *turning* 57.5 between individuals starting unemployment in 2001 versus individuals starting unemployment in 2004.¹¹ For the start search effect δ_3 , the treatment effect is correctly identified under the assumption that individuals aged 57.5+ and starting unemployment in 2001 are a good control for the business cycle in the sense that they pick up any ‘being in 2004 or beyond’ effect that the inclusion of time-varying seasonal effects cannot control for.

⁹In order to keep our figure comparable to that of Tuit and van Ours (2010^a) we show inflow in UI for males only.

¹⁰Inclusion of this regressor generally does not affect our results. Note that this does not imply that the cancellation of extended benefits was ineffective: married individuals entering unemployment when being close to 60, turn 65 before exhausting their (3.5 instead of 2 years lasting) extended benefits and are only moderately affected. In contrast, married individuals younger than 57.5 at inflow lose a full 2 years of extended benefits. The fact that we find a zero result of the cancellation of extended benefits is therefore inherent in our choice of treatment and control groups.

¹¹Note that there could be a general age effect, in that outflow from unemployment (into jobs) already decreases before turning 57.5. To the extent that this age effect is constant throughout the years, the age regressors are a sufficient control and our estimate of γ_5 is unbiased. Moreover, including an interaction of age and year of inflow does not change the results for outflow to jobs or DI benefits for any of the measured treatment effects.

Table 4. BACKGROUND CHARACTERISTICS

Year of inflow in UI	2001		2003		2004		$\Delta_{57.5+}^{03-01}$	$\Delta_{57.5+}^{04-01} - \Delta_{57.5-}^{04-01}$
Age at inflow in UI	55.5-57.5	57.5-59.5	57.5-59.5	55.5-57.5	57.5-59.5			
Search required?	until age 57.5	never	from 01-01-04	always	always			
Age	56.46	58.33	58.42	56.48	58.36	0.09***	0.01	
Female	0.31	0.25	0.28	0.32	0.27	0.03***	0.01	
Single	0.08	0.06	0.06	0.08	0.07	0.00	0.01	
Married	0.74	0.79	0.77	0.73	0.76	-0.02*	-0.02	
Divorced/widowed	0.18	0.15	0.17	0.19	0.17	0.02**	0.01	
Dutch	0.85	0.86	0.84	0.83	0.85	-0.02***	0.01	
Western	0.13	0.11	0.12	0.13	0.11	0.01**	0.00	
Non Western	0.04	0.03	0.04	0.04	0.04	0.01**	0.01	
Dependent child	0.27	0.21	0.23	0.35	0.27	0.02*	-0.02*	
Education low	0.15	0.15	0.14	0.10	0.11	-0.01	0.01	
Education mid1	0.35	0.37	0.34	0.32	0.33	-0.03***	-0.01	
Education mid2	0.32	0.31	0.34	0.38	0.37	0.03***	0.00	
Education high	0.18	0.17	0.18	0.19	0.18	0.01	0.00	
Revived UI right short PBD	0.19	0.10	0.12	0.22	0.19	0.02***	0.06***	
long PBD	0.10	0.05	0.05	0.07	0.05	0.00	0.03***	
Monthly UI benefits	0.87	0.92	0.92	0.91	0.93	0.00	-0.03***	
# Hours in UI	1177	1316	1375	1187	1269			
# Observations	32.84	33.77	33.20	32.65	33.25			
	3152	3476	3675	6270	5292			

Definition of variables is explained in the text. # Hours in UI denotes the number of hours in the previous job. The Dif-in-Dif statistic $\Delta_{57.5+}^{04-01} - \Delta_{57.5-}^{04-01}$ is the parameter β_3 from a regression of the type: $y = \beta_0 + \beta_1 * I^{04} + \beta_2 * I[a^I \geq 57.5] + \beta_3 * I^{04} * I[a^I \geq 57.5]$.

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$

Since both the always search effect γ_3 and the continue search effect γ_5 provide a before-during regression discontinuity design (BD-RDD) estimate (Lalive, 2008) we do *not* need to assume that the difference in characteristics between 57.5+ year olds and 57.5- year olds is the same when comparing the 2001 with the 2004 inflow. However, it is comforting to see that they do. Looking at individuals aged 57.5-59.5 in Table 4, we see that individuals becoming unemployed in 2004 seem to be more likely to have a child present in the household¹² and tend to be slightly higher educated as compared to the unemployed in 2001. To the extent that the increase in education for the inflow in 2004 is *both* typical for the 57.5-59.5 age group *and* discontinuous in age, the always search parameter γ_3 could be overestimating the true treatment effect on the outflow to jobs (assuming individuals with a higher education are to find jobs faster). However, since the increase in education seems to be a general phenomenon for the whole sample (aged 55.5-59.5), this effect will be picked up by the indicator for inflow in 2004. t-tests on the difference-in-difference shown in column 7

¹²This probably indicates a cohort effect since the fraction of the younger age group in 2001 having a dependent child is similar to the fraction for the older age group in 2004.

of Table 4 indicate that the only difference between treated and control is that in 2004 the 57.5-59.5 year olds are slightly more likely to be on short-term UI benefits or have a revived UI right. Since this change is highly unlikely to be discontinuous at age 57.5 when becoming unemployed, this development will be picked up by inclusion of a continuous age effect in the regression analysis. Moreover, Section 7 shows that controlling for the fact that business cycle effects might influence older age group differently does not affect the baseline results presented here.

Using the 57.5+ year old 2001 inflow as a control for the business cycle in regression specification (2) seems more problematic: not only is the 2003 group slightly older, they are also more likely to be female, divorced, non-dutch and relatively highly educated. Moreover, since dynamic selection is likely to add to the differences between the 2001 inflow and the 2003 inflow sample on the 1st January 2004, the results of regression (2) need to be interpreted with some caution. However, the sensitivity analyses in Section 7 show that selection of a control group that becomes unemployed in 2002, or a treatment group that becomes unemployed any time in the year 2003 does not change the baseline results. These results suggest that the treatment effect presented in the next Section is not (much) contaminated by business cycle effects.

Even though observable characteristics of treatment and control groups develop in the same way, it is instructive to consider the possibility of a discontinuity in unobservables. Anticipation of the policy change can result in selective inflow into unemployment around the time the policy was initiated. Figure 2b depicts the residuals of a regression of month dummies on inflow into the UI system between the years 2000 and 2005. There is no sign of an increase in discrepancy between the 57.5- and 57.5+ inflow around the 1st of January 2004. The intuition for this is straightforward: since none of the individuals flowing into UI in 2003 were exempted from the new rules, there was no incentive to try to circumvent the policy change by speeding up the firing procedure. Anticipation is also largely irrelevant in regression (2): it is highly unlikely that an unemployed would increase search effort in December 2003 as a means to avoid the requirement to increase search effort in January 2004.

Table 5 shows the proportion of individuals that two years after the start of their unemployment spell transit to a job, early retirement or DI benefits respectively. As expected, older individuals more often flow into retirement, rather than to jobs and DI benefits. Moreover, it appears that individuals becoming unemployed in 2004 flow into jobs more often than individuals becoming unemployed in 2001. More importantly, for exit to DI benefits the difference between the age groups declines in the later years. This indicates that there is at least some effect of the 2004 policy change: stricter search requirements decrease the relative gap in outflow to DI benefits between the 55.5-57.5 and 57.5-59.5 year olds.¹³ For the outflow to jobs and retirement, Table 5 also provides an indication of an effect of tighter search requirements. Moreover, Table 6 shows that the average duration until a job is found is decreasing stronger over the years for the older age

¹³From Table 5 it seems that instead of observing an increase in inflow to DI for the older age group, there is a decline in inflow to DI for the younger age group. Indeed, inflow in DI declined following changes in the DI system in 2002 (De Jong, 2008). The fact that there is no decline in DI inflow for individuals aged 57.5-59.5 indicates that there was a counteracting (policy) change specifically affecting DI inflow for this age group - for example, the change in search requirements.

group than for the younger age group. This suggests a higher speed of outflow to jobs for older unemployed in recent years.

