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The Necessity of Self-Employment Towards Retirement

Evidence from Labor Market Dynamics and Search Requirements for Unemployment Benefits

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The necessity of self-employment towards retirement: evidence from labor market dynamics and search requirements for unemployment benefits *

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Abstract

This paper investigates whether individuals at the end of working life choose self-employment out of necessity and to what degree job search requirements for unemployment benefits induce people to become self-employed. For this purpose we analyze labor market transitions for people between the ages of 50 and 63 using a dynamic multinomial logit model with unobserved heterogeneity.

The results indicate that at the end of the career individuals with a weak labor market position have a relatively high probability to become self-employed, e.g. to end or avoid a period of unemployment or inactivity (necessity driven self-employment). Contrasting some earlier work, the results do not suggest that self-employment is used as a gradual retirement route for employees. A difference-in-differences analysis shows that job search requirements among un-

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employed older workers increased the outflow from unemployment and decreased the inflow into unemployment, but did not increase self-employment out of necessity or opportunity.

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1 Introduction

In virtually all OECD countries, labor force participation rates of the 50+ population decreased in the period from the 1960s to the mid-1990s (OECD, 2011). This was partially due to generous unemployment insurance, disability insurance and early retirement schemes (Gruber & Wise, 1998).[1] Since the mid-1990s aging has raised concerns about the sustainability of the welfare state and reforms have been undertaken to increase the labor force participation of the 50+ population. As a result, the share of people in paid-employment[2] and self-employment increased. This paper focuses on self-employment at older ages and the introduction of job search requirements for unemployed older workers.

This paper's contribution to the literature is twofold. To begin with, this study contributes to the literature on the importance of necessity and opportunity driven self-employment. In the literature, two main hypotheses have risen to explain self-employment at older ages. First, self-employment may be chosen out of necessity, to end or to avoid unemployment.[3] The 50+ population particularly faces difficulties finding a new job once unemployed (Chan & Stevens, 2001 and Maestas & Li, 2006). Second, self-employment may be chosen as an opportunity to reduce working hours and enhance gradual retirement.[4] To investigate the nature of self-employment at older ages we test 1) whether transitions from unemployment to self-employment are important and increase with age[5], 2) whether high unemployment rates push workers from paid-employment to self-employment[6], and 3) whether the introduction of job

[1] Country-specific analyses can be found in Bould (1980), Hogarth (1988), Ruhm (1995), Riphahn (1997), Kerkhofs et al. (1999), Hernoes et al. (2000), Roed & Haugen (2003), Friedberg & Webb (2005), Van Vuuren & Van Vuren (2007), Euwals & Van Vuuren (2010), Euwals et al. (2012) and De Vos et al. (2012).

[2] Defined as being an employee.

[3] E.g. Taylor (1999), Reize (2000), Earle & Sakova (2000), Kuhn & Schuetze (2001), Kellard et al. (2002), Rissman (2003) and Glocker & Steiner (2007).

[4] This is suggested by Fuchs (1982), Hurd (1996), Bruce et al. (2000), Morris & Mallier (2003), Zissimopoulos & Karoly (2007), Giandrea et al. (2008), and Gu (2009). Hamilton (2000) finds that nonpecuniary benefits of self-employment, such as the flexibility in working hours decisions, are an important reason to choose for self-employment.

[5] Parker & Rougier (2007) find that transitions from unemployment to self-employment are relatively important and argue that this indicates necessity-driven self-employment at older ages.

[6] Several studies find that high unemployment rates increase self-employment propensities, e.g. Benedict & Hakobyan (2008), Kim & Cho (2009), and Congregado et al. (2012). This latter effect is known as the *recession push hypothesis*. This hypothesis is, however, not confirmed in all papers (Moore & Mueller, 2002 and Tapia, 2008). Among others, Carrasco (1999) finds that self-employment becomes more attractive when the economic situation improves (the *prosperity pull hypothesis*).

search requirements for unemployed older workers increases self-employment. For the last test we use a Dutch UI reform which introduced job search requirements for unemployed persons between the age of 57.5 and 63 as from January 2004. Before this reform unemployed older workers did not have to search for a job in order to receive unemployment benefits. The reform implied an exogenous and unanticipated shock in the attractiveness of unemployment as a pathway to retirement. Whereas Lammers et al. (2013) and Hullegie & Van Ours (2013) investigate the effect of this reform on the outflow from welfare and substitution effect with regard to disability and early retirement[7], we focus on substitution between unemployment and self-employment. Self-employment may increase when unemployment becomes less attractive as an exit route to retirement. As far as we know, there are no other studies that investigated the effect of job search requirements on substitution between unemployment and self-employment as an exit route to retirement.[8]

Our second contribution concerns the effect of job search requirements on the inflow to unemployment. We expect that the introduction of search requirements for unemployed older workers lowers the inflow into unemployment, since job search requirements make unemployment a less attractive exit route to retirement. Other studies that investigate the inflow into unemployment are focused on entrance requirements to unemployment insurance (e.g. Green & Riddell, 1997, Christofides & McKenna, 1996) and on the level and/or duration of benefits (e.g. Andersen & Meyer, 1997, Winter-Ebmer, 2003, Lalive et al., 2006, and Tuit & Van Ours, 2010). Lalive et al. and Tuit et al., for example, focus on unemployed older workers and show that benefit duration affects the inflow to unemployment insurance. The bulk of the literature on search requirements is focused on the effects of exiting unemployment instead of the inflow to unemployment (Fredriksson & Holmlund, 2006).

This paper analyzes labor market transitions using a dynamic multinomial logit model.[9] This model allows us to study the pathways through which people enter self-employment, to

[7]Lammers et al. (2013) and Hullegie & Van Ours (2013) both find that the 2004 UI reform significantly increased exits from unemployment to paid-employment. Lammers et al. (2013) also find substitution effects between unemployment insurance and disability insurance.

[8]For an overview of the literature regarding the effects of job search requirements in unemployment, see Fredriksson & Holmlund (2006).

[9]Among others, this model has been used by Cappellari et al. (2010), Constant & Zimmerman (2004), Caliendo & Uhlendorff (2008) and Martinez-Granado (2002).

study the effect of the unemployment rate on transitions to self-employment, and to study the effect of the introduction of job search requirements on labor market transitions using a difference-in-differences approach. We correct for unobserved heterogeneity by allowing for correlated random effects (Wooldridge, 2010) and we take into account the initial conditions problem by using the method of Wooldridge (2005). Estimating a dynamic multinomial logit model avoids a possible sample selection bias, which may occur when considering binomial models describing transition processes. To estimate the model, the paper takes advantage of the long panel dimension of the Dutch Income Panel data (1989-2009).

