

The effects of job search requirements for older unemployed

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Abstract

In this paper, 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, retirement and sickness/disability. The reform, becoming effective on January 1st 2004, required 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 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 that were affected by the policy change, the stricter search requirements did significantly increase 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.

1 Introduction

How can policy be successful in keeping older workers attached to the labor market? This question is central to policy reforms involving an outward shift of retirement age to 67 and beyond, as is being discussed or implemented in many countries. One important aspect in increasing the labor market participation of older individuals is how to get them back to work after a period of unemployment. However, little is known about the labor market behavior of this growing age class. In particular job search behavior and its relation to financial incentives are not well documented. This state of affairs is peculiar since inflow rates of older workers into unemployment are typically higher than those of prime-aged employees. Outflow rates back into employment are, on the other hand, remarkably low. It is well documented that a job loss results in large and lasting effects on future employment probabilities of older workers, for example in the U.S (Chan and Stevens (2001)) and in the Netherlands (de Graaf-Zijl and Hop (2007)).

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This paper exploits a recent policy change in the Netherlands to examine how changes in search requirements for the older unemployed affect their transition rates to employment, retirement and disability benefits. Before January 1st 2004, older unemployed (defined as being at least 57.5 years old) were not required to actively search for a job in order to receive full UI benefits. After 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. Hence, the policy shift allows us to identify any causal reaction of labor *supply* to changed incentives, holding constant the possibly more unfavourable labor market conditions faced by the elderly.

To study labor market transitions of older workers, access to a dataset with a large cross sectional dimension is needed. Labor market surveys are usually based on a representative sample of the entire working age population and only a tiny fraction of older unemployed individuals is observed, precluding meaningful analyses of transition behavior within this group. The present paper contributes to filling this gap by using a large administrative database covering all registered benefit and wage receipts in the Netherlands, including all individuals on UI benefits. The data provides very precise information on income and labor market status, giving us a large enough sample to analyze labor market transitions of the older unemployed in the years 2001 to 2005.

This study is related to the 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 (van den Berg and van der Klaauw (2006), Abbring et al. (2005) and van den Berg et al. (2004)), changes in potential benefit duration (Card and Levine (2000), van Ours and Vodopivec (2006), (Caliendo et al., 2009), (Lalive et al. 2006), Lalive (2008)) or the level or replacement rate of unemployment benefits (Carling et. al. (2001), Røed and Zhang (2003)). Studies examining a tightening of search requirements are less widespread. Manning (2009) finds large flows out of claimant status upon a policy change in the U.K but does not find an effect on search intensity. Petrongolo (2009), studying the same U.K. reform, concludes that although unemployment duration has decreased, the outflow to disability insurance benefits increased, indicating that some individuals decided to stop searching and entered other social insurance schemes instead. Our paper is closest to Heyma and van Ours (2005), who examine the effect of a discontinuity in UI eligibility criteria for the Dutch elderly. 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 variation over time, we are able to estimate treatment effects for various treated groups. Moreover, we can control for the selective inflow in unemployment around age 57.5 found by Heyma and van Ours (2005).

Instead of focussing only 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. Indeed, 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 in case 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 might instead substitute towards other benefit types, such as disability benefits or, in case of the elderly, 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 part of policy evaluation. In this paper, we are able to furnish empirical evidence as to the importance of the various channels. Estimating flexible form competing risks duration models using difference-in-difference and regression discontinuity approaches, we find that for several groups of individuals that were affected by the policy change, the stricter search requirements did significantly increase entry rate into employment. However, we also find evidence of a higher outflow to disability insurance, a presumably unwanted side-effect of the policy change. In contrast, no significant substitution from UI benefits towards early retirement benefits could be 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 (DI) 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. Finally, Section 8 studies after-unemployment job characteristics. Section 9 concludes.

2 Institutional Context

The next section gives an overview of the UI benefit system in the Netherlands from 2001-2005 and reports important policy changes aimed at the elderly in these years. It also considers changes in the DI and early retirement system that could possibly affect the relative 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

UI benefits can be divided into three categories: short-term UI-benefits, wage-related UI-benefits and follow-up-benefits. In order to be eligible for short-term UI-benefits, an individual needs to have worked at least 26 weeks out of 39 weeks before becoming unemployed (the 26-out-of-39 requirement) and be ‘available for work’ (for example, an individual cannot live abroad or join an educational program). Short-term benefits can be received for at most half a year 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 out when the claimant fulfills the 26-out-of-39 requirement and in addition worked for 52 days or more in at least 4 out of 5 (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 a year in 2003.¹ Follow-up benefits are to be received after the maximum duration of wage-related benefits have expired, and have the same height as short-term benefits. An overview of the system is given in Table Appendix A.

The maximum duration of wage-related benefits is a step-wise function of age. A potential employment history is calculated by adding the number of years from the year an individual turned 18 until five calendar years before unemployment starts to the 4 (or 5) years that an individual worked before becoming unemployed. A longer potential employment history implies a longer UI eligibility, with a maximum of 5 years for wage-related benefits. For most individuals, maximum duration for follow-up benefits is two years. However, if a worker gets unemployed at age 57.5 or above, follow-up benefits can be received for up to 3.5 years. A graphical representation of potential benefit durations for wage-related and follow-up UI benefits and their relation to age at unemployment is given in Figure <EXTEND - add Stefan’s figure>.

2.1.2 Developments in the Dutch Unemployment Insurance System 2001-2005

In the period under study (2001-2005), 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.

As of May 11th 2001, employers are obliged to pay part of the UI benefits if they fire an employee aged 57.5 or above.² For individuals becoming unemployed on or after August 11th 2003, follow-up-benefits were abolished. Instead, those aged 50+ when becoming unemployed fell under the so-called IOAW scheme with payments that provide the household with an income of 70% of minimum wage after expiry of UI benefits. This is the same level of benefits previously provided for by follow-up UI benefits. The only difference with

¹Years in which an individual cares for a child who is less than 6 years old are also considered as a year worked. For a child between 6 and 12 years of age, half a year per year of care is added to the number of years worked.

²The contribution in 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.

the UI system is that applying for jobs is compulsory and that benefits are tested against the income of the spouse.

A reform becoming effective on January 1st 2004 directly changed the conditions for UI benefit receipt: older unemployed (57.5+) were no longer exempted from the requirement to actively search for jobs. In addition, starting from the 1st of January 2005, potential duration of wage-related UI benefits were made (partly) dependent on actual employment history instead of merely on age for new UI recipients. Employment history is calculated from the number of years actually worked between 1998 and the calendar year preceding unemployment and the number of years potentially worked before 1998 (1998-18- year of birth). An overview of the developments aimed at older unemployed can be found in Table 3.

Focus of the present paper is the January 1st 2004 reform when elderly (57.5+) job seekers lost their special status in terms of search requirements. Post-reform, they are treated in the same way as all other unemployed, including an intake meeting and a meeting in which they are informed about the search obligation.³ Search requirements stipulate to apply to at least 4 jobs in 4 weeks. Noncompliers run the risk of being severely sanctioned: benefits can be reduced with a maximum of 20 percentage points for 16 consecutive weeks. In case of recidivism, this can be as high as 30 percentage points. Table 4 shows that in the year 2004, in which the policy change became effective, there was about a 5 percentage point increase in the share of sanctions due to noncompliance with the search requirement in the total number of sanctions. Since there was also about a 5 percentage point increase in the number of UI benefit recipients needing to report their search effort, these descriptives suggests that there were indeed also sanctions levied on older individuals.⁴ Table 5 shows that huge cuts in benefits indeed take place in practice: noncompliers are punished with an average 20 percentage points decrease in benefits (from 70 to 50 percent of previous/minimum wage) for 14 consecutive weeks.⁵ Appendix B gives a more detailed description of the Dutch Unemployment Insurance procedure.

Not only new unemployed are affected by this change in search requirements. For elderly that were already unemployed, a transitional arrangement is in place: the search requirement is activated on January 1st 2004 for all individuals that have been unemployed for less than one year at December 31st 2003 and did not yet reach the age of 62 years and 3 months 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 have been unemployed for more than a year. Exceptions to the obligation to search are made, among others, for individuals aged 64 or above at the first day of unemployment, for individuals starting up their own business or taking part in an educational program which is considered necessary for

³The obligation to attend an intake meeting and the requirement to accept 'suitable' jobs (if offered by the unemployment office) was extended to include the elderly who turned 57.5 on May 1st 1999 or later.

⁴Anecdotal evidence (Verveen et al., 2005) suggests that the elderly were more likely to comply with the newly imposed search requirements. Indeed, Table 4 only gives descriptive evidence of the actual imposition of sanctions on the elderly. In our data, we unfortunately do not observe whether sanctions have been imposed, nor do we observe the actual search effort of individuals.

⁵The shorter average duration is caused by the fact that there are some individuals who started working before the end of the formal sanction spell.

re-integration, and for individuals aged 57.5 or above at the 31st of December 2003 who received DI benefits just before entering UI.

2.2 The Dutch Disability Insurance System

It is well known that not all individuals entering DI are actually disabled. Autor and Duggan (2003) find that DI is used as a substitute for DI in the U.S.. For the Netherlands, Koning and van Vuuren (2007) find that 3% of all dismissals takes place via the DI scheme. These findings suggest that individuals can to some extent ‘choose’ to enter DI, and therefore a change in DI inflow may be triggered by adjustments in the UI system. However, instead of being ‘pushed’ from UI into DI (as is the case when search requirements for eligibility of UI increase) individuals can be ‘pulled’ into DI upon modification of the latter system. We therefore present a review of the DI system and changes therein. Since nearly all policy changes from 2001-2005 were aimed at employers and are irrelevant to the unemployed, an overview of (for our purposes largely irrelevant) major adjustments can be found in Appendix Appendix C.