Table 5. EXIT DESTINATIONS WITHIN 2 YEARS AFTER ENTERING UI

Year of inflow in UI	2001		2004		
Age at inflow in UI	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5	$\Delta_{57.5+}^{04-01} - \Delta_{57.5-}^{04-01}$
Search required?	until age 57.5	never	always	always	
Job	0.45 (0.63)	0.31 (0.50)	0.40 (0.71)	0.28 (0.56)	0.02 (-0.02)
Retirement	0.10 (0.14)	0.24 (0.39)	0.07 (0.13)	0.14 (0.28)	-0.07 (-0.10)
DI benefits	0.16 (0.23)	0.07 (0.11)	0.09 (0.16)	0.08 (0.16)	0.08 (0.12)
Still in UI	0.29	0.38	0.44	0.50	-0.03
# Observations	3152	3476	6270	5292	

In parentheses: as a fraction of the number of observations that exit UI within 2 years

For exit to job and DI: when $\Delta_{57.5+}^{04-01} - \Delta_{57.5-}^{04-01}$ is positive, convergence between treated and control over time occurred

For exit to retirement and still in UI: when $\Delta_{57.5+}^{04-01} - \Delta_{57.5-}^{04-01}$ is negative, convergence between treated and control over time occurred

Table 6. MEAN AND MEDIAN DURATION WITHIN 2 YEARS AFTER ENTERING UI (DAYS)

Year of inflow in UI	2001		2004		
Age at inflow in UI	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5	$\Delta_{57.5+}^{04-01} - \Delta_{57.5-}^{04-01}$
Search required?	until age 57.5	never	always	always	
To job					
- mean	145	164	173	160	-32
- median	105	120	134	126	-23
To retirement					
- mean	243	343	126	209	-17
- median	155	334	61	184	-56
To DI					
- mean	182	262	194	174	-100
- median	128	198	160	137	-103

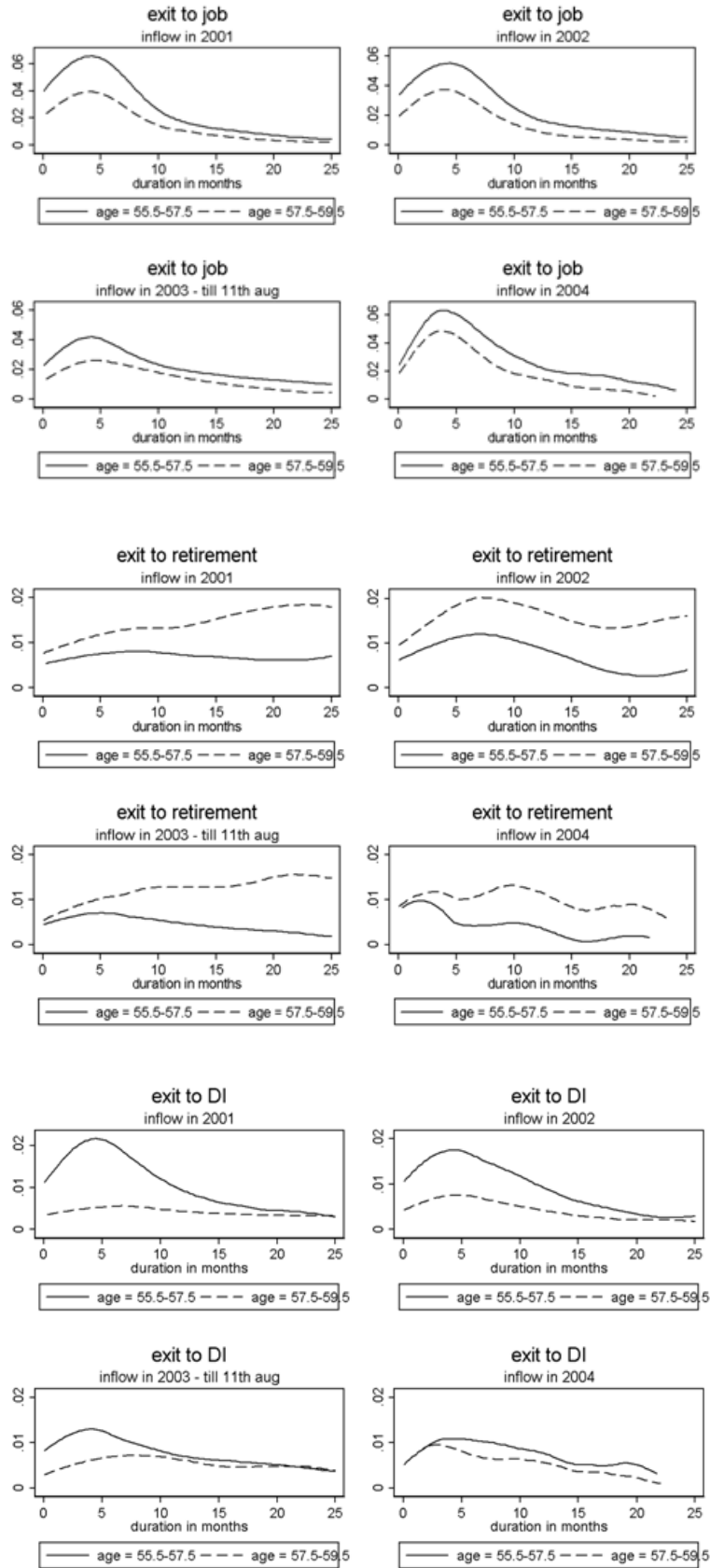
For all exit states: when $\Delta_{57.5+}^{04-01} - \Delta_{57.5-}^{04-01}$ is negative, convergence between treated and control over time occurred

6 Estimation Results

6.1 Nonparametric Results

Figure 3 depicts the nonparametric estimation of the (kernel) smoothed hazards.

Figure 3: NONPARAMETRIC ESTIMATION OF HAZARD FUNCTIONS



Since individuals aged 57.5+ did not need to fulfill search requirements in 2001 and 2002, we expect the difference in the speed of outflow to a job between the young and the old age group to be large in those years. For the inflow in 2003 and 2004, both age groups needed to fulfill search requirements. We therefore expect the difference in outflow rates between the age groups to be smaller in 2003 and 2004 (as compared to 2001/2002). Figure 3 indeed shows that the speed of outflow to a job has converged between age groups.

Note that individuals that are slightly younger than 57.5 and entered unemployment in 2003 and 2004 are also affected by the reform: they now need to continue searching when turning 57.5. Graphical or descriptive evidence cannot separate the discontinuity in age at inflow from the discontinuity in age during the UI spell, and therefore cannot show clear evidence on the impact of the reform. In order to separate these two discontinuities and at the same time take into account a general (continuous) age effect, we estimate the always search and continue search effects simultaneously using equation (1) specified in Section 5.1. Similarly, in order to separate a general 2004 business cycle effect from the effect of the policy change, we estimate equation (2) parametrically.

6.2 Parametric results

Regression equation (1) is specified for the three exit states out of unemployment: exit to a job, (early) retirement, and DI benefits. An overview of treatment effects for the two regression specifications is given in Tables 7 and 8. Full results from the baseline model are given in Tables B.6 and B.7. Results are given in exponentiated coefficients and can therefore be interpreted as a change in the (overall) hazard ratio as a result of a 1-unit change in the corresponding covariate. If there is any positive effect of stricter search requirements for older unemployed on the inflow to jobs/early retirement/DI, we would therefore expect the reported coefficients to be significantly larger than 1. Separate models are estimated for males and females, following the results of Wald tests which for each exits to job and early retirement clearly rejected a joint model ($p < 0.01$). A joint model is estimated on regression equation (2) for exit to DI, since a Wald test indicated that joint estimation is acceptable ($p = 0.11$). In the baseline model, which includes background regressors (described in Section 5.1 and shown in Table 4), we find always search (γ_3) hazard ratios for the exit to jobs equal to 1.75 (males) and 1.96 (females). Loosely speaking, an unemployed man who is older than 57.5 at inflow and needs to search for jobs has a speed of outflow to jobs that is 1.75 times the speed of outflow of an 57.5+ year old that does not face any search requirements. The effect of a search requirement becoming effective at age 57.5 when an individual is between 55.5 and 57.5 at the time of inflow (i.e. the continue search effect) is of similar magnitude, increasing the hazard rate by a factor 1.95 (males) and 1.77 (females) over the remaining duration of the spell.

Do note that the magnitude of the coefficients is not informative on the magnitude of the absolute differences in outflow rates: since the effect of continued search is measured only over the latter part of the unemployment spell, where outflow rates are lower for all individuals, the *absolute* effect of the search requirement change could very well be larger for the 57.5+ year olds. We therefore graphically show in

Figure 4 parametric hazards for the treatment and control groups based on the regression results. The hazard functions are calculated for all male treated individuals and subsequently averaged in order to show an average (intention to) treatment effect on the treated. It can be seen from Figure 4 that because of a smaller baseline hazard, the absolute treatment effect for the hazard rate to DI is smaller than for the hazard to a job.