Our main finding is that at the end of the career unemployed individuals have a relatively high probability to enter self-employment (necessity driven) and this effect is found to be significantly increasing with age. For men in paid-employment the results show significant evidence for the recession push hypothesis. For inactive men, on the other hand, we find that a higher unemployment rate decreases the probability to enter self-employment. For women we find that a higher unemployment rate decreases the probability of entering self-employment regardless of the previous labor market status. Introducing job search requirements for the unemployed at the end of their working life increased exits from unemployment and reduced the inflow to unemployment. This reform, however, did not increase self-employment out of necessity (we find no significant increase in flows from unemployment to self-employment due to the reform).

The structure of the paper is as follows. The next section describes the Dutch unemployment insurance system. Section 3 presents the model, and section 4 describes the data. Section 5 reports the estimation results, after which section 6 provides some discussion and section 7 concludes the paper.

2 Unemployment insurance towards retirement

As this paper focuses on self-employment and unemployment as exit routes to retirement, this section provides an overview of the Dutch UI benefit system. In the 1990s unemployment was an attractive exit route for older workers because of generous arrangements and easy eligibility

rules. As from the age of 57.5 people had the possibility to use UI benefits up to the mandatory retirement age without having to search for a job. Unemployment was, therefore, used frequently as an exit route to retirement. The number of UI beneficiaries expanded and, in light of the aging population, reforms have been undertaken.[10]

This paper investigates the effect of a UI reform introduced on January 1st 2004, which implied that unemployed persons older than 57.5 years were no longer exempted from the requirement to search actively for a job. Search requirements involve that persons in unemployment 1) have a mandatory intake meeting at the unemployment office, where individual criteria are made regarding the expected activities undertaken during unemployment that are *ex post* testable,[11] 2) have the obligation to accept suitable job-offers, where suitable job offers are defined by the educational level and the time spent in unemployment, 3) have to make a sufficient number of applications,[12] where sufficiency is individually determined and related to the labor market, the number of available vacancies and personal health, 4) have to participate in educational programs and job search assistance when they are assumed to not to be able to find work within six months, and 5) have regular report meetings every 4-6 weeks in addition to the mandatory intake meeting and the follow-up to explain the further procedures.

The baseline from which individual arrangements are made is the requirement of applying for a job once a week on average. An automatic exception is made for individuals starting their own business. Furthermore, exceptions are made for persons participating in care or volunteering for at least 20 hours per week for a period of at most six months, individuals taking part in an educational program, people of age 64, or persons older than 62 years and 2 months who already received UI benefits for at least a year in 2004. The first two exceptions are made because they may increase the probability to find a job. The latter two exceptions are made because of a transitory regime. The strictness of job monitoring in the Netherlands is high[13] and due to the risk of substantial financial sanctions we can reasonably assume people

[10]For an international comparison of unemployment as an early retirement route, see Gruber & Wise (1998).

[11]The employability of an individual is determined by objective characteristics such as profession, education, age and experience as well as the subjective impression of the caseworker during the interview.

[12]The following options are considered to be an application: letter, e-mail, phone call or nuncupative contact with a company, registering at an agency, having a job interview and doing an assessment.

[13]From an international perspective, Venn (2012) ranks the Netherlands among countries with a high strictness of job search monitoring. The OECD indicator suggests that monitoring job search is stricter in the Netherlands

to be complying with the search requirements (Verveen et al., 2005). After some time, people even have to accept all job offers irrespective of their educational level.

Fulfilling above mentioned requirements, together with eligibility requirements that people have worked at least 26-out-of-36 weeks, gives persons the right to receive UI benefits. Until October 2006 the maximum UI benefits duration for receiving 70% of previous earnings was age-dependent and amounted to a maximum of 42, 48 and 60 months for persons aged 50-54, 55-59 and 60-64 respectively. Until August 2003 persons aged 57.5+ could, in principal, even extend the benefit period up to the age of 65 by using extended UI benefits. These extended UI benefits amounted 70% of minimum wage. From August 2003, extended UI benefits were abolished simultaneously with the introduction of the so called IOAW-benefits[14] targeted at unemployed 50+ individuals. The only difference between the extended UI benefits and the IOAW for older unemployed is that receiving the latter depends on the income of the spouse while extended benefits were unconditional on the income of the spouse. Single households are therefore indifferent between receiving extended UI benefits or IOAW benefits.

In October 2006, both benefits and the duration of benefits were moderated for all UI recipients and the maximum UI benefit duration was made conditional on the employment history, with a maximum of 38 months. However, after 38 months of UI benefits, unemployed elderly can obtain social benefits from *IOAW* and the *IOW*[15] (implemented in 2004 and 2009, respectively) to complement household income up to subsistence level without asset-based means testing (and for the IOW also unconditional on the income of a partner). Furthermore, self-employed elderly individuals with a low income who have to stop their business can receive benefits to complement their income up to subsistence level, without the strict asset-based means testing from social assistance benefits.[16]

than in countries such as the US, Canada and Scandinavian countries.

[14] *Wet inkomensvoorziening oudere en gedeeltelijk arbeidsongeschikte werkloze werknemers.*

[15] *Inkomensvoorziening oudere werklozen.*

[16] This program is called the IOAZ (*Wet Inkomensvoorziening oudere en gedeeltelijk arbeidsongeschikte gewezen zelfstandigen.*)

3 Model

3.1 Exit routes to retirement

This section describes the model we use to investigate labor market transitions among the 50+ population. The exit route to retirement can be seen as the outcome of a maximization process, in which individuals reevaluate their optimal labor market status each period, given their preferences and the constraints that coincide with each labor market state. Individuals compare utility streams associated with different exit routes and choose the alternative with the highest utility stream. More specifically, we define the inter-temporal utility of individual i as follows:

$$U_{it} = \sum_{\tau=t}^{T} (1+\rho)^{t-\tau} u_\tau(c_{i\tau}, l_{i\tau}, j_{i\tau}; s_{i\tau}, v_{i\tau}) \tag{1}$$

where $c_{i\tau}$ and $l_{i\tau}$ denote consumption and leisure of individual i in time period τ implicitly defined by labor market state j. ρ is the discount factor and T the time horizon of the individual. In our model we distinguish between four mutually exclusive labor market states: paid-employment ($j = 1$), self-employment ($j = 2$), unemployment insurance ($j = 3$), and inactivity ($j = 4$).[17] Each labor market status is associated with it's own consumption and leisure possibilities, but labor market status itself may also influence the utility function directly. E.g., conditional on leisure and consumption, some people receive a higher utility from self-employment than from paid-employment, due to characteristics of self-employment such as the independence and flexibility that self-employment provides.