The Dutch DI System in 2001 consists of two main Acts: the Sickness Insurance Act (ZW) and the Disability Act (WAO). The Sickness Insurance Act (ZW) provides an income floor to anyone with or without employer, including those receiving UI benefits, 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 1 year. After receiving Sickness benefits for a full year, an individual enters the Disability Act (WAO). After medical examination, a worker who is considered at least partially disabled (>15%) is eligible for WAO payments of up to 70% of last earned wage, depending on the degree of disability. Individuals aged 58 and older receive wage-related WAO benefits for a maximum of 6 years, and individuals in the age range 53-57 for 3 years. From the age of 59 onwards, wage-related WAO benefits can therefore be received until age 65, after which an individual becomes eligible for old age pension payments. After wage-related WAO benefits have expired, individuals receive a follow-up benefit. The follow-up benefit is also dependent on age and previous wage. Follow-up benefits can be received for as long as the disability lasts.

2.3 The Dutch Early Retirement System

In the Netherlands, the old age pension system consists of three so-called pillars: the first pillar encompasses social assistance in the form of a basic pension, financed by premiums levied on the working age population (a PAYG system), the second pillar consists of supplementary schemes provided by employers and employees in industry-specific collective agreements (CAO’s) and the third and last pillar comprises private, individually financed pensions and savings.

The single largest change in the early retirement system in the 1990’s and early 2000’s was the transformation of the second pillar. Early retirement pension payments that used to be actuarially unfair and financed by a PAYG system were slowly replaced by actuarially fair capital funded schemes. Instead of applying a flat rate, which reduces the financial incentive to continue working to zero, pension payments

decrease upon retirement at an earlier age. Moreover, the replacement rate was greatly reduced (from 80% to 70% when retiring at the age of 62 in some of the larger sectors). As from the 1st of April 1997, the pension system for civil servants (ABP) was the first to transfer to the new 'Pre-Pension' (PP) scheme. Euwals et al. (2010), examining this change in the early retirement system, find that the shift to an actuarially fair system with lower pension wealth induced individuals to retire later.

Individuals that are at least 40 years old at the time they become unemployed, continue to build up their second pillar 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, this 'free' building up of pension rights continues until they reach the legal retirement age of 65. However, since with the introduction of the new PP scheme a switch to a capital-funded system was enacted, *pensioners* were no longer building up their pension rights, making it more attractive for UI benefit recipients to stay unemployed.

3 Theoretical considerations

In a standard two-state job search model, an increase in search requirements affects job search both directly and indirectly. The direct effect is to increase search effort to the newly defined threshold for individuals that would otherwise search less. A possible indirect effect is theoretically examined by Manning (2009) and Petrongolo (2009). They show that although some individuals will increase their search intensity, there will also be unemployed that consider the new required amount of search too costly and decide to decrease their initial search effort. The key idea behind their calculations is that an extension of search requirements makes the receipt of unemployment benefits conditional on whether the individual searches the *increased* amount. Whereas some individuals initially complied with a low amount of search just to avoid getting sanctioned, the increased amount of search necessary for eligibility can be too costly. Since the initial amount of search effort is no longer sufficient to qualify for a higher (expected) benefit, those individuals will choose a level of search effort lower than the initial requirement. However, in a situation without an initial (lower) search requirement, the mechanism considered by Manning (2009) and Petrongolo (2009) is not suitable for explaining a possibly lower search effort by the elderly. Instead, a lower observed inflow in UI is predicted: whereas some fraction of individuals could find it worthwhile to register at the unemployment office and going to an intake meeting in order to collect full benefits, they might not want to actively search for jobs in order to remain eligible for full benefits and therefore not decide to register at the unemployment office altogether.

However, other indirect effects of instituting a minimum of formal search are due to an increase in the cost of search for each job application. This (i) decreases the value of unemployment (which decreases the reservation wage) and thereby increases search effort, (ii) by decreasing the value of unemployment also decreases the value of the subsequent job and thereby decreases search effort near benefit exhaustion (the so-called 'entitlement effect', Mortensen (1977)) and (iii) decreases search effort for individuals already

conforming to the search requirements by means of informal search. Van den Berg and van der Klaauw (2006) argue that in case of older workers, this last effect may be small: informal channels may be limited such that a focus on formal search will aid the elderly in finding suitable job offers. Moreover, for elderly the entitlement effect of a decrease in unemployment is small, since by the time they have re-earned entitlement to wage-related UI benefits, they will also be eligible to collect an (early) retirement pension.⁶ Search requirements may therefore be especially effective for the elderly.

On the demand side, the job offer probability for the older unemployed might also change as a result of enforcing minimum job search requirements: formal search requirements could lead to fake applications by the elderly, thereby stigmatizing job applications of older workers such that employers will be less willing to hire older unemployed. Moreover, when we consider the possibility of workers being heterogeneous in terms of productivity, an increase in the amount of search resulting from a decrease in the value of unemployment could lead to a changing average productivity of applicants. Assuming that initially only the most motivated individuals with good labour market prospects were engaged in active job search, average productivity of the applicant pool decreases leading to a lower job offer probability for older unemployed.

Now consider a three-state search model in which the option to collect some sort of other benefits is introduced. Since formal search requirements reduce the value of receiving UI benefits, whereas the value of receiving other benefits stays constant, individuals can also decide to forgo UI benefits and collect those other benefits (which are not dependent on search effort) instead. That is, if eligibility conditions for these other benefits can be met with positive probability. The conclusion is that although we can expect individuals to flow out of unemployment and into jobs faster (due to lower reservation wages and higher search effort), a tightening of search requirements could also increase the inflow to other social insurance schemes. A requirement for an increased inflow into another social insurance scheme is that the initial values (before search requirements were instituted) of receiving UI or receiving some other benefits should be close. In case of older unemployed, two important other social insurance schemes are DI and early retirement pensions. In the empirical analysis we therefore consider not only outflow from UI into jobs, but also take the possibility of a higher outflow to disability (DI) benefits and early retirement pensions into account.

Considering the choice between substitution towards DI benefits or early retirement pension payments, the balance is more likely to tip in favor of DI benefits. That is, the expected value of applying for DI benefits is likely to be close to the value of receiving UI benefits. First, the possible duration of DI benefits is 7 years for individuals aged 57 and older which is higher than the maximum of 5 years of wage-related UI benefits. Furthermore, the total PBD of UI benefits is not decreased by an intervening spell of sickness/disability, already providing individuals with a rationale to substitute to DI (if only temporarily). A change in search requirements in UI could therefore just make the required difference for DI to be a worthwhile alternative.⁷

⁶In order to be eligible for wage-related UI benefits, individuals should have worked 4 years out of the previous 5. See also Section 2 for a more elaborate description of the UI and early retirement system in the Netherlands.

⁷Note 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 expected value of receiving DI benefits and making substitution more

Early retirement pension payments are a less attractive alternative since, as mentioned before, an unemployed aged 40+ continued to build up pension rights. Since in the old pension system (VUT) retirement benefits were at a flat rate of around 80% from age 59 (or 60,61 depending on the sector of previous employment) onwards, there used to be a high incentive to switch to receipt of early retirement pensions at that pivotal age. Since with the new capital-funded PP scheme individuals old age pension replacement rates continued to increase with retirement age until an age of 65, the incentive to switch to the receipt of early retirement payments was greatly reduced.

4 Data and Selection of Treatment/Control Groups

In estimating a change in search requirements for the older unemployed, we make use of administrative data obtained from Statistics Netherlands (CBS). The so-called SSB (Social Statistical Files) data is obtained from municipalities, tax authorities and social insurance administrations. It contains 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 in which state individuals find themselves on each day for the years 1999-2005. The states that we can distinguish include full-time and part-time employment, being unemployed (i.e. receiving unemployment insurance), being ill/disabled (i.e. receiving sickness or disability benefits) and entering (early) retirement (retirement payments). Since we observe the universe of Dutch individuals, we can still retain thousands of observations for analysis when selecting a flow sample of older unemployed individuals entering unemployment in a certain period.

The information in the SSB-files is merged with information on education available from the unemployment office (CWI, now UWV werkbedrijf). Since the data on education is only available from 2001-2006, information on education is missing for the short-term unemployed that flow into unemployment in 1999-2000 and only have one spell of employment over the years 2001-2006. Since this group is likely to be selective (for example, higher educated individuals) we exclude individuals becoming unemployed before the year 2001. In order 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.

Individuals becoming unemployed in 2001 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, our selected unemployment spells starting in 2001 are unaffected by the change in policy. Individuals flowing into unemployment in 2001 who are younger than 57.5 are required to search for a job. 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. Our 2001 inflow can therefore serve as a control group.

Individuals entering the UI benefit system in the year 2004 *are* affected by the policy change, in various likely.

ways. Unemployed younger than 57.5 at time of inflow need to continue searching at the age of 57.5, allowing us to study the effect of needing to continue searching at age 57.5 versus being allowed to stop searching at that age. Those aged 57.5+ entering unemployment in 2004 also need to actively search for new employment. Here we can examine the effect of being required to search from the start of the unemployment spell versus never having a formal requirement to search.

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 start searching for a job. However, when they were still unemployed at the 1st of January, they needed to start searching. In order to only estimate the effect of an increase in search requirements, we drop individuals that became unemployed from the 11th of August onwards. Our 2003 inflow sample therefore is not affected by a cancellation of extended benefits (see section 2.1.2). We can therefore also examine the effect of needing to search formally after being unemployed for 5-12 months, versus not being required to search at all.

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. Dropping less than 1% of these individuals because of unobserved covariates (mainly education) and selecting only individuals that came from jobs in the private sector we retain 36642 observations for analysis. Excluding inflow from 11th August to 31st December 2003 leaves us with a final sample of 32053 observations. Table 6 shows us the distribution of states of origin for the various years of inflow. Although inflow from a private sector job is slightly smaller in 2001, whereas inflow from DI benefits is slightly larger, we conclude that selecting the sample on inflow from private sector jobs does not confront us with a selective sample for analysis. Moreover, since search requirements were abolished in 2004 for individuals that were in DI before flowing into the UI system, selecting on individuals that came from jobs ensures us that all individuals in the 2004 inflow sample were indeed affected by the reform.