Figure 4: PARAMETRIC ESTIMATION OF HAZARD FUNCTIONS

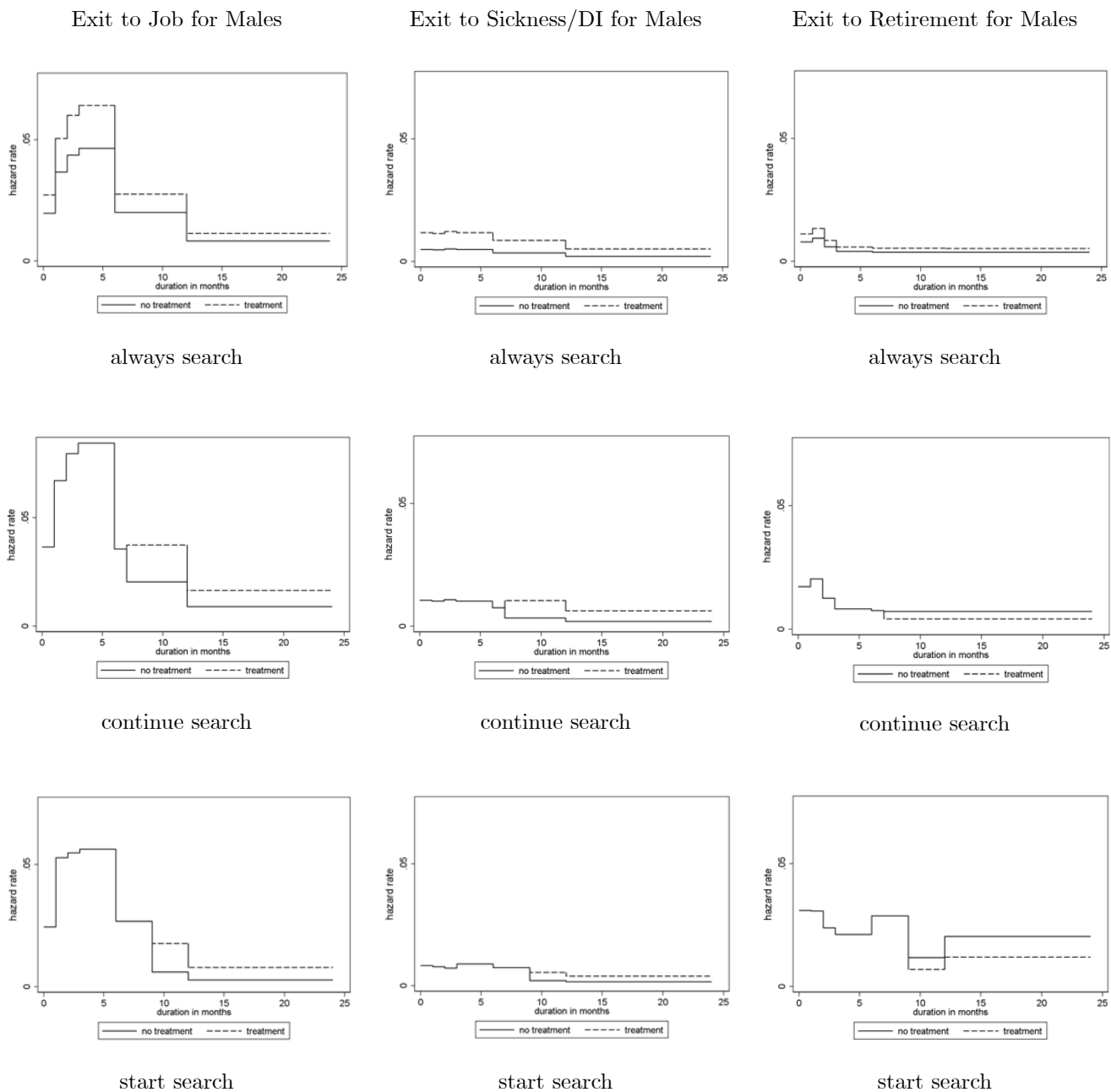


Table 7. TREATMENT EFFECTS, OVERVIEW OF REGRESSION 1 - COMPARISON ACROSS SPECIFICATIONS

MALES		Exit to a job			Exit to retirement			Exit to DI benefits				
Always search vs. never (γ_3)	2.37*** (0.20)	1.38*** (0.12)	1.38*** (0.13)	1.56*** (0.19)	0.92 (0.16)	1.55* (0.35)	1.46* (0.34)	1.60** (0.37)	4.14*** (0.68)	2.39*** (0.42)	2.48*** (0.47)	2.53*** (0.50)
Continue search at age 57.5 (γ_5)	4.54*** (0.45)	1.84*** (0.19)	1.82*** (0.20)	2.36*** (0.35)	0.38*** (0.10)	0.63** (0.13)	0.60** (0.13)	0.84** (0.13)	4.90*** (0.85)	3.08*** (0.57)	3.04*** (0.59)	3.24*** (0.57)
Baseline controls ^a	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes
Incl sectors	no	no	yes	no	no	no	yes	no	no	no	yes	no
Frailty	no	no	no	gamma	no	no	no	gamma	no	no	no	gamma
# Obs	12945	12945	11665	12945	12945	12945	11665	12945	12945	12945	11665	12945
# Failures	5108	5108	4513	5108	2241	2241	2092	2241	1189	1189	1047	1189
FEMALES		Exit to a job			Exit to retirement			Exit to DI benefits				
Always search vs. never (γ_3)	3.95*** (0.51)	1.77*** (0.24)	1.76*** (0.25)	2.04*** (0.38)	1.06 (0.35)	0.84 (0.39)	1.57 (0.56)	0.84 (0.39)	8.82*** (1.85)	5.19*** (1.61)	5.06*** (1.18)	5.99*** (0.61)
Continue search at age 57.5 (γ_5)	4.61*** (0.72)	1.89*** (0.30)	1.75*** (0.30)	2.34*** (0.55)	0.26*** (0.09)	0.29** (0.14)	0.42** (0.21)	0.37** (0.18)	6.24*** (1.61)	3.24*** (0.87)	3.66*** (1.03)	3.64*** (1.11)
Baseline controls ^a	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes
Incl sectors	no	no	yes	no	no	no	yes	no	no	no	yes	no
Frailty	no	no	no	gamma	no	no	no	gamma	no	no	no	gamma
# Obs	5245	5245	4774	5245	5245	5245	4774	5245	5245	5245	4774	5245
# Failures	1680	1680	1520	1680	640	640	600	640	623	623	565	623

Standard errors in parentheses

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$

a) A full set of regressors can be found in Table B.6

Table 8. TREATMENT EFFECTS, OVERVIEW OF REGRESSION 2 - COMPARISON ACROSS SPECIFICATIONS

MALES												
	Exit to a job			Exit to retirement			Exit to DI benefits					
Start search after 5-12 months (δ_3)	7.72***	2.87***	3.16***	5.38***	1.07	0.74**	0.76**	0.74**	3.39***	2.63***	2.16***	2.63***
(s.e.)	(2.09)	(0.91)	(1.06)	(2.25)	(0.12)	(0.10)	(0.11)	(0.10)	(0.76)	(0.67)	(0.58)	(0.67)
Baseline controls ^a	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes
Incl sectors	no	no	yes	no	no	no	yes	no	no	no	yes	no
Frailty	no	no	no	gamma	no	no	no	gamma	no	no	no	gamma
# Obs	5252	5252	4790	5252	5252	5252	4790	5252	7151	7151	6551	7151
# Failures	1637	1637	1438	1637	1537	1537	1455	1537	664	664	600	664
FEMALES												
	Exit to a job			Exit to retirement			Exit to DI benefits					
Start search after 5-12 months (δ_3)	4.37***	1.94	2.17	1.94	2.07***	1.19	1.15	1.19	3.39***	2.63***	2.16***	2.63***
(s.e.)	(1.91)	(0.99)	(1.19)	(0.99)	(0.43)	(0.29)	(0.29)	(0.29)	(0.76)	(0.67)	(0.58)	(0.67)
Baseline controls ^a	no	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes
Incl sectors	no	no	yes	no	no	no	yes	no	no	no	yes	no
Frailty	no	no	no	gamma	no	no	no	gamma	no	no	no	gamma
# Obs	1899	1899	1761	1899	1899	1899	1761	1899	7151	7151	6551	7151
# Failures	462	462	426	462	276	276	243	276	664	664	600	664

Standard errors in parentheses

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$

a) A full set of regressors can be found in Table B.7

In a competing risks setting, an increase in the hazard rate cannot directly be interpreted as an increase in the number of individuals leaving to a certain exit state. Figure 5 shows simulations of the average (intention to) treatment effect on percentage of individuals who flow out to jobs and disability benefits respectively. Since we can track labour market behaviour of individuals that start their unemployment spell in 2004 for a maximum of two years, we only show the change in outflow after a maximum of two years of unemployment. Another reason to choose this time limit is that there is only a very small number of individuals that finds a job after being unemployed for more than two years. Standard errors used to compute the 95% confidence bounds are calculated using bootstrapping.¹⁴ Table 9 provides for both males and females an overview of treatment effects for exit to a job, DI and retirement within two years.