Social insurance rules $s_{i\tau}$ that hold for individual i in period τ influence the exit route to retirement. An increase of job search requirements, for example, decreases the amount of leisure and so the value of unemployment as a retirement route. Furthermore, transitions from self-employment or inactivity to unemployment are not possible because only persons in paid-employment are eligible for UI benefits. Finally, observed and unobserved characteristics $v_{i\tau}$ influence the utility function indirectly through preferences. For example, age, the number of children in the household, and education may influence the utility perceived from consumption

[17] Inactivity includes individuals in disability, welfare, early retirement, and individuals without personal income.

and leisure.

Equation 1 provides a guideline for the empirical specification of the model. It shows that individuals choose the exit route that maximizes their utility over consumption, leisure, and labor market status. Furthermore, individual characteristics and social insurance rules affect current and future labor market statuses. For the empirical implementation of the problem, like Blau (1998) and Mastrogiacomo et al. (2004), we approximate the value function U_{it} for individual i who chooses labor market status j at time t with a linear function:

$$V_{ij}(t) = X_{it}\beta_j + Z_{it-1} \otimes [1 \quad AGE'_{it} \quad YEAR'_{it}]\gamma_j + Z_{it-1}UR_t\theta_j + D_{ijt} + \mu_{ij} + \varepsilon_{ijt}, \qquad (2)$$

where X_{it} is a vector of observed personal and household characteristics that influence preferences as shown in (1). Z_{it-1} is a vector of dummy variables indicating lagged labor market status. AGE_{it} and $YEAR_{it}$ are vectors of dummy variables indicating age and year categories. These are interacted with Z_{it-1} to allow for mobility differences across age and periods. UR_t is the unemployment rate in period t, which we interact with Z_{it-1} to take into account that the unemployment rate may affect individuals with various previous employment states differently. The treatment variables function D contains variables and interactions that we use to identify the effect of the job search requirements introduced in 2004 and will be explained in section 3.2.

Finally, the terms μ_{ij} describe individual specific unobserved heterogeneity and ε_{ijt} are i.i.d. error terms, which we assume to be independent of the explanatory variables and to follow a Type I extreme value distribution. Hence, the probability for individual i to have labor market status j at time $t > 0$ can be written as

$$\begin{aligned} &P(j_t|X_{it}, Z_{it-1}, AGE_{it}, YEAR_{i,t}, UR_t, D_{ijt}, \mu_{i1}, ..., \mu_{iJ}) = \\ &\frac{\exp(X_{it}\beta_j + Z_{it-1} \otimes [1 \quad AGE'_{it} \quad YEAR'_{it}]\gamma_j + Z_{it-1}UR_t\theta_j + D_{ijt} + \mu_{ij})}{\sum_{k=1}^{J} \exp(X_{it}\beta_k + Z_{it-1} \otimes [1 \quad AGE'_{it} \quad YEAR'_{it}]\gamma_k + Z_{it-1}UR_t\theta_k + D_{ikt} + \mu_{ik})}, \end{aligned} \qquad (3)$$

where J denotes the number of mutually exclusive labor market states distinguished in the model. To identify the model, $\beta_1, \gamma_1, \theta_1$ and μ_{i1} are normalized to zero (paid-employment is

the reference category). The unobserved heterogeneity or random effects $\mu_i = (\mu_{i2}, \mu_{i3}, \mu_{i4})'$ are assumed to follow a multivariate normal distribution with mean zero and variance Σ_μ.

Introducing unobserved heterogeneity has the advantage that the irrelevance of independent alternatives (IIA) property of the multinomial logit model is avoided. Furthermore, allowing for unobserved heterogeneity within choice possibilities will give true, instead of spurious, state dependence in the model. The initial labor market status Z_{i0} is not fixed or exogenous and, as in most papers, we do not have the entire history of the process generating individual's employment dynamics available. Therefore, the initial conditions problem arises, which is discussed by Heckman (1981). To deal with this problem Heckman (1981) proposed to estimate a static multinomial logit model for the initial state with different slope parameters and without lagged labor market status, simultaneously with the dynamic model. Several studies investigating transitions between multiple states have used this method, e.g. Gong et al. (2000), Uhlendorff (2006) and Cappellari et al. (2010). In this paper we will use an alternative approach, proposed by Wooldridge (2005), to take into account the initial conditions problem. In the method of Wooldridge (2005), individual specific heterogeneity terms are modeled conditional on the initial condition, the initial value of the lagged dependent variable, and the individual mean of time-varying covariates

$$\mu_{ij} = Z_{i0}\alpha_{1j} + X_i\alpha_{2j} + a_{ij} \quad j = 2,3,4 \tag{4}$$

where Z_{i0} is the vector of initial conditions and X_i the vector of the individual mean of time-varying covariates. The remaining stochastic element, a_{ij}, is assumed to follow a multivariate normal distribution with mean zero and variance Σ_a. In other words,

$$\begin{pmatrix} a_{i2} \\ a_{i3} \\ a_{i4} \end{pmatrix} = L \begin{pmatrix} \eta_{i2} \\ \eta_{i3} \\ \eta_{i4} \end{pmatrix} \quad \text{with} \begin{pmatrix} \eta_{i2} \\ \eta_{i3} \\ \eta_{i4} \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \right), \tag{5}$$

where L is the Cholesky matrix of Σ_a which has to be estimated (the unique lower triangular matrix such that $LL' = \Sigma_a$). In this way, we allow for unobserved heterogeneity within and

between choice possibilities.

Applying the Wooldridge correction for initial conditions in the way explained above, automatically results in a Correlated Random Effects model (Mundlak, 1978). Applying this Correlated Random Effects regression has the advantage of allowing for correlation between observed- and unobserved heterogeneity similar to a fixed effects model, even in an unbalanced panel (Wooldridge, 2010).

Akay (2012) studied the performance of the Wooldridge method, compared to the Heckman method. He found that the method proposed by Wooldridge works well for moderately long panels (5-8 periods) and that all methods perform equally well for panels of long duration (longer than 15-20 periods)[18]. For short panels, Rabe-Hesketh & Skrondal (2013) find that the bias practically disappears when the initial-period explanatory variables are included as additional regressors. Examples of other studies that used the Wooldridge approach are Buddelmeyer et al. (2010), Christelis & Sanz-de Galdeano (2011), Devicienti & Poggi (2011), Haan & Wrohlich (2011), and Michaud & Tatsiramos (2011).