5 Methodology and Descriptive Statistics

5.1 Regression Specifications

In order to assess the effect of a search requirement change for the older unemployed we specify hazard models for the exit rate to a job, disability benefits and early retirement payments. We adopt a difference-in-difference approach and regression discontinuity approaches as our main identification strategies.

We define τ^I as the day of inflow, a^I as the age at inflow and T to be total unemployment duration. Moreover, let a_τ denote a time-varying variable indicating the age of an individual at calendar time τ . 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 proportional hazard model following an exponential distribution. In a first regression specification, we select individuals becoming unemployed in 2001 (non-treated) and in 2004 (treated). Then

the 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 $\theta^x(t|X, t^I, a^I, a)$:

$$\theta^x(t|X, \tau^I, a^I, a_\tau) = \lambda(t) \exp \{X'\beta + \gamma_1 I^{2004} + \gamma_2 I[a^I \geq 57.5] + \gamma_3 (I^{2004} * I[a^I \geq 57.5]) + \gamma_4 I[a_\tau \geq 57.5] + \gamma_5 (I^{2004} * I[a_\tau \geq 57.5])\} \quad (1)$$

where I^{2004} indicates the policy change or treatment ($\tau^I = 2004$, i.e. inflow in 2004), $I[a^I \geq 57.5]$ is an indicator function equal to 1 when an individual is at least 57.5 years of age at inflow into unemployment, and the interaction effect $I^{2004} * I[a^I \geq 57.5]$ picks up a 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. Moreover, the indicator $I[a_\tau \geq 57.5]$ is a time-varying variable equal to 1 from the time an individual turns 57.5 and the interaction $I^{2004} * I[a_\tau \geq 57.5]$ picks up a second treatment effect: the need to formally continue search when a person turns 57.5 as opposed to being allowed to stop searching at that moment.

Note that the inclusion of the parameters γ_4 and γ_5 do not only allow us to examine a second treatment effect, but is also needed to correctly estimate the first treatment effect: since we are using individuals aged 55.5-57.5 as our control group to identify γ_3 , the treatment effect on the 57.5-59.5 year olds, we do need to correct for the fact that the younger individuals that became unemployed in 2004 also got treated as 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 5-12 months in unemployment:

$$\theta^x(t|X, t^I, \tau) = \lambda(t) \exp \{X'\beta + \delta_1 I^{2003} + \delta_2 I[\tau \geq 1 \text{ Jan } 2004] + \delta_3 (I^{2003} * I[\tau \geq 1 \text{ Jan } 2004])\} \quad (2)$$

where I^{2003} indicates possibility of treatment if still unemployed at 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 $I^{2003} * I[\tau \geq 1 \text{ Jan } 2004]$ picks up a 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.

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

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

with $I_k(t)$ the indicator function taking the value 1 if t is in interval k . There are $K = 7$ 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. We normalize $\mu_1 = 0$.

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

$$f^x(T|X) = \theta^x(T|X) \exp\left(-\int_0^T \theta^x(s|X) ds\right)$$

The loglikelihood adds the contributions of uncensored and censored spells:

$$L^x = \sum -\int_0^T \theta^x(s|X) ds + I^c \sum \log \theta^x(T|X) \quad (3)$$

where I^c equals 1 when an unemployment spell is censored or an individual is observed to exit to a state other than x . Tables 11 and 12 in the Appendix give a schematic overview of the identification of the parameters for both regression specifications.

In order to control for observed heterogeneity between the treatment and control groups, we include as background characteristics dummies for gender, marital status, an interaction of female and married, age and its square, dummies for nationality (dutch, foreign-born with a western nationality, or foreign-born with a non-western nationality), and a dummy indicating whether there are any dependent children in the household. We furthermore control for education level in four categories: whether the highest diploma an individual received was at primary school (low), a low level of highschool or the lowest level of higher education (mid1), a high level of highschool or a middle level of higher education (mid2) or higher professional education or university (high1). 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 by a job or sickness/disability spell and an individual gets back in 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 on short-term UI-benefits (a potential benefit duration of 6 months). Moreover, we include the quarters of the year as time-varying variables, thereby allowing for seasonal effects on outflow.

In regression 1 we need to take into account that the cancellation of extended benefits on the 11th August 2003 can affect the estimation of γ_3 : if this policy change had a disproportionate effect on outflow to a job for 57.5-59.5 year olds as opposed to 55.5-57.5 year olds, the point estimate will be biased. However, after the 11th August policy change all individuals aged 50+ at the beginning of unemployment could continue their unemployment spell in a scheme in which the height of the benefits was exactly the same as the extended UI benefits (i.e. 70% of minimum wage). The difference between the two schemes was that in the new situation, the receipt of benefits was conditional on income of the partner. In other words, individuals that have a partner who receives income are worse off under the new regime. We therefore include an interaction effect of our treatment parameter γ_3 with being single.⁸

⁸Inclusion of this regressor does not affect our results. Note that this does not imply that the cancellation of extended

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). However, including an interaction effect of age with year of inflow did not lead to a change in estimates and we therefore report estimation results excluding this regressor.

5.2 Identification and Descriptive Evidence

In order to give some insight into similarity and dissimilarity of the various treatment and control groups, background characteristics are given in Table 8. Note that for an unbiased estimate of treatment parameter γ_3 , we need to 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 treatment parameter 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 2004.⁹ For the treatment parameter 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.

Although the use of RDD within the DiD estimates does not require our treatment and control groups to develop in the same way, it is comforting to see that they do. Looking at individuals aged 57.5-59.5 in table 8, we see that individuals becoming unemployed 2004 seem to be more likely to have a child present in the household¹⁰ 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, our treatment effect 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. The same holds true for the fraction of individuals with a dependent child. Table 8 therefore gives no indication of a possible bias of treatment parameter γ_3 .

Even though observable characteristics of treatment and control groups seem to develop in the same way,

benefits was ineffective: married individuals entering unemployment when being close to 60, turned 65 before exhausting their (3.5 instead of 2 years lasting) wage-related benefits and were only moderately affected. In contrast, married individuals younger than 57.5 at inflow lost a full 2 years of extended benefits. The fact that we find a zero result of the cancellation in extended benefits is therefore inherent in our choice of treatment and control groups.

⁹Do note 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. Indeed, 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.

¹⁰This 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.

it is instructive to consider the possibility of a discontinuity in unobservables caused by the anticipation of the policy change. In order to rule out the effect of anticipation on our 2004 inflow, there should be no discontinuity in inflow for the 57.5+ year olds versus the 57.5- year olds right before the introduction of the tighter eligibility criteria on the 1st of January 2004. Depicting the inflow into the UI system between 1999 and 2005, figure 1 does not show any increase in discrepancy between the 57.5- and 57.5+ inflow. 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 therefore might only play a role in regression 2, in the sense that if individuals decide to start searching for a job before the 1st of January 2004, thereby flowing out of unemployment before 2004, the January 2004 effect will be underestimated. However, it seems unlikely that unemployed would increase search effort in one month as a means to avoid the requirement to increase search effort in the next month.

Table 9 describes the proportion of individuals that end their unemployment spell with exit to a job, retirement and DI benefits respectively. Since the number of censored individuals is higher for individuals becoming unemployed in more recent years, the proportion as a fraction of individuals that are non-censored is given in parentheses. Within a certain year of inflow, it is clear that older individuals more often flow into retirement, at the expense of the outflow to jobs and DI benefits.

At first sight, it appears that individuals becoming unemployed in 2004 flow into jobs more often than individuals becoming unemployed in 2001. More importantly, the difference between the age groups seems to decline (relatively) in the later years for exits to DI benefits. From this, we could conclude that there is at least some effect of the 2004 policy change: stricter search requirements do decrease the relative gap in outflow to DI benefits between the 55.5-57.5 and 57.5-59.5 year olds.¹¹ Since the difference in outflow probability to a job stays constant over the years, Table 9 gives no evidence of an effect of the policy change on outflow to jobs. However, the average durations until a job is found is more strongly decreasing over the years for the older age group than for the younger age group, from Table 10. This suggests a higher speed of outflow to jobs for older unemployed in recent years. Note, however, that the observation window for individuals first observed in 2004 is considerably shorter than the time we observe individuals that became unemployed in 2001. The average and median duration for the outflow to jobs for those starting their unemployment spell in 2004 are therefore considerably underestimated. Indeed, there is a 47% censoring rate for those aged 57.5-59.5 and flowing in in 2004 (Table 9). We will therefore apply duration analysis in order to get a more detailed view of the effects of the policy change.

¹¹From table 9 it seems that instead 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, general inflow in DI declined following changes in the DI system in 2002. The fact that there was no decline in DI inflow for individuals aged 57.5-59.5 indicates that there was another change specifically affecting DI inflow for this age group - for example, the change in search requirements.