From Table 9, we conclude that the percentage of individuals finding a job within 2 years after becoming unemployed increased with about 6 (11) percentage points following the introduction of compulsory search requirements for male (female) individuals aged 57.5+ that needed to search from the start of their unemployment spell. The percentage point increase for a male (female) individual aged 57 who needed to continue search when turning 57.5 is about 6 (6) percentage points. However, there was also an increase of 4 (9) and 2 (3) percentage points in take up of disability benefits after a maximum of 2 years in unemployment, for male (female) individuals aged 57.5+ and aged 57 respectively. For the start search effect measured by the parameter δ_3 in equation (2), we can see from Table 9 that there is an increase in outflow to jobs of around 9 (7) percent and a small and insignificant increase in outflow to DI benefits for a male (female) individual that is already unemployed for 9 months and from that moment on requested to report job search efforts to the unemployment office. As for the exit to retirement, there is no general pattern in the estimated treatment effects in Tables 7 and 8. The gradual transition from a PAYG to an actuarially fair capital funded early retirement system greatly reduced the incentive for the unemployed to retire early. Since this effect cannot be completely separated from the effect of search requirements in UI, estimates are biased downwards. Cumulative incidence functions for this exit state are therefore omitted.¹⁵

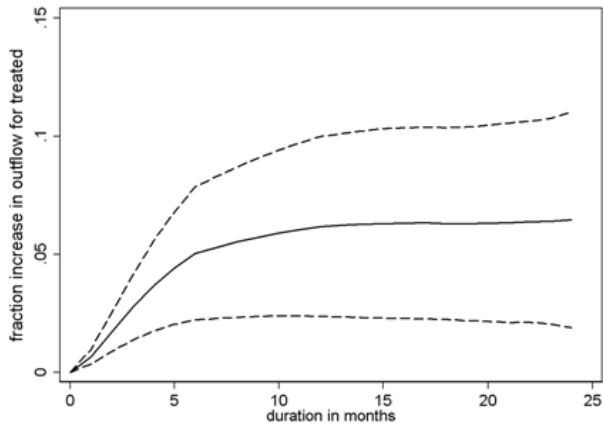
Our results are in accordance with Been and Knoef (2012) who use a dynamic panel data model to show that the imposition of search requirements led to a reduction in take up of social insurance for men and women aged 55-64. Previous studies found that (financial) incentives matter for the number of individuals taking up various forms of social insurance as a means to exit the labour force at older ages (Kerkhofs et al. 1999, Heyma 2004, Inderbitzin et al. 2012). The findings in this paper show that substitution between social schemes is also important for unemployed individuals.

¹⁴100 bootstrap replications. Using the delta method to calculate standard errors gives similar results.

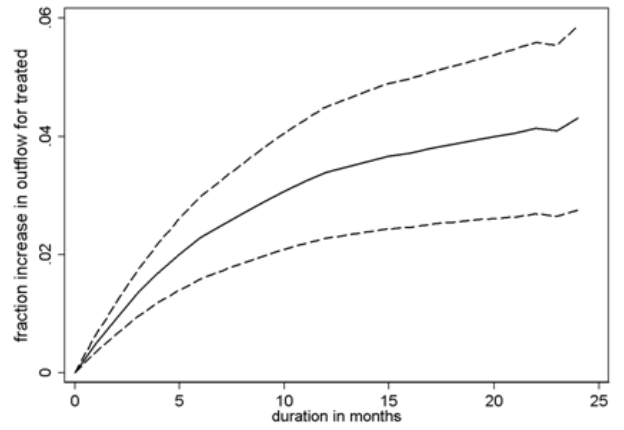
¹⁵In estimating the treatment effect in terms of outflow probabilities, we do need to take retirement into account as an alternative exit state. If outflow to retirement decreases, more individuals can exit to a job and the estimated treatment effect (in terms of outflow probabilities) for exit to jobs will be underestimated if exit to retirement is not taken into account.

Figure 5 - CUMULATIVE INCIDENCE FUNCTIONS,
Exit to job for Males

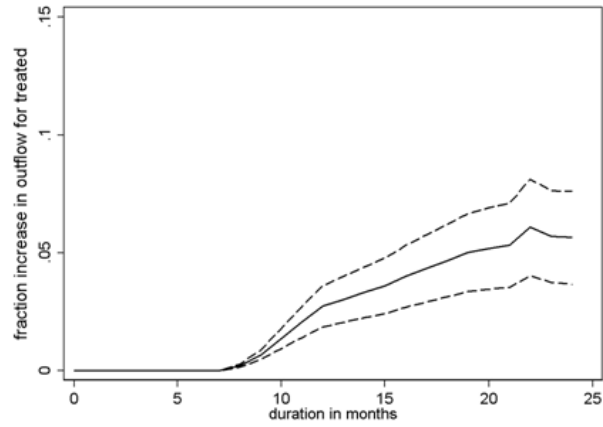
INCLUDING 95% CONFIDENCE INTERVALS
Exit to Sickness/DI for Males



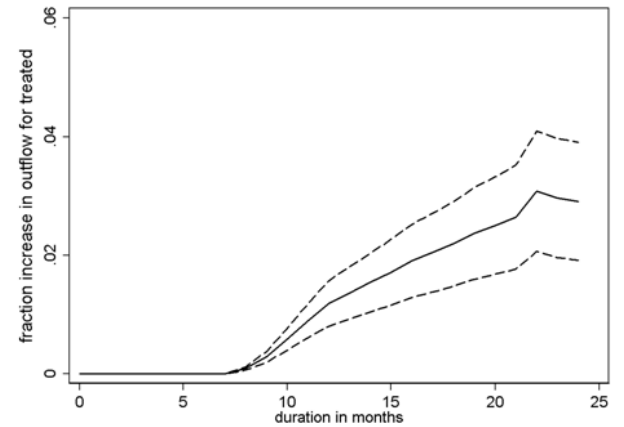
always search



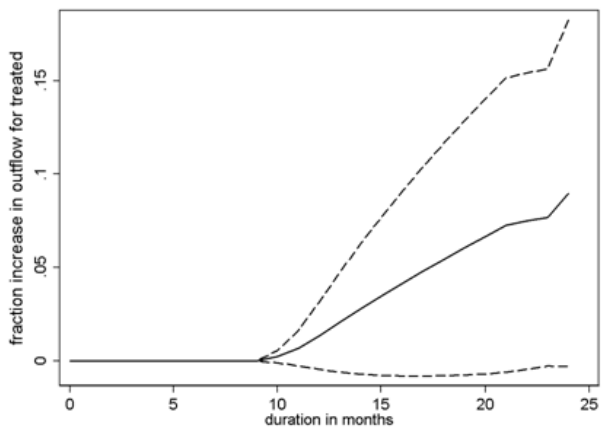
always search



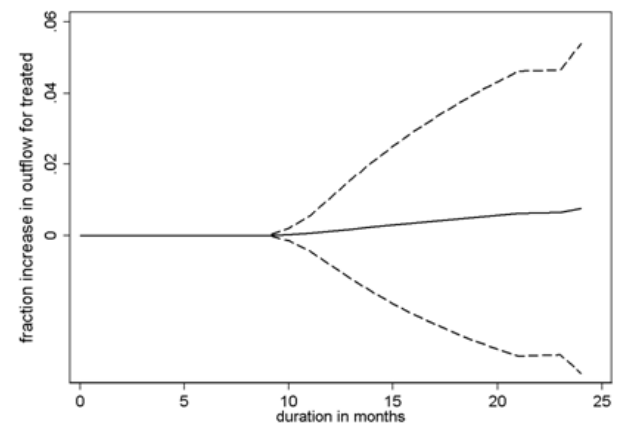
continue search



continue search



start search



start search

Table 9. PERCENTAGE EXIT TO JOB AND DI WITHIN 2 YEARS AFTER ENTERING UI

	Job		DI	
	males	females	males	females
57.5-59.5, always search	37.8	30.2	8.4	11.7
57.5-59.5, never search	31.3	19.1	4.1	2.5
Effect of always search (γ_3)	6.5**	11.1***	4.3***	9.1***
57, Continue search at age 57.5	49.9	41.3	10.3	12.5
57, Stop search at age 57.5	44.3	35.6	7.4	9.4
Effect of continue search (γ_5)	5.7***	5.8***	2.9***	3.1***
57.5-59.5, start search after 9 months	27.3	30.5	2.4	2.4
57.5-59.5, never search	18.3	23.2	1.7	1.7
Effect of start search (δ_3)	9.0*	7.2	0.8	0.8