3.2 Identifying the effects of job search requirements

The 2004 UI reform, described in section 2, provides an exogenous source of variability in the data. As from 2004 individuals of age 57.5 and older are no longer exempted from job search requirements. Increased active hours due to the introduction of search requirements stem from mandatory (intake) meetings and submitting a sufficient number of applications with the potential threat of training programs, the potential risk of substantial financial sanction when not complying and the potential risk of mandatory job acceptance below level decreases the value of V_{i3} in equation (2) (where $j = 3$ indicates unemployment). This implies that the UI reform makes the value of unemployment relatively lower compared to paid-employment, self-employment and inactivity. To infer causal effects of job search requirements, we apply a difference-in-differences framework. In this framework, we compare the inflow to and the outflow from unemployment before and after the reform for the 57.5+ population (for whom job search requirements were no longer exempted), relative to those younger than 57.5 (for whom

[18] In this paper we have a long panel of 21 periods available.

nothing changed). We assume that in absence of the reform there would not be a discontinuous change in labor market transitions for 57.5+ individuals relative to those younger than 57.5 after the reform.[19]

Formally, the difference-in-differences framework is implemented in equation (2) using the treatment variable function D which is given by

$$D_{ijt} = [PE_{it-1} \quad UI_{it-1}] \otimes [G_{it} \quad P_{it} \quad G_{it} \cdot P_{it}]\delta_j \tag{6}$$

where G_{it} is a dummy variable indicating the treatment group, which is equal to one if a person is between the ages of 58 and 63 (at December 31th) and zero otherwise.[20] Only, due to a transitional regime, persons older than 62 years and 2 months who were already unemployed for a minimum of one year at the time the reform was implemented were not affected by the reform and are classified as belonging to the control group. P_{it} indicates the treatment period (2004-2009), and $G_{it} \cdot P_{it}$ is one for those persons that are treated. Finally, by interacting the treatment variables with indicators for paid-employment (PE) and unemployment (UI) in the previous period, we investigate the effects of the reform on the outflow from unemployment and on the inflow from paid-employment to unemployment.

Lammers et al. (2013), who exploit the same policy reform, notice that anticipation of the policy change can result in selective inflow into unemployment around the time the policy was initiated, but found no evidence of this. Probably, since none of the individuals flowing into UI in 2003 were exempted from the new rules, speeding up the firing procedure could not prevent them from the new search requirements after the age of 57.5. Therefore, we can reasonably assume that the introduction of the reform was unanticipated. Another type of anticipation effect may well arose before the reform. If before 2004 unemployed individuals who were close to 57.5 were already reducing their search capacity in anticipation of the removal of the search requirement after the age of 57.5, the labor market transitions of those younger than

[19] Placebo tests will follow to verify this common trends assumption.

[20] Since we have yearly data we cannot identify effects that start during a year. The smallest bias is introduced when we define individuals to belong to the treatment group as from the year in which they become 58. Taking the year in which people become 57 increases the bias, since all individuals born after June do not reach the age of 57.5 during that year. Furthermore, also those born from January to June have a smaller bias when the treatment group starts as from the year in which individuals become 58.

57.5 are also affected by the reform. Hullegie & Van Ours (2013) find that individuals already reduced their search intensity about two months prior to the age of 57.5 in the period before 2004, meaning that persons anticipated the abolishment of search requirements at older ages. If indeed the treated group would be all individuals as from the age of 57 and 4 months (57.5 minus 2 months), we would change our definition of the treatment group. We would indicate persons born in January or February to be treated as from the year in which they become 57 (instead of 58), so to reduce the bias resulting from the yearly observations. A robustness check (not reported here) in which the treatment group consists of persons as from the age of 57 who were born in January or February shows that the results hardly change.

The 2004 UI reform did not change the UI benefit level and -duration, but only introduced mandatory job search requirements that increased the number of active hours to be spend in unemployment. To make sure that we only measure the effects of the introduction of job search requirements on the first of January 2004 and not the abolition of extended benefits in August 2003, we exploit in the robustness checks the fact that the reform of August 2003 did not affect singles (as mentioned in section 2).

3.3 Estimation

We estimate the model's parameters using maximum likelihood. The likelihood contribution of an individual i with observed labor market states $j_1, ..., j_M$ is

$$L_i(j_1,...,j_M|X,Z,AGE,YEAR,UR,D,a_i;\alpha,\beta,\gamma,\theta,\delta) =$$
$$\prod_{t=1}^{M_i}\prod_{j=1}^{J}\left(\frac{\exp(X_{it}\beta_j + Z_{it-1}\otimes[1 \quad AGE'_{it} \quad YEAR'_{it}]\gamma_j + Z_{it-1}UR_t\theta_j + D_{ijt} + Z_{i0}\alpha_{1j} + X_i\alpha_{2j} + a_{ij})}{\sum_{k=1}^{J}\exp(X_{it}\beta_k + Z_{it-1}\otimes[1 \quad AGE'_{it} \quad YEAR'_{it}]\gamma_k + Z_{it-1}UR_t\theta_k + D_{ikt} + Z_{i0}\alpha_{1k} + X_i\alpha_{2k} + a_{ik})}\right)^{I(j=j_t}$$
(7)

where M_i is the last observation for individual i. We do not observe the individual specific effects a_i $(= (a_{i2}, a_{i3}, a_{i4}))$. This term has to be integrated out, such that the likelihood contri-

bution becomes

$$L_i(j_1,...,j_M|X,Z,AGE,YEAR,UR,D,a_i;\alpha,\beta,\gamma,\theta,\delta) = \int_{-\infty}^{\infty} L_i(j_1,...,j_M|X,Z,AGE,YEAR,UR,D,a_i;\alpha,\beta,\gamma,\theta,\delta)da_i \quad (8)$$

We evaluate the integral using Maximum Simulated Likelihood (for details, see Gourieroux & Monfort, 1993 and Hajivassiliou & Ruud, 1994). We apply Halton draws instead of random draws, as they are found to give more precise estimation results (Train, 2000 and Bhat, 2001).

Current Stata software does not allow us to estimate our dynamic multinomial logit model with unobserved heterogeneity for all observations at once.[21] Hence, we have to draw a random sample of individuals. To increase the efficiency of the estimated coefficients we estimate the model on two subsamples of the data, such that all observations are used, and apply minimum distance (Chamberlain, 1984), where we restrict the estimates of the two subsamples to be the same. This method is applicable to all kind of situations in which (complicated) models have to be estimated with large data sets.