6 Estimation Results

6.1 Nonparametric Results

Since the descriptive statistics do not take censoring into account, it is instructive to estimate survival and hazard functions for the various times of inflow and age groups. From figure 2a, depicting the nonparametric estimation of the (kernel) smoothed hazard for exit to a job, we can see that the difference in outflow rate between the age groups is smaller for the 2003 and 2004 inflows as compared to the 2001 inflows. This is as expected, since for the 2001 inflow, the 57.5-59.5 year olds never needed to search for a job, whereas the 55.5-57.5 year olds did. This gives some confidence in a positive effect of the tightening of search requirements for the age 57.5-59.5 inflow.¹² However, individuals that were slightly younger and entered unemployment in 2004 were also affected by the policy change: they needed to continue searching even when they turned 57.5. In order to separate these two effects, we resort to parametric duration analysis and estimate equation 1 specified in section 5.1. Similarly, in order to separate a general business cycle effect (of flowing in in 2003) from the effect of the policy change, we continue by estimating 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, or DI benefits. The focus is on the coefficients γ_3 and γ_5 , indicating the treatment effects. An overview of the treatment effects for the two regression specifications is given in Table 14.¹³ Note that 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, we would therefore expect γ_3, γ_5 to be significantly larger than 1. Separate models are estimated for males and females, following the results of Wald tests which for each exit state clearly rejected a joint model ($p < 0.01$). We indeed find hazard ratios for the exit to jobs equal to 1.33 and 1.50 (males) and 1.72 and 2.01 (females) respectively for the model including background regressors and gamma distributed heterogeneity. Loosely speaking, an unemployed man who is older than 57.5 at inflow and needs to search for jobs has an outflow rate to jobs that is 1.33 times the outflow rate 57.5+ year olds that do 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 is relatively larger, increasing the hazard rate almost twofold over the remaining duration of the spell. Do note that this does not say anything about 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+

¹²Note from figure 2c that also for exit to DI benefits, nonparametric hazard rates for the two age groups seem to move closer together in later years.

¹³Full regression results are available from the authors on request.

year olds. We therefore graphically show the treatment effects by estimating parametric hazards for the treatment and control groups after estimation in Figure 3. The effects are shown for a male individual, high educated and married, being 59 years old to identify the γ_3 and δ_3 effects (figure 3a and 3c) and 56 years old for the γ_5 effect (figure 3b) respectively. As is clear from a comparison of figures 3a and 3c, although the point estimate for δ_3 is more than 2 times higher than the point estimate for γ_3 , absolute effects as depicted in the graphs are quite similar.

Bearing this in mind, we can interpret the treatment effects for outflow to retirement and DI benefits in the same way. Turning to Table 14, we see that although the speed of inflow into jobs increased, the hazard rate disability benefits increased as well. An unwanted side-effect of stricter search requirements therefore is an increase in the proportion of individuals that stop claiming UI benefits, flowing into other social insurance schemes instead. As for the exit to retirement, there is no general pattern in the estimated treatment effects. As explained in Section 3, the transition from a PAYG to an actuarially fair capital funded early retirement system greatly reduced the incentive to retire early in the early 2000's. Since this effect cannot be separated from the effect of search requirements in UI, our estimates are biased downwards.

In order to assess whether there is an effect of institutionalizing formal search requirements for individuals that are unemployed for 5-12 months and did not find a job yet, the results of regression specification 2 are examined in Table 15. As expected, even if individuals are unemployed for some time, the exit rate out of unemployment increases by a factor 2 to 6 once the change in search requirements becomes effective. However, also in this case we see that not only outflow to a new job increases, but also the rate of inflow to DI benefits is boosted, confirming the results of equation 1 which also showed this unwanted side-effect of the policy change.

Since in a competing risk settings, an increase in the hazard rate cannot directly be interpreted as an increase in the number of individuals leaving to a certain exit state, we simulate in Figures 7 and 8 the treatment effects in terms of an increased outflow to jobs and disability. From this, we conclude that although the outflow to jobs is expected to increase with 6 to 8 percentage points following an institutionalization of compulsory search requirements, there was also an increase of 2.5 percentage points in individuals taking up disability benefits.

7 Sensitivity Analysis

After estimation of the basic model (column 1 of Tables 14 and 15), the basic model including background regressors (column 2), including the sector of previous jobs (column 3) and adding gamma distributed heterogeneity (column 4), a few concerns on the interpretation of the coefficients remain. First, the age range from 55.5-59.5 might be too wide to be able to precisely estimate the RDD-parameters in regression 1. We therefore estimate equation 1 using only 56.5-58.5 year-olds. Results are reported in table Appendix A. As can be seen, the parameters for exits to jobs, early retirement or disability hardly change.

Second, we can make use a different control group. In column 3 of table Appendix A we show results when using the individuals becoming unemployed in 2002 instead 2001 as a control group. Interestingly, the estimated treatment effects for exit to disability seem slightly larger for males, and slightly smaller for females using this control group.

Third, instead of including sector of previous occupation, we can include 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 and results are not reported. Including this regressor did 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.

Fourth, since inclusion of an interaction of the treatment effect γ_3 did not affect results of regression 1, we experimented with the inclusion of all individuals becoming unemployed in 2003 in regression specification 2. Again, this did not affect results and is therefore not reported.

Fifth, we re-ran both regression specifications using 50.5-54.5 year olds, letting our 50.5-52.5 olds play a fake control group (fake in the sense that they were also treated) and indeed we couldn't find an extra effect of the policy reform for the (redefined) older age group.¹⁴ Another check on the effectiveness of the reform was to re-run our regression specification 1 using instead of 2001 and 2004 inflow individuals becoming unemployed in 1999 and 2001 respectively (both not treated). Indeed, we did not find any effect of this fake reform on outflow to jobs, early retirement, or disability benefits.

Sixth, we ran regressions on specific subgroups of the population. From a policy perspective, it is interesting to know whether search requirements are effective especially (and maybe only) 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. On the other hand, the same individuals could also be the ones that use informal search channels even without a search requirement, exactly because the expected payoff of doing this is higher. Moreover, these are the same individuals who can be expected to have a lower disutility of working. We tested these hypotheses by running separate regressions by educational level. We could not derive any general pattern from the results of these regressions.¹⁵

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 exits shouldn't influence the estimation of 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 2 mass points of the heterogeneity distribution per equation and construct logit functions to estimate the mixing probabilities. A more elaborate description of the Likelihood is given in Appendix D. Results of the estimation are given

¹⁴For exit to a job for males, we did find a significant and positive estimate of 1.43 on our γ_3 parameter.

¹⁵From the unemployment office, we also obtain an indicator for employability of the individual. However, since before the search requirement was enacted all elderly were automatically assigned to the group of least employable individuals, we cannot use this indicator for our purposes.

in Table 16. Sign and significance of the estimates for exit to a job or DI benefits are similar to the single equation estimation results, although the treatment effect for the older males (aged 57.5 and up at inflow) as measured by γ_3 is no longer significant for the outflow to jobs. However, the effect of needing to start searching after spending a few (non-searching) months in unemployment on the outflow to jobs (δ_3) is greatly magnified in this specification. Concerning the outflow to retirement, the most striking result is that some of the estimates that were previously significant, are no longer significant on the 5% level when estimated jointly.

8 After-unemployment job characteristics

Because an expansion of search requirements entails an increase in search costs, thereby decreasing the value of being unemployed, it is predicted that the 1st of January 2004 policy change does not only increase search effort, but also decreases the reservation wage. Both have an upward effect on the outflow to jobs. Although an increase in search effort is the effect that policy makers would like to establish enforcing these search requirements, another possibility is that elderly are matched to lower-skilled and lower-paid jobs. It is therefore interesting to examine the effects on after-unemployment job characteristics more closely. Table 17 gives a first indication of the importance of these effects. For most of our 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 is decreasing 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 elderly may only be able to find part-time employment after an unemployment spell. Table 18 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 indeed more often take up part-time employment after a spell of unemployment, trying to bridge the last couple of years to the pensionable age of 65 (i.e. the so-called ‘bridge-jobs’). Although the fraction of full-time workers has decreased over the years, there does not seem to be a clear pattern between the treatment and control groups: individuals becoming unemployed in any year are about half as likely to have a full-time job after their unemployment spell. Employment with flexible hours (i.e. no fixed time in

the week in which the work takes place) has become more popular as an option to take up a job for older unemployed. Taken together, table 18 does not indicate that the 2004 policy change had large effects on after-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 labor market policies on behaviour of the elderly. This paper deals with one such policy, namely the imposition of job search requirements for older unemployed. The effects of the need to report job search efforts to the employment office have previously been studied by Manning (2009) and Petrongolo (2009), both using a U.K. policy reform. Though both find an increase in the hazard out of unemployment, Petrongolo (2009) also finds that the hazard to claiming of DI benefits increased.

Using a large administrative database covering all wage and social security payments to Dutch individuals in the years 1999-2005, we can examine the effect of a search requirement increase which was specifically aimed at the elderly. The reform, coming into effect from the 1st January 2004, made an end to the separate treatment of unemployed elderly. Before the law was initiated, an individual turning 57.5 did not need to report his/her search effort to the unemployment office any longer. The new policy however required elderly to continue actively searching for a job even after turning 57.5. Using difference-in-difference techniques and regression discontinuity designs within a 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 conclusions pertain that although outflow to jobs increased with 5 to 8 percentage points after 60 months upon a tightening of search obligations, this was accompanied by a 2.5 percentage points increase in the number of individuals that used 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, our estimation results cannot separate between the changes in the UI and in the early retirement system, and therefore cannot provide evidence for an increased outflow to early retirement. An interesting venue for further research would be to estimate the impact of extended search conditions for elderly on their after-unemployment job characteristics. Theory predicts that an increase in search costs will decrease reservation wages and might therefore lock the elderly into low-skilled and low-paid jobs, another unwanted side-effect of a policy that is meant to induce elderly to become more active labor market participants.

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Appendix A Tables and Figures

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

type of UI benefit	eligibility requirements	duration	payment
short-term UI-benefits	26-out-of-39 weeks requirement	6 months	70% of minimum wage or 70% of previous wage whichever is lower
wage-related UI-benefits	26-out-of-39 weeks requirement + 4-out-of-5 years requirement	6 months to 5 years, dependent on age	70% of previous wage
follow-up-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)

Table 2. DETERMINATION OF POTENTIAL BENEFIT DURATION

Employment history	age at unemployment	duration wage-related-benefits
less than 5 years	less than 24 years	6 months
5-9 years	22-28	9 months
10-14 years	27-33	1 year
15-19 years	32-38	1.5 years
20-24 years	37-43	2 years
25-29 years	42-48	2.5 years
30-34 years	47-53	3 years
35-39 years	52-58	4 years
40 years or more	57 years or more	5 years

Table shows potential unemployment benefit duration for individuals who fulfill the requirements for receiving wage-related benefits. Note: overlap in age ranges for potential unemployment duration occurs because the exact potential duration depends on the exact month of birth and unemployment, and on whether an individual worked 4 or 5 years prior to becoming unemployed.