Every first two lines reported are average exit rates within 2 years after entering UI for the treated individuals. Every third line reports the treatment effect.

* indicates $p < 0.10$, ** indicates $p < 0.05$, *** indicates $p < 0.01$

7 Sensitivity Analysis

After estimation of the baseline model including only the treatment effects (column 1 of Tables 7 and 8), a model including background regressors (column 2), adding the sector of the previous job as a regressor (column 3) and incorporating gamma distributed unobserved heterogeneity parameters (column 4), a few concerns may remain. We therefore supply additional sensitivity checks, results of which are reported in Tables 10 and 11. In all sensitivity checks, we compare results to that of the baseline model in column 2 of Tables 7 and 8. The baseline model results are reproduced in column 1 of Tables 10 and 11.

First, the age range from 55.5-59.5 might be too wide to be able to precisely estimate the always search and continue search parameters in regression (1). Making treatment and control groups even more similar, we estimate equation (1) using only 56.5-58.5 year olds. As can be seen from column 2 of Table 10, treatment parameters for exits to jobs, early retirement or disability hardly change.

Second, for regression equation (2), instead of only selecting individuals that became unemployed in 2003 until the 11th of August we can choose to form a treatment group containing *all* individuals becoming unemployed in 2003. The treatment parameters remain of similar magnitude, again strengthening the confidence that the cancellation of extended UI benefits does not interfere with our results.

Third, we show results using the individuals becoming unemployed in 2002 instead of 2001 as a control group in column 3 of Table 10 and Table 11. In this regression, we can only use individuals aged 56.5 and above since those unemployed are all at least 57.5 year old at the 1st January 2004 and are therefore unaffected by the policy change. Interestingly, in regression (1) the estimated treatment effects for exit to disability seem slightly larger for males, and slightly smaller for females using this control group. Moreover,

the start search effect for exit to a job as estimated in regression (2) becomes significantly positive for females.

We have carried out a large number of other sensitivity checks: we included average (monthly) wage earned in the previous occupation as an indicator of productivity. Unfortunately, including previous wage as a regressor results in a loss of about 70% of observations. Including this regressor does not lead to large changes in results, either qualitatively or quantitatively. The coefficient estimate on wage itself was often close to 1 and never significant.

Another concern with regression (1) might be that it is important to account for the possibility that business cycle effects influence older age groups differently (Jaimovich and Siu, 2009). Including an interaction effect of age with year of inflow does not lead to large changes in the estimates. Moreover, adding also an interaction of age with the indicator for being in the treatment group (γ_2) and an interaction of age with the always search treatment parameter γ_3 leads to slightly larger coefficient estimates on the treatment effects. In order to keep the specification parsimonious, we exclude these extra regressors from the baseline specification.

We present estimates on only single individuals in column 4 of Table 10. Single individuals were not affected by the abolition of extended benefits in August 2003: instead of extended benefits they receive IOAW payments which also equal 70% of minimum wage. The only difference between extended UI benefits and IOAW payments is that the latter is tested against the income of the spouse. Since spouse's income is zero for all singles, they are indifferent between receiving extended UI benefits or IOAW benefits. Although estimation only on single individuals leads to a loss of observations and hence a reduction in statistical significance, it does not lead to large changes in the estimated treatment effects.

In order to further strengthen confidence that the regression specifications do not erroneously return significant results on the treatment parameters, we can perform placebo tests. First, we run both regression specifications using 50.5-54.5 year olds, letting the 50.5-52.5 olds play a fake control group (fake in the sense that they are also treated) and indeed we do not find an extra effect of the policy reform for the (redefined) older age group.¹⁶ Another check on the effectiveness of the reform is to run regression specification (1) using individuals becoming unemployed in 2001 and 1999 as a treatment and control group (both groups of individuals are not treated). Indeed, we do not find any effect of this fake reform on outflow to jobs, early retirement, or disability benefits.

As a check on heterogeneity of treatment effects (over and above the heterogeneity dictated by the proportional hazard structure) we run regressions on specific subgroups of the population. From a policy perspective, it is interesting to know whether search requirements are especially (and maybe only) effective for high employability individuals. These individuals face better prospects when actively searching for jobs and might therefore be affected the most by a compulsory search requirement. We test this hypothesis by running separate regressions by educational level. The results from these regressions do not show large differences in magnitude by education level for any of the search effects.¹⁷

¹⁶For exit to a job for males, we do find a significant and positive estimate of 1.43 on our always search γ_3 parameter.

¹⁷Because the expected payoff of searching is higher, highly educated individuals might use informal search channels even

A general concern with the estimation of competing risks in a one-by-one equation setting is that time to exit for the different states might be interrelated. Although neglecting possible correlation in hazard rates to the various exit states should not influence the estimation of interaction/treatment effects as much as level effects, it is nevertheless instructive to jointly estimate the 3-equation model. For this aim, we specify a Multivariate Mixed Proportional Hazards model with Heckman-Singer (1984) heterogeneity. We make use of 2 mass points of the heterogeneity distribution per equation and construct logit functions to estimate the mixing probabilities.¹⁸ Sign and magnitude of the MMPH estimates are very similar to the single equation estimation results. Results are displayed in Table B.8 in Appendix B.

As a final sensitivity check, note that the continue search effect γ_5 should be close to the effect measured by Heyma and van Ours (2005). Selecting a sample of individuals aged 55.5-57.5 they study the effect of the absence of search requirements from age 57.5 on outflow to jobs *before* the policy change took place. They therefore study the same continue search parameter γ_5 in a slightly different model. The fact that our estimation returns similar results to Heyma and van Ours (2005) therefore strengthens confidence in the functional form specification of equation (1). Our estimated continue search effect is close to being the reciprocal of their discontinue search effect which is to be expected if both models are correctly specified. Moreover, from the full results of our baseline model depicted in Table B.6 we can see that before policy change, there is a discontinuity at age 57.5 both for males and for females. After the policy change, this discontinuity disappears.¹⁹

without a search requirement. This goes against finding a more positive effect for the highly educated.

¹⁸Specifying more than 2 mass points results in convergence of at least 2 of the heterogeneity parameters to the same point. We conclude that 2 mass points are sufficient to capture (neglected) unobserved heterogeneity.

¹⁹This can be seen from the parameter estimates presented in Table B.6: $\gamma_4 * \gamma_5 = 0.59 * 1.84 \approx 1$ for males and $\gamma_4 * \gamma_5 = 0.57 * 1.89 \approx 1$ for females.