4 Data

4.1 Data and definitions

Data are drawn from the Dutch Income Panel Study 1989-2009 (IPO, Inkomens Panel Onderzoek, CBS, 2009), gathered by Statistics Netherlands. IPO is an administrative dataset that contains a representative sample of the Dutch population. About 95,000 individuals are selected, based on their national security number, and followed over time. Detailed information is available, most particularly from the tax office, on income, wealth, gender, age, marital status, children, ethnicity, homeownership and labor market status.

A major advantage of having administrative data is the number of observations and the high level of representativeness. It is a well-known fact that the rich and the poor are often underrepresented in surveys, but also that self-employed individuals are often underrepresented.

[21] We have a large dataset consisting of 164,620 men and 161,487 women.

Another advantage of IPO is that we have a long time span available (21 years) and that we have no endogenous panel attrition, since panel attrition only occurs as a result of emigration or death.

In this paper we select men and women between the ages of 50 and 63.[22] To define labor market status we use an individuals's main source of income during a year of observation. We make one exception for self-employment, namely, when a person has a negative profit (a loss) and income from wealth is larger than any other component that year we also indicate this person to be self-employed. This allows us to take into account start-ups.[23]

The analysis also uses additional published data of Statistics Netherlands about the macroeconomic unemployment rate and the consumer price index (CPI). The unemployment rate decreased from 6.9% in 1989 to 2.6% in 2009, with peaks in 1994 (7.5%) and 2004 (4.5%).

4.2 Descriptive analysis

Table 1 describes the data. We distinguish individuals in the treatment and the control group, and in the treatment and control period. Men and women are analyzed separately, because their retirement routes may be quite different. Individual and household characteristics are about the same between the control and treatment period. Only, the share of men and women with a partner decreased about 10%-points between the control and the treatment period for the control group.

Labor market statuses changed substantially between the pre- and post-reform period. Paid-employment increased at the expense of inactivity, especially among women in the treatment group. This can be explained by cohort effects, as found by Euwals et al. (2011). About 10% of the individuals are self-employed and only 2-5% of these individuals received a substantial amount of labor income in addition to business profits (at least half of their profit). Furthermore, only 10 to 15% of the unemployed received a substantial amount of labor income (at least half of their unemployment benefits). This reassures us that that we do not have to worry about using the main income source to define labor market status.

[22] Individuals of age 64 are excluded from the UI reform that we investigate.

[23] Income from self-employment comprises business profits, freelancing or income from being a director/major shareholder.

For all years of observation we observe income from wealth on the household level and we use this information to identify relative wealth differences. Since labor market status influences wealth (e.g. wealth may decline in a period of unemployment), we use initial wealth in our analysis. We find that young cohorts receive a higher income from financial wealth than old cohorts and that homeownership has increased among younger cohorts. Also, mortgages have increased, probably largely due to tax incentives and eased loan restrictions.

Transition matrices in tables 2 and 3 present labor market transitions. The diagonals of table 2 show that year to year transitions out of paid-employment, self-employment and inactivity diminished between the control and treatment period. In contrast, yearly transitions out of unemployment increased between the control and treatment period (10% in the treatment group and 17% in the control group). People who leave unemployment move into paid-employment, self-employment and inactivity. In the treatment group transitions from unemployment to self-employment increased from 0.49% to 1.25%. This may be due to the introduction of job search requirements, however, also for younger men and women (the control group) we find an increase (from 1.88% to 3.97%). Transitions from unemployment to paid-employment increased from 1.80% to 4.69% in the treatment group and from 15.99% to 26.84% in the control group. Among the individuals active in the labor market, self-employment is higher in the treatment than the control group. This may be due to necessity reasons (it is generally more difficult for older men to find a job), but also preferences may play a role (gradual retirement through self-employment). Transitions from paid-employment to self-employment did not change very much but we do observe a decline in the share of employed people that moved to unemployment, especially in the treatment group, who were confronted with the search requirements of the 2004 UI reform. For treated men we find that transitions from paid-employment to unemployment declined from 2.49% to 1.41%, compared to a decline only from 1.29% to 1.18% in the control group.

Similar patterns emerge for women. The major difference compared to men is that relatively more women are inactive. Transitions in tables 2 and 3 are not conditional on observed and unobserved characteristics. Therefore, information on state dependence may be spurious. In the following section we take into account background characteristics and unobserved het-

erogeneity.

5 Results

5.1 Estimation results

Tables 4 and 5 show the estimation results of our baseline model for men and women, respectively.[24] The results provide evidence of self-employment out of necessity among older workers. First, after controlling for individual- and household characteristics as well as unobserved heterogeneity, the results show that unemployed individuals between the ages of 54 and 63 are significantly more likely to enter self-employment than paid-employed individuals and this increases with age (necessity hypothesis I and II at the end of the table). This is in line with Zissimopoulos & Karoly (2009) who show that propensity of self-employment entry from unemployment and disability relative to paid-employment increases with age among older workers. Second, γ_4 and γ_8 in the self-employment equation do not indicate that transitions from paid-employment to self-employment increase with age, such as the opportunity hypothesis of self-employment as a bridge to retirement would suggest. In fact, the probability of flowing from paid-employment to self-employment even decreases with age for men.

Table 4 shows that, compared to unemployed men, inactive men between the ages of 50 and 57 were even more likely to become self-employed between 1999 and 2009 (necessity hypothesis III). For women this only holds for the age group 50-53 between 1999 and 2003 (table 5). Table 6 shows that inactive men who enter self-employment were often depending on income from disability, wealth or the income of a spouse in the previous period. Furthermore, we find that individuals flowing from disability, early retirement, or social assistance to self-employment had a relatively low income, compared to all people in the same labor market status. This indicates necessity driven self-employment. Only, men for whom income from wealth is the main income source became self-employed more often when they had a relatively large income, suggesting that not all flows from inactivity to self-employment are driven by

[24] In our estimation procedure we use 50 Halton draws. The baseline results are, however, robust for 100 and 200 Halton draws.

necessity.