Table 3. 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	follow-up-benefits cancelled
2004, 1st jan	57.5+ year olds are (also) required to search actively
2005, 1st jan	max. UI duration determined partly by employment history
2006, 1st oct	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

Table 4. 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 is obtained from the unemployment office (UWV) and provided by

J. Bolhaar and B. van der Klaauw.

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 5. 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 is obtained from the unemployment office (UWV) and provided by

J. Bolhaar and B. van der Klaauw.

Table 6. ORIGIN OF UI SPELL (I.E. STATE OF INFLOW)

	2001		2003		2004	
	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5
private sector job	4493	4360	8581	6457	8268	6266
	(0.83)	(0.86)	(0.85)	(0.87)	(0.87)	(0.87)
DI benefits	902	706	1395	886	1176	822
	(0.16)	(0.14)	(0.14)	(0.12)	(0.12)	(0.11)
other	48	32	103	56	114	75
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
TOTAL	5443	5098	10079	7399	9558	7163

Table 7. MULTIPLE SPELLS FOR THE SAME INDIVIDUAL

	Number of Persons (fraction)	Number of Spells
Observed once	30831 (0.95)	30831
Observed twice	2354 (0.04)	4708
Observed three times	324 (0.00)	972
Observed four times	29 (0.00)	116
Observed five times	3 (0.00)	15
TOTAL	33541	36642

Table 8. BACKGROUND CHARACTERISTICS

	2001		2003		2003		2004	
	55.5-57.5	57.5-59.5	1st jan - 55.5-57.5	10th aug 57.5-59.5	11th aug - 55.5-57.5	31st dec 57.5-59.5	55.5-57.5	57.5-59.5
Age	56.17	58.48	56.21	58.6	56.23	58.57	56.22	58.54
Female	0.31	0.25	0.3	0.28	0.28	0.26	0.33	0.26
Single	0.08	0.06	0.09	0.06	0.08	0.07	0.08	0.07
Married	0.74	0.79	0.71	0.77	0.71	0.77	0.72	0.76
Divorced/widowed	0.17	0.15	0.21	0.17	0.2	0.16	0.2	0.18
Dutch	0.85	0.86	0.83	0.84	0.84	0.85	0.82	0.85
Western	0.11	0.11	0.13	0.12	0.13	0.11	0.13	0.11
Non Western	0.04	0.03	0.05	0.04	0.04	0.04	0.05	0.04
Dependent child	0.28	0.22	0.31	0.23	0.32	0.25	0.35	0.26
Education low	0.15	0.15	0.1	0.14	0.11	0.16	0.1	0.11
Education mid1	0.36	0.37	0.31	0.33	0.36	0.37	0.32	0.33
Eudcation mid2	0.32	0.31	0.39	0.34	0.38	0.33	0.39	0.38
Education high	0.17	0.17	0.21	0.19	0.16	0.14	0.2	0.18
Revived UI right	0.17	0.11	0.18	0.13	0.26	0.19	0.22	0.2
short PBD	0.09	0.06	0.07	0.05	0.07	0.07	0.07	0.06
long PBD	0.87	0.92	0.89	0.92	0.91	0.92	0.91	0.93
Monthly UI benefits	1168	1303	1263	1379	1108	1160	1183	1266
# Hours in UI	32.86	33.71	32.84	33.29	33.16	32.89	32.63	33.18
# Observations	4149	3887	5629	4270	2651	1938	8011	6107

Note: definition of variables is explained in the text

Table 9. EXIT DESTINATIONS (FRACTIONS)

	2001		2003		2003		2004	
	55.5-57.5	57.5-59.5	1st jan -	10th aug	11th aug -	31st dec	55.5-57.5	57.5-59.5
			55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5		
Job	0.48 (0.57)	0.32 (0.43)	0.40 (0.56)	0.28 (0.41)	0.48 (0.63)	0.40 (0.56)	0.42 (0.66)	0.30 (0.52)
Retirement	0.17 (0.20)	0.33 (0.44)	0.09 (0.13)	0.24 (0.35)	0.08 (0.11)	0.17 (0.24)	0.06 (0.09)	0.14 (0.24)
DI benefits	0.18 (0.21)	0.09 (0.12)	0.15 (0.21)	0.10 (0.15)	0.13 (0.17)	0.07 (0.10)	0.09 (0.14)	0.07 (0.12)
Censored	0.16	0.25	0.30	0.33	0.24	0.27	0.34	0.40
# Observations	4149	3887	5629	4270	2651	1938	8011	6107

Note: in parentheses: as a fraction of non-censored observations

Table 10. MEAN AND MEDIAN OF DURATION VARIABLES, DAYS

	2001		2003		2003		2004	
	55.5-57.5	57.5-59.5	1st jan -	10th aug	11th aug -	31st dec	55.5-57.5	57.5-59.5
			55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5		
Total duration								
- mean	502	693	468	535	331	357	303	324
- median	172	426	332	469	182	200	249	312
to job								
- mean	188	187	238	232	184	163	172	158
- median	109	123	153	181	132	112	136	126
to retirement								
- mean	638	579	249	402	126	232	126	197
- median	485	518	176	365	59	119	61	165
to DI								
- mean	247	392	242	334	214	208	194	176
- median	151	268	161	281	130	147	162	132

Note: all spells (including censored ones at 31st dec 2005) included.

Table 11. 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= $\gamma_1+\gamma_5$

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

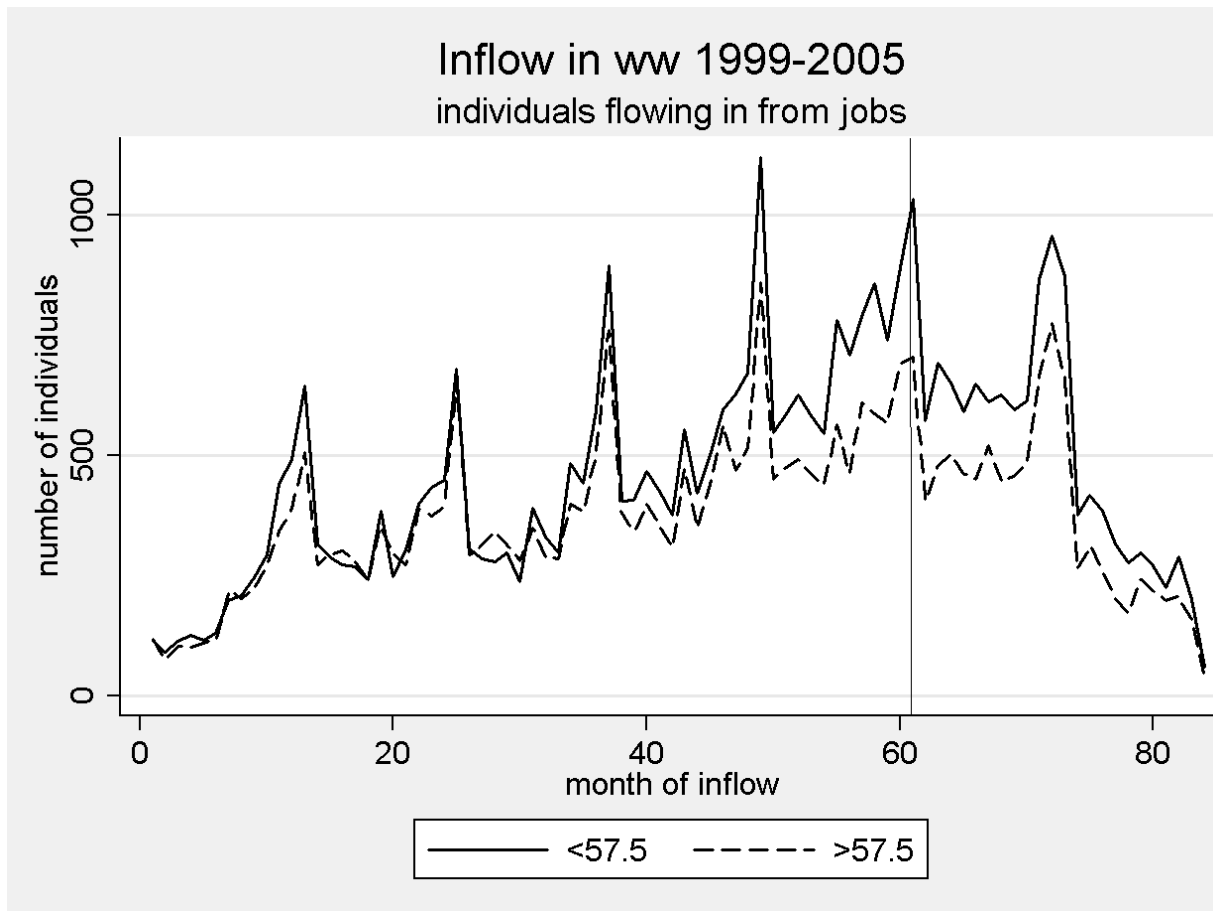
Note: $\gamma_5=(f-e)-(c-a)$: effect of needing to continue search at 57.5 (age at inflow <57.5)

Table 12. IDENTIFICATION REGRESSION 2

	till 1 jan 2004, being >57.5@inflow	from 1 jan 2004 , being >57.5@inflow
inflow in 2001	a	b, $\delta 2$
inflow in 2003	c, $\delta 1$	d, $\delta 1 + \delta 2 + \delta 3$
	$c - a = \delta 1$	$d - b = \delta 1 + \delta 3$

Note: $\delta 3 = (d - b) - (c - a)$: effect of starting to search (@ 1 jan 2004) after 5-12 months of unemployment as opposed to never (age at inflow >57.5)