Table 10. SENSITIVITY ANALYSIS REGRESSION 1

MALES													
		Exit to a job				Exit to retirement				Exit to DI benefits			
Always search	1.38***	1.75***	1.61***	1.24	1.40*	1.12	0.93	1.52	2.21***	3.02***	3.70***	2.93***	
vs. never (γ3)													
(s.e.)	(0.12)	(0.22)	(0.20)	(0.17)	(0.27)	(0.39)	(0.19)	(0.27)	(0.30)	(0.74)	(0.86)	(0.78)	
Continue search	1.84***	1.95***	1.72***	2.07***	0.63**	0.42***	0.36***	0.50	3.08***	3.00***	4.08***	3.14***	
at age 57.5 (γ5)													
(s.e.)	(0.19)	(0.24)	(0.19)	(0.45)	(0.13)	(0.13)	(0.08)	(0.26)	(0.57)	(0.70)	(0.89)	(1.05)	
Control group	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow
Age range	55.5-59.5	56.5-58.5	56.5-58.5	55.5-59.5	55.5-59.5	56.5-58.5	56.5-58.5	singles only	55.5-59.5	56.5-58.5	56.5-58.5	56.5-58.5	singles only
# Obs	12945	7195	7757	2751	12945	7195	9080	2751	12945	7195	7757	7195	2751
# Failures	5108	2680	2783	1077	2241	1298	1850	345	1189	638	679	638	308
FEMALES													
		Exit to a job				Exit to retirement				Exit to DI benefits			
Always search	1.77***	1.96***	1.41*	1.80***	0.91	0.47	1.09	1.36	3.73***	4.75***	2.92***	4.06***	
vs. never (γ3)													
(s.e.)	(0.24)	(0.38)	(0.26)	(0.34)	(0.42)	(0.35)	(0.52)	(0.94)	(0.76)	(1.46)	(0.82)	(1.35)	
Continue search	1.89***	1.77***	1.76***	1.90**	0.29**	0.32	0.31**	0.21**	3.24***	2.02**	2.00***	2.32	
at age 57.5 (γ5)													
(s.e.)	(0.30)	(0.35)	(0.33)	(0.50)	(0.14)	(0.23)	(0.15)	(0.14)	(0.87)	(0.65)	(0.62)	(1.18)	
Control group	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow
Age range	55.5-59.5	56.5-58.5	56.5-58.5	55.5-59.5	55.5-59.5	56.5-58.5	56.5-58.5	singles only	55.5-59.5	56.5-58.5	56.5-58.5	56.5-58.5	singles only
# Obs	5245	1803	2823	3041	5245	1803	2823	3513	5245	1803	2823	1803	3041
# Failures	1680	830	908	618	640	354	470	253	623	315	351	315	217

Standard errors in parentheses

* indicates p<0.1, ** indicates p<0.05, *** indicates p<0.01

Table 11. SENSITIVITY ANALYSIS REGRESSION 2

MALES												
	Exit to a job			Exit to retirement			Exit to DI benefits					
Start search after 5-12 months of unemployment (δ_3) (s.e.)	2.87*** (0.91)	2.92*** (0.91)	1.97*** (0.31)	0.74** (0.10)	0.58*** (0.08)	0.91 (0.10)	2.63*** (0.67)	2.25*** (0.56)	2.85*** (0.57)			
Control group	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2002 inflow	2002 inflow
Treatment group	2003 11th aug	2003 total	2003 11th aug	2003 11th aug	2003 total	2003 11th aug	2003 total	2003 11th aug	2003 11th aug	2003 total	2003 total	2003 11th aug
# Obs	5252	6451	7025	5252	6451	7025	7151	8793	9630			
# Failures	1637	2123	2185	1537	1745	1914	664	783	833			
FEMALES												
	Exit to a job			Exit to retirement			Exit to DI benefits					
Start search after 5-12 months of unemployment (δ_3) (s.e.)	1.94 (0.99)	1.93 (0.95)	2.52*** (0.81)	1.19 (0.29)	0.91 (0.21)	0.88 (0.18)	2.63*** (0.67)	2.25*** (0.56)	2.85*** (0.57)			
Control group	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2002 inflow	2002 inflow
Treatment group	2003 11th aug	2003 total	2003 11th aug	2003 11th aug	2003 total	2003 11th aug	2003 total	2003 11th aug	2003 11th aug	2003 total	2003 total	2003 11th aug
# Obs	1899	2343	2605	1899	2343	2605	7151	8793	9630			
# Failures	462	635	735	276	536	548	664	783	833			

Standard errors in parentheses

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$

8 Post-unemployment job characteristics

Because an expansion of search requirements entails an increase in search costs, thereby decreasing the value of being unemployed, the January 2004 policy change theoretically leads to a decrease in the reservation wage. Although an increase in search effort is the effect that policy makers would like to establish with imposing the new search requirements, another possibility is that older workers are matched to lower-skilled and lower-paid jobs. It is therefore interesting to examine the effects on post-unemployment job characteristics more closely. Table B.9 gives an indication of the importance of these effects. For most of the groups, the wage distribution after unemployment is not first-order stochastically dominated by the wage distribution before unemployment. Instead, the wage distribution after unemployment is more dispersed than the distribution before unemployment, indicating that although some individuals need to give up some salary in order to get re-employed, there is also a considerable group of individuals that receives a higher wage after the unemployment spell. If anything, the difference between wages previously earned and wages accepted decreases over time between the age groups. Whereas the decrease in accepted wages and previous wages for unemployed aged 57.5-59.5 is large when they become unemployed in 2001, individuals aged 55.5-57.5 are earning wages comparable to their previous wage. For individuals becoming unemployed in 2003 and 2004 however, the loss (or gain) in wages accepted is very much equal between the two age groups. In conclusion: these descriptives do not provide direct evidence for a declining reservation wage theory.

Not only reservation wages may decline upon an increase in search costs, individuals may also start searching for jobs that are different in other respects. For example, older workers may only be able to find part-time employment after an unemployment spell. Table B.10 describes the fraction of individuals that were in part-time, full-time or flexible work arrangements both before and after the unemployment spell. As is intuitive, older individuals (aged 57.5+) are more likely to take up part-time employment after a spell of unemployment, trying to bridge the last couple of years to the pensionable age of 65. Although the fraction of full-time workers decreases in later years, there does not seem to be a clear pattern between the treatment and control groups: individuals becoming unemployed in any of the examined years are about half as likely to have a full-time job after their unemployment spell. In contrast, employment with flexible hours has become more popular as an option to take up a job for older unemployed. Taken together, Table B.10 does not indicate that the 2004 policy change had large effects on post-unemployment job characteristics.

9 Conclusions

As the challenges associated with an ageing population become more prominent and many countries increase statutory retirement age, it becomes all the more important to document the effects of labour market policies on behaviour of older workers. This paper deals with one such policy change which has recently been implemented in various countries, namely the imposition of job search requirements for older unemployed. Using a large administrative database covering all wage and benefit payments to Dutch individuals in the

years 1999-2005, we show the effects of a tightening of search requirements which is specifically aimed at older workers. A policy reform, coming into effect on the 1st of January 2004, makes an end to the special treatment of older unemployed individuals. Before the law was initiated, an unemployed individual aged 57.5 did not need to report his/her job search effort to the unemployment office. The new policy required older unemployed to continue actively searching for a job even after turning 57.5. Using difference-in-difference and regression discontinuity techniques within a flexibly specified duration framework, we estimate the effect of this reform on outflow to jobs, early retirement and disability benefits for the various affected groups of individuals aged 55.5 to 59.5. The main finding is that within 24 months after the start of an unemployment spell, there is a 6 (11) percentage points increase in the number of male (female) individuals that find a job. However, this strong effect on labour market participation is accompanied by a 4 (9) percentage point increase in the number of male (female) individuals who use DI benefits as an alternative exit route. In light of the evidence that UI benefits and DI benefits are alternative pathways to early retirement, one would expect outflow to retirement to increase as well. However, changes in the UI and in the early retirement system cannot be completely separated, and therefore we cannot provide evidence for an increased outflow to early retirement. These conclusions are remarkably robust: using various sources of variation generated by the policy change we show strong effects of search requirements for the older unemployed on their chances to find jobs, and their probability to receive DI payments. Moreover, the same results are found in many types of alternative regression specifications.

The finding that unemployed individuals substitute between receipt of UI benefits and DI benefits can be expected to hold in many countries. The exact magnitude of both the job finding effect and the substitution effect likely differs according to institutional settings such as the way in which stricter rules are enforced, the height of penalties, and the attractiveness of other social schemes. An interesting venue for further research is to estimate the contribution of these parameters to the gross effect presented in this paper. Another suggestion for further research is to estimate the impact of search conditions on after-unemployment job characteristics. Theory predicts that an increase in search costs will decrease reservation wages and might therefore lock the older workers into low-skilled and low-paid jobs, another unwanted side-effect of a policy that is meant to induce older workers to become more active and productive labour market participants.

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effects of job search requirements for the older unemployed".