With regard to the macroeconomic unemployment rate, the results for men show that a higher unemployment rate not only leads to more transitions from paid-employment to unemployment, but also to relatively more transitions from paid-employment to self-employment. This suggests that self-employment is not only chosen to end a spell of unemployment but also as a way of avoiding unemployment, consistent with the *recession push hypothesis* found in Benedict & Hakobyan (2008), Kim & Cho (2009), and Congregado et al. (2012). For women, on the other hand, we find that a higher unemployment rate reduces the probability of flowing from paid-employment to self-employment which is consistent with the *prosperity pull hypothesis* found by Carrasco (1999). The difference between men and women can be explained by the fact that men are more often the main income earner of a household. A higher unemployment rate does not lead to significantly more or less transitions from unemployment or inactivity to self-employment.[25] Finally, as expected, people in unemployment are significantly more likely to stay in unemployment when the unemployment rate is high. In line with Lammers et al. (2013) and Hullegie & Van Ours (2013) the results show that job search requirements for unemployed individuals between the ages of 58 and 63 have increased transitions out of unemployment (δ_2 in the unemployment equation of tables 4 and 5). Our results show that the introduction of search requirements did not increase transitions from paid employment or unemployment to self-employment, relative to paid employment. Apparently, individuals that are confronted with search requirements are (at least partly) able to find a job.

In addition to previous research, our approach allows us to investigate the effect of job search requirements on the inflow to unemployment (instead of only investigating the effect of job search requirements on the outflow from unemployment). δ_1 in the unemployment equation of tables 4 and 5 show that the introduction of job search requirements significantly reduced transitions from paid-employment to unemployment. For women we find a weakly significant positive effect of the treatment on transitions from paid employment to inactivity, suggesting substitution effects between unemployment and inactivity as exit routes to retirement. The

[25]The sum of θ_1 and θ_3 and the sum of θ_1 and θ_4 are not significantly different from zero in the self-employment equation.

lower parts of tables 4 and 5 show the variances and covariances of the random effects. We allow for flexible correlated random effects that take into account, for example, unobserved differences in education and ambition. When we do not take into account these effect, we find a higher state dependence (spurious versus true state dependence). The estimates show that the random effect for self-employment plays a significant role and is more important than the idiosyncratic error term (which has a variance of $\pi^2/6$, by normalization). This means that, compared to paid-employment, time invariant unobserved characteristics play a substantial role in the choice for self-employment. The variance of the random effect for inactivity is smaller but also significant, and for unemployment the variance of the random effect is significant only for women. The covariances of the random effects for self-employment and unemployment are significantly positive, meaning that unobserved characteristics that are related with a high probability of self-employment are also related with a high probability of unemployment. The covariance of the random effect for self-employment and inactivity is positive for men and negative for women. This difference between genders may be explained by the fact that for women inactivity often means having no personal income (relying on the income of a spouse), whereas for men inactivity often means early retirement or disability. Finally, for women we find a significantly positive covariance between unemployment and inactivity. This is reasonable as both states imply non-participation. The significance of the covariances show us that it is important to model self-employment, unemployment and inactivity simultaneously.

In table 7 we extend the baseline model with financial variables and health status. We use the initial state since, for example, wealth may decline when people become unemployed or inactive or when people start their own business. Panel A shows that homeownership and financial wealth are associated with a higher probability to enter self-employment for men. For women, only homeownership is associated with a higher probability to enter self-employment. Mortgages are negatively associated with inactivity. The financial variables are endogenous, e.g. risk loving individuals may hold more risky assets and may be more likely to be self-employed. The treatment effects, however, hardly change with the inclusion of financial variables.

Health, measured by receiving disability benefits in the first period of observation, is neg-

atively associated with self-employment and positively associated with unemployment and inactivity, compared to paid-employment. This is in line with Parker & Rougier (2007), who show that a poor health status decreases the probability of self-employment entry relative to retirement entry among older persons. Results of Zissimopoulos & Karoly (2007), on the other hand, indicate that limiting health conditions increase the probability of self-employment entry from paid-employment among older persons.

5.2 Robustness checks

This section presents three types of robustness checks, (1) two placebo tests to verify the common trends assumption, (2) robustness checks with regard to the time span of the sample around the treatment, and (3) a robustness check that ensures us to measure the effects of the introduction of job search requirements and not the abolition of extended benefits.

In the first placebo test we estimate the treatment effects for people of age 56-57, just prior to the group that actually received the treatment. In the second placebo test we estimate the treatment effects for the period 2002-2003, which is the period just before the period in which the reform was actually introduced. The results in panel A of table 8 are reassuring in that we do not find significant effects from the fake treatments on the inflow and outflow from unemployment.

The robustness check in panel B of table 8 shows that also after reducing the time window to the period 1999-2009, search requirements still increase the outflow from unemployment for men and women. However, the inflow to unemployment is no longer significantly affected by the reform. Table 8 only shows the coefficients of the treatment effects, however, conclusions with regard to mobility and the macroeconomic unemployment rate do not change.

Using yearly data makes it hard to disentangle the effects of the job search requirements introduced in January 2004 and the abolition of extended benefits in August 2003. To ensure that our treatment effect measures the effect of the introduction of search requirements we exploit the fact that the abolition of the extended UI benefits did not change the generosity of the UI system for single persons as mentioned in section 2. This robustness check is also exploited by Lammers et al. (2013).

In panel C of table 8 we test whether the treatment effects of singles are significantly different. For men δ_1 and δ_2 are highly comparable to δ_1 and δ_2 in the baseline regression of table 4. ϑ_1 and ϑ_2 in are not significantly different from zero, which implies that the treatment effects of singles are not different from the treatment effects of non-singles.

For women, δ_1 and δ_2 in panel C of table 8 are highly comparable to δ_1 and δ_2 in the baseline regression of table 5. Only, δ_2 in the self-employment equation is now significantly negative at the 0.10 level whereas this coefficient was only close to the 0.10 significance level in the baseline regression. ϑ_1 and ϑ_2 are not significantly different from zero, except for ϑ_1 in the self-employment equation. This result, however, does not affect our necessity-hypotheses.

Finally, conclusions do not change when we test the robustness of the results with regard to different model specifications, e.g. sensitivity analyses of the age and time categories as well as the categories in the multinomial dependent variable (not reported here).

Since the data set only contains yearly information, we do not observe within-year transitions. For example, if someone's main source of income in year $t-1$ was unemployment, but he also received a substantial amount of labor income, than we indicate this person as unemployed in year $t-1$. Table 1 already showed that partial unemployment and partial self employment are not very important. As a last robustness check we added variables to the model indicating partial unemployment and partial self-employment. Including these variables in the baseline specification does not affect the conclusions.