Figure 1: INFLOW IN UI 1999-2005



Note: the solid vertical line denotes january 2004, i.e. the moment of the policy change

Table 13. TREATMENT EFFECTS, OVERVIEW OF REGRESSION 1

		Exit to a job			Exit to retirement			Exit to DI benefits					
MALES													
γ_3		2.36***	1.33***	1.31***	1.50***	1.23*	1.40*	1.31	1.45*	3.27***	2.21***	2.41***	2.37***
(s.e.)		(0.14)	(0.09)	(0.09)	(0.13)	(0.13)	(0.27)	(0.26)	(0.29)	(0.41)	(0.30)	(0.34)	(0.35)
γ_5		4.54***	1.84***	1.83***	2.36***	0.56**	0.63**	0.60*	0.61**	4.90***	3.08***	3.05***	3.24***
(s.e.)		(0.45)	(0.19)	(0.20)	(0.35)	(0.10)	(0.13)	(0.13)	(0.13)	(0.85)	(0.57)	(0.59)	(0.57)
Baseline controls	no	yes	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes
Incl sectors	no	no	yes	yes	no	no	no	yes	no	no	no	yes	no
Frailty	no	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													
γ_3		3.38***	1.72***	1.76***	2.01***	0.49***	0.91	1.15	0.88	6.85***	3.73***	4.21***	4.82***
(s.e.)		(0.38)	(0.21)	(0.21)	(0.30)	(0.13)	(0.42)	(0.54)	(0.40)	(1.25)	(0.76)	(0.82)	(0.79)
γ_5		4.61***	1.89***	1.78***	2.34***	0.12***	0.29**	0.42**	0.29**	6.24***	3.24***	3.70***	3.64***
(s.e.)		(0.72)	(0.30)	(0.30)	(0.55)	(0.05)	(0.14)	(0.21)	(0.14)	(1.61)	(0.87)	(1.04)	(1.11)
Baseline controls	no	yes	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes
Incl sectors	no	no	yes	yes	no	no	no	yes	no	no	no	yes	no
Frailty	no	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

Note: ** indicates $p < 0.5$, *** indicates $p < 0.01$

Note: γ_3 : effect of needing to search always as opposed to never (age at inflow > 57.5)

Note: γ_5 : effect of needing to continue search at 57.5 (age at inflow < 57.5)

Table 14. SENSITIVITY ANALYSIS REGRESSION 1

		Exit to a job			Exit to retirement			Exit to DI benefits			
		55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5
MALES											
γ_3		1.33***	1.60***	1.51***	1.03	1.40*	a)	2.21***	2.29***	2.79***	
(s.e.)		(0.09)	(0.14)	(0.13)	(0.32)	(0.27)	a)	(0.30)	(0.45)	(0.51)	
γ_5		1.84***	1.95***	1.72***	0.42**	0.63**	a)	3.08***	3.01***	4.08***	
(s.e.)		(0.19)	(0.24)	(0.19)	(0.13)	(0.13)	a)	(0.57)	(0.70)	(0.89)	
Control group	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2002 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow	2002 inflow	
Age range	55.5-59.5	56.5-58.5	56.5-58.5	55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5	56.5-58.5	
# Obs	12945	7195	7757	12945	7195	12945	a)	12945	7195	7757	
# Failures	5108	2680	2783	2241	1298	1189	a)	1189	638	679	
FEMALES											
		Exit to a job			Exit to retirement			Exit to DI benefits			
		55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5
γ_3		1.72***	1.89***	1.35**	0.69	0.91	a)	3.73***	3.00***	2.02***	
(s.e.)		(0.21)	(0.31)	(0.21)	(0.49)	(0.42)	a)	(0.76)	(0.80)	(0.49)	
γ_5		1.89***	1.77***	1.76***	0.32**	0.29**	a)	3.24***	1.99***	2.00***	
(s.e.)		(0.30)	(0.35)	(0.33)	(0.22)	(0.14)	a)	(0.87)	(0.64)	(0.62)	
Control group	2001 inflow	2001 inflow	2002 inflow	2001 inflow	2002 inflow	2001 inflow	2002 inflow	2001 inflow	2001 inflow	2002 inflow	
Age range	55.5-59.5	56.5-58.5	56.5-58.5	55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5	55.5-59.5	56.5-58.5	56.5-58.5	
# Obs	5245	2823	3041	5245	2823	5245	a)	5245	2823	3041	
# Failures	1680	830	908	640	354	623	a)	623	315	351	

Note: ** indicates $p < 0.5$, *** indicates $p < 0.01$

Note: γ_3 : effect of needing to search always as opposed to never (age at inflow > 57.5)

Note: γ_5 : effect of needing to continue search at 57.5 (age at inflow < 57.5)

Note: a) results to come.

Table 15. TREATMENT EFFECTS, OVERVIEW OF REGRESSION 2

MALES		Exit to a job			Exit to retirement			Exit to DI benefits				
δ_3	7.72***	2.87***	5.38***	3.24***	1.07	0.74**	0.74**	0.74**	3.39***	2.63***	2.63***	2.19***
(s.e.)	(2.09)	(0.91)	(2.25)	(1.09)	(0.12)	(0.10)	(0.10)	(0.10)	(0.76)	(0.67)	(0.67)	(0.58)
Baseline controls	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	5252	4790	5252	5252	5252	4790	7151	7151	7151	6551
# Failures	1637	1637	1637	1438	1537	1537	1537	1455	664	664	664	600
FEMALES		Exit to a job			Exit to retirement			Exit to DI benefits				
δ_3	4.37***	1.99	1.94	2.19	2.07***	1.19	1.19	1.02	3.39***	2.63***	2.63***	2.19***
(s.e.)	(1.91)	(0.99)	(0.99)	(1.20)	(0.43)	(0.30)	(0.30)	(0.26)	(0.76)	(0.67)	(0.67)	(0.58)
Baseline controls	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	1899	1761	1899	1899	1899	1761	1899	1899	1899	1761
# Failures	462	462	462	426	276	276	276	243	664	664	664	600

Note: * indicates $p < 0.1$, ** indicates $p < 0.5$, *** indicates $p < 0.01$

Note: δ_3 : effect of starting to search (@ 1 jan 2004) after 5-12 months of unemployment as opposed to never (age at inflow > 57.5)

Table 16. MULTIVARIATE MIXED PROPORTIONAL HAZARD MODEL

REGRESSION 1			
MALES			
	exit to a job	exit to retirement	exit to DI benefits
γ_3	2.6***	2.10***	3.39***
(s.e.)	(0.19)	(0.36)	(0.41)
γ_5	5.58***	0.90	5.31***
(s.e.)	(0.56)	(0.17)	(0.90)
# Obs	15001	15001	15001
FEMALES			
	exit to a job	exit to retirement	exit to DI benefits
γ_3	3.67***	1.60	6.89***
(s.e.)	(0.4)	(0.64)	(1.17)
γ_5	5.31***	0.39**	7.03***
(s.e.)	(0.85)	(0.18)	(1.76)
# Obs	6285	6285	6285
REGRESSION 2			
MALES			
	exit to a job	exit to retirement	exit to DI benefits
δ_3	26.84***	1.06	5.93***
(s.e.)	(1.32)	(1.14)	(1.31)
# Obs	5862	5862	5862
FEMALES			
	exit to a job	exit to retirement	exit to DI benefits
δ_3	18.73***	1.12	17.12***
(s.e.)	(1.52)	(1.22)	(1.62)
# Obs	2134	2134	2134

Note: ** indicates $p < 0.5$, *** indicates $p < 0.01$

Note: γ_3 : effect of needing to search always as opposed to never (age at inflow > 57.5)

Note: γ_5 : effect of needing to continue search at 57.5 (age at inflow < 57.5)

Note: δ_3 : effect of starting to search (@ 1 jan 2004) after 5-12 months of unemployment (age at inflow > 57.5)

Table 17. GROSS HOURLY WAGE (in euros) OF JOB BEFORE AND AFTER UNEMPLOYMENT SPELL

	2001		2003		2003		2003		2003		2004					
	55.5-57.5		57.5-59.5		1st jan - 55.5-57.5		10th aug - 57.5-59.5		11th aug - 55.5-57.5		31st dec - 57.5-59.5					
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After				
10%	9.1	8.6	10.2	8.6	9.6	9	10	8.9	9.5	9.2	9.9	9.6	9.3	9.2	9.8	9.5
25%	11.4	10.2	12.1	10.7	11.7	10.8	12	11.1	11.6	11.4	11.8	11.4	11.3	11.2	12.2	12.5
50%	13.9	13.7	14.9	14.3	14.6	13.9	14.7	15.1	14.2	14.2	14.2	14.7	14.2	14.9	15	15.9
75%	18.3	18.2	20.3	16.6	19.5	18.6	20	21	18.6	18.2	18	19.7	18.9	20.1	20.4	21
90%	24.2	26.7	27.9	23.5	27.3	27.4	26.9	30.9	25.6	28.1	26.6	33.6	25.9	27.3	26.6	25.3
min	5	5.4	5.1	5.6	5.3	5.1	5.1	5.8	4.9	5.6	5.7	6.3	4.9	2.1	5	6.6
max	82.2	93.6	72.3	48.5	84.2	118.4	100	65.2	93.1	89.1	98.2	93.7	68.8	123.6	111.2	59.2
# Hours	149	130	154	128	148	113	151	101	148	117	152	150	146	117	152	118
# Obs	1127	290	1228	104	1614	318	1455	111	632	160	575	56	2267	527	1797	200

Note: inflation correction applied

Table 18. PARTTIME,FULLTIME OR FLEXTIME WORK BEFORE AND AFTER AN UNEMPLOYMENT SPELL

	2001		2003		2003		2004	
			1st jan -	10th aug	11th aug -	31st dec		
	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5	55.5-57.5	57.5-59.5
Before								
Parttime	0.21	0.17	0.28	0.28	0.25	0.27	0.31	0.27
Fulltime	0.66	0.74	0.58	0.62	0.56	0.60	0.54	0.61
Flex	0.13	0.09	0.14	0.10	0.18	0.13	0.15	0.13
# Observations	1627	1595	3001	2266	1425	1036	4465	3279
After								
Parttime	0.34	0.38	0.36	0.46	0.30	0.35	0.33	0.35
Fulltime	0.45	0.44	0.36	0.32	0.42	0.43	0.36	0.39
Flex	0.21	0.18	0.29	0.21	0.28	0.23	0.31	0.26
# Observations	1080	745	1398	762	725	396	2082	1162

Note: 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).