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Appendices

A Changes in the DI System 2001-2005

Most policy changes in the DI system in the period 2001-2005 were aimed at employers. The presumably largest changes in the DI system took place in 2002 and 2004. From April 1st 2002, the Gatekeeper Improvement Act (Wet Verbetering Poortwachter) specifies that both employers and employees must prove that they have put enough effort in preventing inflow in the DA during the one year period of sickness. When the unemployment office decides that the reintegration programme does not suffice, the period in which the employer pays sickness benefits (the SA period) is extended for at most one year. Otherwise, DA payments to the employee are refused or reduced. Incentives to enter the DA therefore significantly decrease. However, in absence of an employer, the Act is not expected to have reduced SA inflow from unemployed workers.

Since January 1st 2002, employers get a 2% reduction on the DA premium paid for a worker at least 57 years of age (on the 1st of January of that year). An employer might therefore be more willing to hire 57+ year olds. Since employers' DA premiums comprised 4.76% of gross wage, less than 0.1% of gross wage can be saved by hiring a 57+-year old. Note again that this policy provides incentives for employers, and is not likely to influence behaviour of the unemployed. Although the number of job offers to older unemployed might increase slightly as a result of this reform, the savings on hiring a 57+-year old are so small that this is not likely to influence our results. Another possibly relevant adjustment came into effect on the 1st of July 2003. As from this date, it is possible for employers to accept responsibility for payment of SA benefits to former employees (becoming unemployed less than 1 month before they get sick). In exchange, employers' SA premiums are reduced. As a result, inflow in SA of UI benefit recipients in the first month of unemployment can be reduced. However, only 26 (mainly small) employers take up this new right until January 1st 2005. The policy change is therefore considered unsuccessful and is abolished in May 2006. It is unlikely that this temporary adjustment in the system will affect our results. Another reform, taking effect on the 1st of January 2004, extends the maximum length of SA benefits from 1 to 2 years. For the employer, this means that an ill employee costs him a maximum of two years of wage payments, instead of one. From this moment on, also unemployed individuals receive two years of SA benefits before transferring to DA. As with the Gatekeeper Improvement Act, such a policy measure aimed at increasing reintegration incentives of employers does not have a bite for individuals without an employer. Another law also introduced on the 1st of January 2004 absolves employers from having to pay a basic (non-differentiated) DA premium when hiring a 50+ year old. Because this affects all individuals in our sample (aged 55.5-59.5) equally, this new policy cannot influence our results. Finally, on the 1st of August 2004, the collective agreement on DA for self-employed is abolished. From that date on, self-employed are expected to self-insure via private insurers. Since we do not consider self-employed in the analysis, the change does not affect the estimates.

B Extra Tables

Table B.1. AVERAGE HEIGHT AND DURATION OF SANCTIONS

Average height of sanctions - percentage points cut in UI benefits					
	2002	2003	2004	2005	2006
Total	17.81	17.54	16.98	16.27	15.62
Non-compliance with required # of job applications	20.96	20.99	20.88	20.92	20.85
Non-compliance with job applications on a suitable 'level'	23.06	22.24	23.98	24.69	22.37
Average duration of sanctions (in weeks)					
	2002	2003	2004	2005	2006
Total	7.49	7.42	7.93	7.48	6.93
Non-compliance with required # of job applications	14.77	14.07	14.07	14.23	13.83
Non-compliance with job applications on a suitable 'level'	13.55	15.26	12.99	12.54	16.33

Data on sanctions are aggregate statistics from the unemployment office.

Table B.2. NUMBER OF SANCTIONED INDIVIDUALS PER YEAR

	2002	2003	2004	2005	2006
Total	28774	34829	49368	48440	38931
- as a % of number of individuals in UI	7.68	7.35	9.04	9.15	a)
Non-compliance with required # of job applications	12999	15120	23808	22327	15729
- as a % of number of individuals in UI	3.47	3.19	4.36	4.22	a)
- as a % of total number of sanctioned individuals	45.18	43.41	48.23	46.09	40.40
Non-compliance with job applications on a suitable 'level'	65	76	93	113	78
- as a % of number of individuals in UI	0.02	0.02	0.02	0.02	a)
- as a % of total number of sanctioned individuals	0.23	0.22	0.19	0.23	0.20

Data on sanctions are aggregate statistics from the unemployment office.

a) could not be calculated since the number of individuals is calculated making use of our 1999-2005 data.

Publicly available aggregate statistics are on the number of benefits, not individuals. Since one individual can receive multiple UI benefits within a year (and even at the same time) this figure cannot be used here

Table B.3. ORIGIN OF UI SPELL (I.E. STATE OF INFLOW)

Year of inflow in UI	2001		2003 (1st jan - 10th aug)		2004	
Age at inflow in UI	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5
Search required?	until 57.5	never	from 01-01-04		always	always
Private sector job	3152 (0.83)	3476 (0.86)	4414 (0.85)	3675 (0.88)	6270 (0.86)	5292 (0.87)
DI benefits	596 (0.16)	554 (0.14)	724 (0.14)	480 (0.11)	922 (0.13)	702 (0.12)
Other	38 (0.01)	25 (0.01)	51 (0.01)	33 (0.01)	95 (0.01)	59 (0.01)
TOTAL	3786	4055	5189	4188	7287	6053

As a fraction of total inflow in parentheses

Table B.4. IDENTIFICATION REGRESSION 1

	being <57.5@inflow	being >57.5@inflow	turning 57.5, being <57.5@inflow
Inflow in 2001	a	b, γ_2	e, γ_4
Inflow in 2004	c, γ_1	d, $\gamma_1+\gamma_2+\gamma_3$	f, $\gamma_1+\gamma_4+\gamma_5$
	c-a= γ_1	d-b= $\gamma_3+\gamma_1$	f-e= $\gamma_1+\gamma_5$

$\gamma_3=(d-b)-(c-a)$: effect of needing to search always as opposed to never (age at inflow >57.5)

$\gamma_5=(f-e)-(c-a)$: effect of needing to continue search at 57.5 (age at inflow <57.5)

Table B.5. IDENTIFICATION REGRESSION 2

	till 1 jan 2004, being >57.5@inflow	from 1 jan 2004 , being >57.5@inflow
Inflow in 2001	a	b, δ_2
Inflow in 2003	c, δ_1	d, $\delta_1+\delta_2+\delta_3$
	c-a= δ_1	d-b= $\delta_1+\delta_3$

$\delta_3=(d-b)-(c-a)$: effect of starting to search (@ 1 jan 2004) after

5-12 months of unemployment as opposed to never (age at inflow >57.5)

Table B.6. TREATMENT EFFECTS, BASELINE - REGRESSION 1

	MALES			FEMALES		
	Job	Retirement	DI benefits	Job	Retirement	DI benefits
I^{04}	0.83***	0.80*	0.49***	0.72***	1.25	0.39***
$I[a^I \geq 57.5]$	0.56***	1.00	0.36***	0.45***	1.43	0.21***
$I[a^I \geq 57.5] * I^{04}$ - <i>always search</i>	1.38***	1.55*	2.39***	1.77***	0.84	5.19***
$I[a_t \geq 57.5]$	0.59***	1.20	0.44***	0.57***	1.43	0.25***
$I[a_t \geq 57.5] * I^{04}$ - <i>continue search</i>	1.84***	0.63**	3.08***	1.89***	0.29**	3.24***
$I[a_t \geq 57.5] * I^{04} * \text{married}$	0.97	0.91	0.92	0.97	1.09	0.72
married	1.03	1.38***	0.80***	0.85***	0.67***	0.93
age	0.80***		0.82	0.78**		0.96
age ²	1.04***		1.05*	1.04*		0.99
western	1.07	0.85**	0.95	0.96	1.03	1.19
non western	0.77***	0.89	1.41***	1.18	0.90	1.33
dependent child	1.26***	0.93	1.16**	1.24***	1.05	1.20*
education mid1	1.02	1.13	0.97	1.07	1.09	0.95
education mid2	1.03	1.36***	0.83**	1.22**	1.40**	0.92
education high	0.87***	1.62***	0.59***	1.34***	2.25***	0.73*
revived UI right	1.12***	0.53***	1.24***			
long PBD	0.59***	4.07***	1.27	0.53***	2.62***	1.03
unknown PBD	0.89	1.73*	0.94	0.95	1.38	1.15
april-june	0.82***	0.29***	0.54***	0.61***	0.53***	0.44***
july-sept	0.48***	0.28***	0.62***	0.57***	0.44***	0.51***
oct-dec	0.27***	0.25***	0.42***	0.37***	0.39***	0.42***
λ_{1-2}	1.73***	1.10	0.91	1.77***	0.95	0.99
λ_{2-3}	1.98***	0.66***	0.93	1.62***	0.61**	1.84***
λ_{3-6}	2.14***	0.47***	0.92	2.08***	0.43	1.66***
λ_{6-12}	0.97	0.49***	0.74***	1.13	0.50***	1.25
λ_{12-24}	0.43***	0.45***	0.45***	0.45***	0.41***	0.76
λ_{24+}	0.09***	0.35***	0.26***	0.10***	0.39***	0.22***
$I[56.5 \leq a_t \leq 57.5]$		1.00			0.50	
$I[57.5 \leq a_t \leq 58.5]$		1.09			1.52	
$I[58.5 \leq a_t \leq 59.5]$		0.99			0.89	
$I[59.5 \leq a_t \leq 60.5]$		2.80***			6.09***	
$I[60.5 \leq a_t \leq 61.5]$		1.71***			2.01**	
$I[61.5 \leq a_t \leq 62.5]$		2.67***			2.71***	
$I[62.5 \leq a_t \leq 63.5]$		1.21			1.38	
$I[63.5 \leq a_t \leq 64.5]$		0.00			1.93	
$I[56.5 \leq a_t \leq 57.5] * I^{04}$		0.84			1.49	
$I[57.5 \leq a_t \leq 58.5] * I^{04}$		0.81			0.50	
$I[58.5 \leq a_t \leq 59.5] * I^{04}$		0.79			0.66	
$I[59.5 \leq a_t \leq 60.5] * I^{04}$		0.69**			0.67	
$I[60.5 \leq a_t \leq 61.5] * I^{04}$		0.46*			1.46	
# Obs	12945	12945	12945	5245	5245	5245
# Failures	5108	2241	1189	1680	640	623