5.3 Simulation

To facilitate the interpretation of the estimation results in the baseline model outlined above, we use the baseline estimates to simulate transition probabilities for a reference individual with specific values assigned to the covariates. Here, we take as a reference a native male and female with a partner, without children in the same household, and of age 60 in the year 2006.[26] For the initial labor market status we take the average of the sample and the random effects are set to zero. First, we present the simulation results without the treatment effect. Next, we show how the transition rates change when we take the treatment into account. Standard errors are

[26]The unemployment rate in 2006 was 3.6%.

based on a parametric bootstrap over the asymptotic distribution of our estimates.

Table 9 shows the simulation results. Compared to the transition rates in the right bottom of tables 2 and 3 we find that state dependence is far less important when observed and unobserved heterogeneity are taken into account, especially for the self-employed. This is in line with the relatively high variance of the random effect for self-employment found in tables 4 and 5. Although the probabilities to enter self-employment are low, this probability is higher for individuals in unemployment than for individuals in paid employment or inactivity (indicating necessity driven self-employment).

The last two rows of table 9 present the treatment effects. First, we analyze the outflow from unemployment. Job search requirements increased the outflow from unemployment for men significantly with 15% (12%-points) and for women insignificantly with 19% (7%-points). These individuals now move to paid employment and inactivity. Because of the reform the probability for men to move from unemployment to paid employment increased significantly with 93% (from 2.14% to 4.14%) and the probability to move from unemployment to inactivity increased significantly with 63% (from 15.61% to 25.45%).[27] For women the probability to move from unemployment to paid employment increased significantly with 165% (from 1.19% to 3.15%) and the probability to move from unemployment to inactivity increased significantly with 8% (from 61.59% to 66.40%).[28] Self-employment out of necessity did not increase because of the reform.

Second, we study the effect of job search requirements on the inflow to unemployment. Job search requirements reduced the probability to enter unemployment significantly with about 40% for men (from 2.77% to 1.65%) and about 59% for women (from 1.71% to 0.70%). Mandatory job search requirements, however, did not induce more people to stay in paid-employment. Substitution effects towards other (inactive) exit routes are mainly observed, suggesting that these options are still more attractive than using self-employment as an oppor-

[27] We find that most treated individuals who move from unemployment to inactivity enter early retirement (almost 60% for both men and women). About 27% of the treated men and 17% of the women enter disability, and the remaining 13% (men) and 23% (women) enter social assistance or become dependent on income from wealth or a partner.

[28] The relative increase of paid employment is higher than the relative increase of inactivity, as was already suggested by the significantly negative coefficient δ_2 in the inactivity equation of table 5.

tunity to reduce working hours.

6 Discussion

A few points remain for discussion. An explanation why unemployed individuals have a higher probability to enter self-employment than paid-employed individuals may be that part-time employment is widely available in the Netherlands and is an effective way to reduce working hours for those in paid-employment.[29]

Another explanation for necessity reasons outweighing opportunity reasons may be that moving from paid-employment to self-employment usually has a negative effect on occupational pension accumulation. These considerations are far less important for transitions from unemployment to self-employment (since occupational pensions are generally not accumulated during unemployment). Zissimopoulos & Karoly (2007) find that having access to pension coverage in paid-employment reduces the probability to enter self-employment. Moore & Mueller (2002), on the other hand, find no effects of pensions in paid-employment on self-employment entry.

A final point of discussion is the absence of education and health shocks in the analysis. The unobserved heterogeneity term corrects for unobserved differences in education levels, but is unable to correct for health shocks. Zucchelli et al. (2012) show that ill-health and health shocks do not increase the probability of using self-employment as retirement mechanism, however. Instead, health seems to be an important determinant for retiring early. Therefore, including health indicators in the analysis will likely be relevant for transitions to and from inactivity, but probably does not affect our conclusions about the nature of choosing self-employment as an exit route to retirement. All the more because in the Netherlands those who are in bad health are selected into disability insurance, which is financially more attractive than unemployment insurance or early retirement schemes (De Vos et al., 2012).

For future research it would be interesting to investigate how income develops when people make a transition from paid-employment or unemployment to self-employment or inactivity.

[29] Emmanoulidi & Kyriazidou (2012) indeed find that in Britain part-time paid employment is more often used as an exit from paid employment than self-employment.

Substantial tax advantages of self-employment (beyond the scope of this paper) are also relevant in this context.

7 Conclusion

This paper examines whether individuals at the end of working life choose self-employment out of necessity and to what degree the introduction of search requirements for unemployment benefits induce people to become self-employed. For this purpose we model transitions between labor market states for people aged 50-63 using a dynamic multinomial logit model with unobserved heterogeneity.

Our empirical specification allows us to measure the role of necessity-driven factors by analyzing the labor market position of people that enter self-employment and, from a macroeconomic perspective, how the unemployment rate affects inflow into self-employment. The effects of search requirements are examined using a Dutch UI reform in 2004, that introduced search requirements for people older than 57.5 years.

The main empirical findings can be summarized as follows. After correcting for observed and unobserved heterogeneity, unemployed and inactive individuals have a higher probability to enter self-employment at the end of working life than those in paid-employment. Furthermore, mobility from paid-employment to self-employment is relatively low and does not increase with age (as would be the case when self-employment would be chosen out of opportunity to increase flexibility at the end of working life). This indicates that at older ages necessity reasons are important to become self-employed. Moreover, the unemployment rate has a positive effect on transitions from paid-employment to self-employment among men. This is in line with the recession push hypothesis, which suggests that men in paid-employment become self-employed at older ages in order to avoid a period of unemployment. For women, on the other hand, we find a negative effects of the unemployment rate on transitions from paid-employment to self-employment, which is consistent with the prosperity pull hypothesis (e.g. they are more likely to start self-employment when the unemployment rate is low). For inactive men and women the prosperity pull hypothesis also holds. At lower ages, self-employment entry is most likely

from inactivity. In the highest age-category, self-employment entry from unemployment and inactivity are not significantly different, suggesting that transitions from unemployment to self-employment become increasingly important over age.

The introduction of job search requirements at the end of working life have stimulated people to exit unemployment and discouraged people to enter unemployment. The reform, however, did not increase necessity or opportunity driven self-employment. Individuals that are confronted with search requirements are partly able to find a job, but there are also large substitution effects between unemployment and inactivity (mostly early retirement) which suggests that these options are still more attractive than using self-employment as (voluntary) retirement mechanism.

Taken together, our findings suggest that at the end of working life individuals with a relatively weak labor market position are more likely to switch to self-employment. The results do not suggest that self-employment is used as a gradual retirement route. Job search requirements in UI increased the outflow from unemployment and reduced the inflow to unemployment, but did not increase self-employment out of necessity or opportunity.