Figure 2: NONPARAMETRIC ESTIMATION OF HAZARD FUNCTIONS



Figure 2a - exit to a job

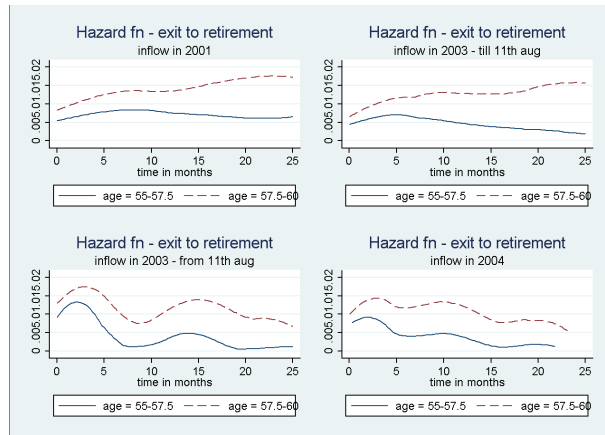


Figure 2b - exit to retirement

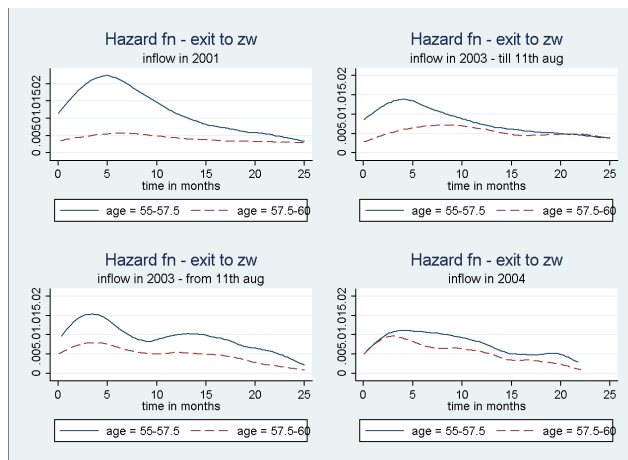


Figure 2c - exit to DI

Figure 3: PARAMETRIC ESTIMATION OF HAZARD FUNCTIONS

Exit to Job for Males

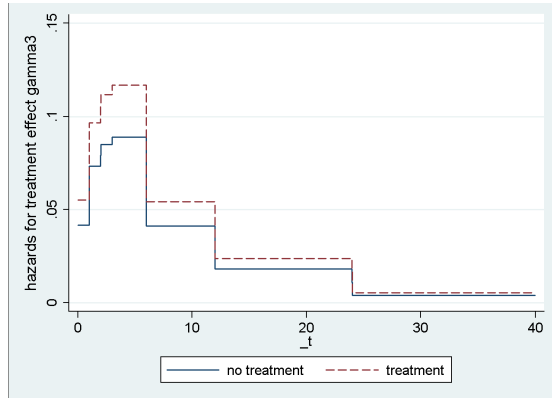


Figure 3a - always vs never search

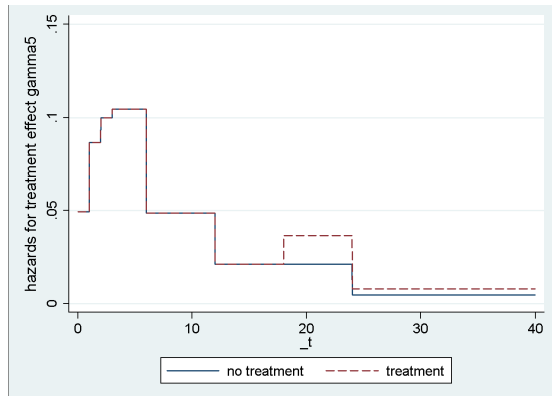


Figure 3b - continue search at 57.5

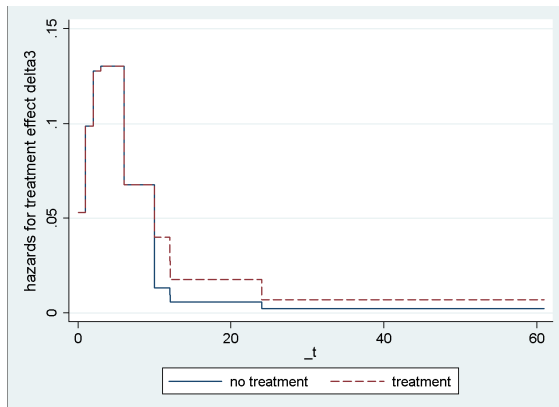


Figure 3c - start search 01-01-2004

Figure 4: PARAMETRIC ESTIMATION OF HAZARD FUNCTIONS

Exit to Retirement for Males

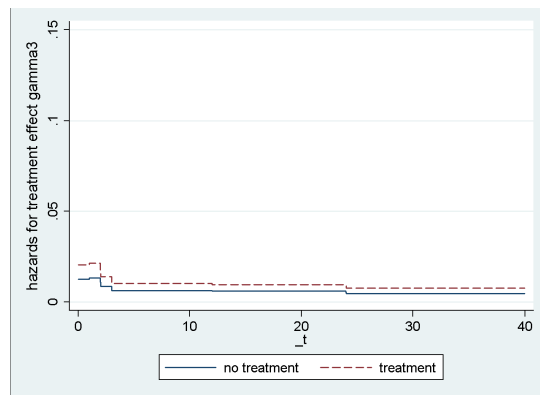


Figure 4a - always vs never search

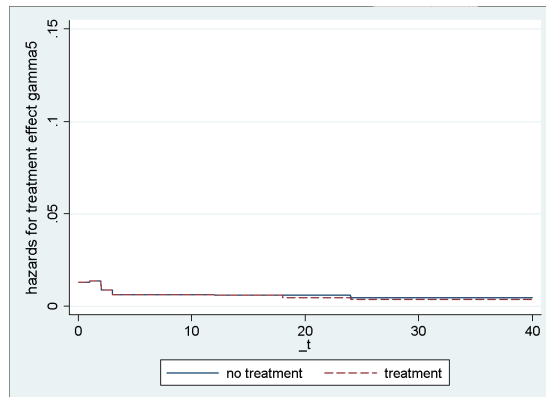


Figure 4b - continue search at 57.5

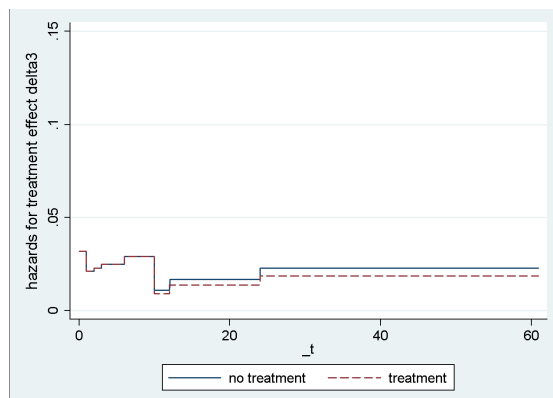


Figure 4c - start search 01-01-2004

Figure 5: PARAMETRIC ESTIMATION OF HAZARD FUNCTIONS

Exit to Sickness/Disability for Males

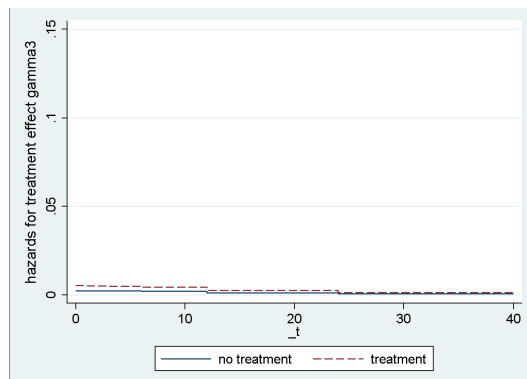


Figure 5a - always vs never search

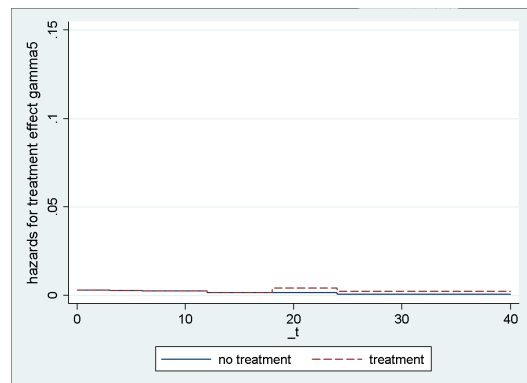


Figure 5b - continue search at 57.5

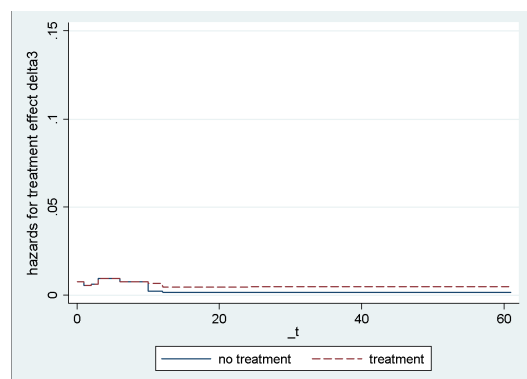
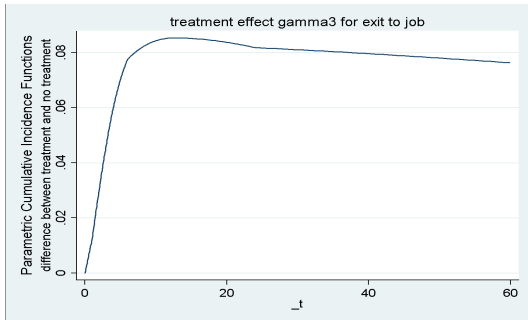
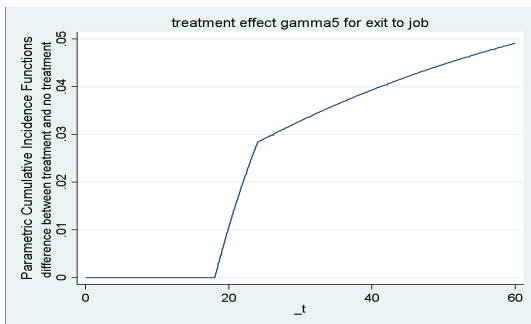