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$

A description of regressors can be found in the main text

Table B.7. TREATMENT EFFECTS, BASELINE - REGRESSION 2

	MALES			FEMALES		
	Job	Retirement	DI benefits	Job	Retirement	DI benefits
Γ^{03}	0.97	1.62***	1.27**	1.46***	1.22	1.27**
$I[\tau \geq 1 \text{ Jan } 2004]$	0.22***	0.43***	0.33***	0.22***	0.44***	0.33***
$\Gamma^{03} * I[\tau \geq 1 \text{ Jan } 2004] - \textit{start search}$ <i>after 5-12 months unemployment</i>	2.87***	0.74**	2.63***	1.94	1.19	2.63***
married	1.00	1.22***	0.84*	0.87	0.67***	0.84*
age	2.20	1.40	3.57	1.62	1.95	3.57
age ²	0.91	0.99	0.84	0.94	0.94	0.84
western	1.03	0.92	0.83	0.77*	0.93	0.83
non western	0.93	0.93	1.29	1.18	0.90	1.33
dependent child	1.34***	1.04	1.05	0.98	0.94	1.05
education mid1	1.02	1.18*	0.91	0.93	1.19	0.91
education mid2	0.90	1.32***	0.93	1.07	1.48**	0.93
education high	0.82**	1.72***	0.67***	1.67***	2.25***	0.67***
revived UI right	1.18***	0.58***	1.37***	1.57***	0.90	1.37***
long PBD	0.50***	2.92***	1.06	0.37***	2.10***	1.06
unknown PBD	1.15	1.64	1.55	0.52***	0.80	1.55
april-june	0.59***	0.27***	0.43***	0.38***	0.53***	0.43***
july-sept	0.35***	0.24***	0.45***	0.34***	0.41***	0.45***
oct-dec	0.16***	0.21***	0.27***	0.18***	0.39***	0.27***
λ_{1-2}	1.80***	0.66***	0.72	1.56*	0.85	0.72
λ_{2-3}	2.24***	0.69**	1.03	2.73***	1.14	1.03
λ_{3-6}	2.34***	0.73**	1.33	2.73***	1.14	1.03
λ_{6-12}	1.21*	0.93	1.07	4.19***	0.85	1.33
λ_{12-24}	0.54***	1.48***	0.77	0.72	2.48***	0.77
λ_{24+}	0.22***	1.80***	0.67*	0.45***	2.70***	0.67*
# Obs	5252	5252	7151	1899	1899	7151
# Failures	1637	1537	664	462	476	664

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$

A description of regressors can be found in the main text

Table B.8. MULTIVARIATE MIXED PROPORTIONAL HAZARD MODEL

REGRESSION 1			
MALES			
	exit to a job	exit to retirement	exit to DI benefits
Always search vs. never (γ_3)	1.40***	1.43*	2.27***
(s.e.)	(0.10)	(0.28)	(0.30)
Continue search at age 57.5 (γ_5)	1.88***	0.58**	3.07***
(s.e.)	(0.22)	(0.12)	(0.57)
# Obs	12945	12945	12945
FEMALES			
	exit to a job	exit to retirement	exit to DI benefits
Always search vs. never (γ_3)	1.98***	0.83	4.42***
(s.e.)	(0.27)	(0.38)	(0.86)
Continue search at age 57.5 (γ_5)	1.95***	0.25***	3.14***
(s.e.)	(0.38)	(0.12)	(0.87)
# Obs	5245	5245	5245
REGRESSION 2			
MALES			
	exit to a job	exit to retirement	exit to DI benefits
Start search after 5-12 months of unemployment (δ_3)	3.58***	0.73***	3.02***
(s.e.)	(1.19)	(0.09)	(0.92)
# Obs	5252	5252	5252
FEMALES			
	exit to a job	exit to retirement	exit to DI benefits
Start search after 5-12 months of unemployment (δ_3)	2.38	1.06	1.94
(s.e.)	(1.47)	(0.24)	(1.01)
# Obs	1899	1899	1899

Standard errors in parentheses

* indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$

Results on females for regression 2 are estimated under the assumption of no heterogeneity in retirement behaviour, since without restrictions the heterogeneity terms in the retirement equation would converge to the same point.

Table B.9. GROSS HOURLY WAGE (in euros) OF JOB BEFORE AND AFTER UNEMPLOYMENT SPELL

	2001	2003 (1st jan - 10th aug)	2004	
Year of inflow in UI	55.5-57.5	57.5-59.5	57.5-59.5	57.5-59.5
Age at inflow in UI	until 57.5	never	until 57.5 and from 01-01-04	always
Search required?	until 57.5	never	until 57.5 and from 01-01-04	always

	Before	After	Before	After	Before	After	Before	After
10%	9.0	8.6	10.2	8.6	9.0	8.9	9.4	9.3
25%	11.5	9.9	12.2	11.0	11.8	11.2	11.3	11.7
50%	14.1	13.8	14.8	14.3	14.7	15.6	14.3	15.3
75%	18.8	18.3	20.0	17.7	19.5	21.1	19.1	20.3
90%	24.7	26.8	27.5	23.7	27.0	30.9	26.4	27.3
Mean	16.1	16.7	17.3	15.7	17.0	18.2	16.5	17.3
Min	5.2	5.4	5.4	5.6	6.1	6.2	4.9	5.9
Max	68.2	93.6	72.3	48.5	77.0	65.2	68.8	123.6
# Hours	149	130	154	129	147	103	147	117
# Obs	822	206	1138	95	1257	97	1763	394

Inflation correction applied

Table B.10. TYPE OF WORK BEFORE AND AFTER UNEMPLOYMENT SPELL

Year of inflow in UI	2001		2003 (1st jan - 10th aug)		2004	
Age at inflow in UI	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5
Search required?	until 57.5	never	until 57.5 and from 01-01-04	from 01-01-04	always	always
Before						
Parttime	0.22	0.17	0.29	0.27	0.31	0.27
Fulltime	0.65	0.73	0.57	0.62	0.55	0.61
Flex	0.13	0.09	0.14	0.11	0.15	0.12
# Observations	1445	1615	2833	2195	4395	3461
After						
Parttime	0.34	0.38	0.36	0.45	0.33	0.35
Fulltime	0.45	0.45	0.37	0.32	0.37	0.40
Flex	0.21	0.17	0.28	0.23	0.31	0.25
# Observations	1642	1170	1901	1044	2791	1678

Numbers given as a fraction of the number of individuals for whom we observe whether they went to parttime, fulltime or flextime unemployment. That is, the total fraction of individuals in the three employment types should add up to 1 for each group (apart from effects of rounding).