Figure 5c - start search 01-01-2004

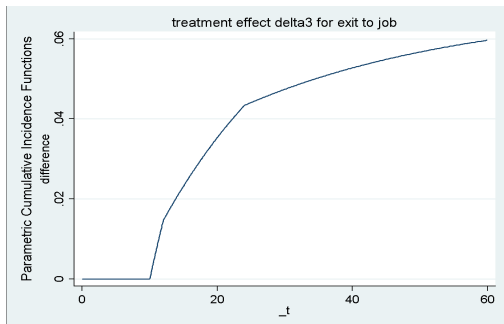
Figure 6 - Cumulative Incidence Functions



always vs never search

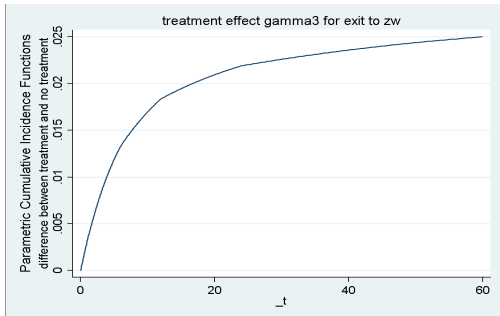


continue search at 57.5

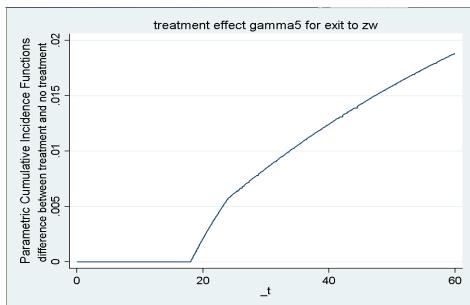


start search 01-01-2004

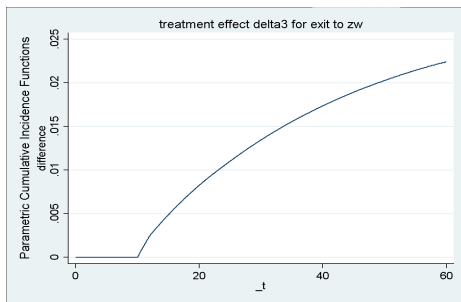
Figure 7: Cumulative Incidence Functions



always vs never search



continue search at 57.5



start search 01-01-2004

Appendix B The Dutch Unemployment Insurance Procedure

An unemployed job seeker is expected to register at the unemployment office (UWV werkbedrijf) on the first day following unemployment. At the same time, the unemployed individual is officially registered as a job seeker. During this first intake, the unemployment office makes an estimation considering the employability of the individual. On the basis of objective characteristics such as profession, labour market experience, education and age, and the impression of the caseworker during the intake itself (subjective characteristics) the individual is distributed to a certain 'phase.' Phase 1 individuals are assumed to be able to find work

within 6 months without any further assistance. Other individuals (phases 2, 3 and 4) receive job search assistance and can be assigned to ALMP's by the unemployment office. Individuals without formal search requirements are automatically assigned to phase 4.

Within a maximum of 8 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 told about the procedures regarding the job search requirements. An individual needs to make a minimum of 4 applications per 4 weeks to suitable jobs. In the first six months of unemployment, a job is considered suitable when (i) the individual has obtained exactly the level of education required for the job¹⁶ (ii) earnings are not below or not 'significantly below' earnings in the previous job (iii) travel time per day is not more than 2 hours. Apart from the '4 applications in 4 weeks requirement' and individual is also expected to consult a public vacancy information system. Moreover, he needs to accept any 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 labor market programs (if any).

In the weeks following this second intake, an individual needs to report to the caseworker at the unemployment office every 4 to 6 weeks. These meetings are meant primarily for checking the fulfillment of the job search requirements by the unemployed. In case the caseworker suspects that an individual did not make enough job applications, an official at the unemployment office is informed. The official then decides whether a sanction needs to be imposed, of which the individual is notified (in written form). The unemployed is then given the opportunity to defend his case (either written or spoken).¹⁷ If it is decided that the individual was to blame for the lack of job applications, he is send a letter in which it is explained when and with what amount benefits are cut. The maximum cut 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). This cut is the same regardless of the individual receiving short-term, wage-related, or follow-up benefits. In case the individual was only to blame partially, the cut is 10 percentage points. In case the individual did not follow up on the job search requirements a second time within two years, the benefit cut can be as a high as 30 percentage points.

After the letter has been send, the individual still has the possibility to fight the decision of the unemployment office in court. However, in that case possible refunding can only be done after a court decision has been reached, which usually takes years.

Appendix C Changes in the DI System 2001-2005

For completeness, in this section we present changes in the DI system that were mainly aimed at employers and are therefore not relevant to the individuals included in our analysis, namely the older *unemployed*.

¹⁶Individuals with a master degree are also obliged to accept work on the bachelor level

¹⁷It can also occur that the official, by checking the formal evidence on job applications, is the one to discover that the individual does not comply to the job search requirements. In this case, he contacts the caseworker to confirm his suspicion or he contacts the unemployed individual immediately.

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 disability during the preceding (one year) period of sickness. When the reintegration programme is considered insufficient by the unemployment office, the period in which the employer pays sickness benefits is extended for at most 1 year. Alternatively, DI payments to the employee are refused or reduced. Incentives to enter the DI scheme are therefore significantly decreased. However, in absence of an employer, the Act is not expected to have reduced DI inflow from unemployed workers.

Since January 1st 2002, employers get a 2% reduction on the DI 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' DI premiums comprised 4.76% of gross wage, this implies that less than 0.1% of gross wage could 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 have increased 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 sickness benefits to former employees (becoming unemployed less than 1 month before they get sick).¹⁸ In exchange, employers' sickness insurance premiums are reduced. This change could reduce inflow in DI of UI-benefit recipients in the first month of unemployment. However, only 26 mainly small employers took up this new right until January 1st 2005. The policy change was therefore considered unsuccessful and was abolished in May 2006. It is therefore unlikely that this temporary adjustment in the system will affect our results. Another reform, institutionalized on the 1st of January 2004, portayed an extension of the maximum length of sickness benefits from 1 to 2 years. For the employer, this meant that an ill employee would cost him/her a maximum of two years of wage payments, instead of one.¹⁹ From this moment on, also unemployed individuals received two years of ZW (sickness) benefits before transferring to the WAO. 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 employers. A final law, governed on the 1st of January 2004, dictates that employers do not have to pay basic (non-differentiated) DI 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 August 2004, the collective agreement on DI 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 our analysis, the change does not affect our estimates.

¹⁸The act is known as the Act Personal Liability Sickness Insurance (Wet eigen risico dragen ziektewet, WEZ).

¹⁹As a compensation to the employers, the differential premium that increases when a large proportion of their employees is receiving disability insurance payments is reduced. Specifically, the premium is increasing in the number of employees that are receiving DI benefits for at most 4 years, instead of 5.

Appendix D Multivariate Mixed Proportional Hazard Model with Heckman Singer heterogeneity

The hazard rate for exit state x is defined as:

$$\theta_1^x(t|X) = \lambda(t) \exp\{X'\beta\}v_1^x \quad (4)$$

$$\theta_2^x(t|X) = \lambda(t) \exp\{X'\beta\}v_2^x \quad (5)$$

Where the constant is normalized to zero for identification.

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

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

With $I_k(t)$ the indicator function taking the value 1 if t is in interval k . There are $K = 7$ 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. We normalize $\mu_1 = 0$ for reasons of identification.

Assuming an exponential distribution, the survivor function for surviving up to period T for a spell with exit state x can be written as:

$$S_1^x(T|X) = \exp\left(-\int_0^T \theta_1^x(s|X) ds\right) = \exp(-\exp\{X'\beta\}Tv_1^x)$$

$$S_2^x(T|X) = \exp\left(-\int_0^T \theta_2^x(s|X) ds\right) = \exp(-\exp\{X'\beta\}Tv_2^x)$$

The likelihood contribution for 1 individual reads

$$L_i = p_1 \prod_{x=1}^X \theta_1^x(t|X)^{d^x} S_1^x(T|X) + p_2 \prod_{x=1}^X \theta_2^x(t|X)^{d^x} S_2^x(T|X) \quad (6)$$

With d^x an indicator function equal to 1 if exit to state x is observed and X the number of exit states (3 in our case). The parameters p_1 and p_2 are probabilities assigned to the mass points, specified as logit functions:

$$p_1 = \frac{1}{1 + \exp(q_1)}, p_2 = \frac{\exp(q_1)}{1 + \exp(q_1)} = 1 - p_1$$

The (log)likelihood is maximized w.r.t. $X'\beta, \mu_k, v_i^x$ and q_1 . By assuming only partial mixing, the number of parameters in the probability functions to be estimated has been reduced from 7 to 1.