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Tables

Table 1: Descriptive statistics[a]

	1989-2003 (control period)				2004-2009 (treatment period)			
	Age 50-57 (Control group)		Age 58-63 (Treatment group)		Age 50-57 (Control group)		Age 58-63 (Treatment group)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Men								
Individual and household characteristics								
Age	53.34	2.28	60.41	1.71	53.48	2.30	60.38	1.69
Birth year	1943	4.83	1936	4.70	1953	2.88	1946	2.28
Immigrant	0.08	0.27	0.07	0.25	0.10	0.30	0.08	0.27
Partner	0.87	0.34	0.96	0.19	0.77	0.42	0.93	0.25
Children	0.17	0.38	0.05	0.22	0.23	0.42	0.05	0.22
Number of children[b]	1.53	0.87	1.57	0.89	1.55	0.76	1.51	0.79
Age youngest child[b]	12.48	4.51	10.73	5.58	12.45	4.28	11.44	5.32
Labor market status								
Paid-employment (PE)	0.65	0.48	0.29	0.45	0.70	0.46	0.42	0.49
Self-employment (SE)	0.12	0.32	0.09	0.28	0.13	0.33	0.10	0.30
Unemployment (UI)	0.02	0.14	0.06	0.23	0.02	0.15	0.04	0.19
Inactive (IA)	0.21	0.41	0.57	0.50	0.15	0.36	0.44	0.50
Partial paid-employment								
SE and PE[c]	0.02	0.14	0.02	0.15	0.03	0.16	0.02	0.14
UI and PE[d]	0.11	0.32	0.04	0.19	0.13	0.34	0.07	0.25
Financial variables (expressed in 2010 euro's using the CPI)								
Income financial wealth (t=0)[e]	636.83	12341.01	562.77	4711.88	1034.79	14542.46	720.33	14974.99
Homeowner (t=0)	0.57	0.50	0.48	0.50	0.67	0.47	0.63	0.48
Income housing wealth (t=0)[f]	-457.32	4678.91	341.83	3711.48	-2037.59	5190.78	-770.87	5237.12
Mortgage (t=0)[g]	66.14	133.67	36.01	82.34	134.01	244.75	73.02	120.75
Risky assets (t=0)[h]	1.45	61.82	1.45	64.16	3.50	111.22	1.59	42.30
Observations	69,916		39,928		31,951		22,825	
Women								
Individual and household characteristics								
Age	53.35	2.28	60.43	1.71	53.46	2.31	60.38	1.69
Birth year	1943	4.82	1936	4.72	1953	2.93	1946	2.28
Immigrant	0.07	0.26	0.07	0.25	0.10	0.30	0.08	0.26
Partner	0.93	0.25	0.99	0.11	0.82	0.38	0.97	0.16
Children	0.09	0.29	0.02	0.14	0.13	0.34	0.02	0.13
Number of children[b]	1.39	0.79	1.61	0.94	1.35	0.64	1.57	0.81
Age youngest child[b]	13.35	4.26	8.74	6.28	13.63	3.77	9.03	6.49
Labor market status								
Paid-employment (PE)	0.33	0.47	0.12	0.32	0.53	0.50	0.23	0.42
Self-employment (SE)	0.07	0.26	0.03	0.18	0.09	0.29	0.07	0.26
Unemployment (UI)	0.02	0.13	0.02	0.13	0.02	0.13	0.02	0.14
Inactive (IA)	0.58	0.49	0.83	0.37	0.36	0.48	0.67	0.47
Partial paid-employment								
SE and PE[c]	0.02	0.15	0.01	0.12	0.05	0.21	0.03	0.17
UI and PE[d]	0.11	0.31	0.04	0.19	0.16	0.36	0.05	0.23
Financial variables (expressed in 2010 euro's using the CPI)								
Income financial wealth (t=0)[e]	971.19	20363.13	833.57	4525.06	1477.91	25362.00	1270.65	28053.39
Homeowner (t=0)	0.54	0.50	0.45	0.50	0.64	0.48	0.59	0.49
Income housing wealth (t=0)[f]	-165.83	4536.95	489.45	3415.68	-1536.87	5348.39	-394.90	5086.26
Mortgage (t=0)[g]	55.09	119.75	29.30	64.23	118.09	392.71	61.26	135.57
Risky assets (t=0)[h]	0.00	0.00	0.00	0.00	3.20	102.92	0.00	0.00
Observations	67,716		40,551		31,095		22,116	

[a] Control period=1989-2003, treatment period=2004-2009, control group=individuals aged between 50 and 57 years, treatment group=individuals aged between 58-63 years. Only 5% of the men and 3% of the women aged between 58 and 63 years between 2004-2009 are in a transitory arrangement.

[b] Conditional on having at least one child.

[c] Partial SE shows the percentage of individuals whose main source of income is profit from business, but who also receive a substantial amount of labor income (at least half of profit from business).

[d] Partial UI shows the percentage of individuals whose main source of income are unemployment benefits, but who also receive a substantial amount of labor income (at least half of the unemployment benefits).

[e] Income from financial wealth is the sum of interest and dividends, minus interest payments for debts other than mortgage debt at the household level.

[f] Income from housing wealth is the imputed rent minus the interest payments from mortgages at the household level.

[g] Mortgage shows the mortgage interest payments divided by the rental value of the house at the household level (this information gives some idea about the loan to value).

[h] Risky assets shows the percentage of income from total wealth that is generated by stocks and bonds at the household level.

Table 2: Average year-to-year transitions, men

Year 1989-2003 (control period)	Age 50-57 (control group) Year t					Age 58-63 (treatment group)				
Year $t-1$	PE	SE	UI	IA	Total	PE	SE	UI	IA	Total
PE	94.60	1.10	1.29	3.01	100.00	73.57	0.98	2.49	22.96	100.00
SE	5.86	86.32	0.13	7.70	100.00	3.67	82.15	0.04	14.15	100.00
UI	15.99	1.88	64.35	17.78	100.00	1.80	0.49	80.61	17.09	100.00
IA	4.54	3.72	0.79	90.95	100.00	1.73	1.23	0.36	96.68	100.00
Total	64.30	12.22	2.23	21.25	100.00	24.44	8.55	5.81	61.21	100.00
Year 2004-2009 (treatment period)	Year t									
Year $t-1$	PE	SE	UI	IA	Total	PE	SE	UI	IA	Total
PE	96.16	0.93	1.18	1.73	100.00	81.17	0.89	1.41	16.53	100.00
SE	3.38	92.27	0.03	4.31	100.00	3.12	85.61	0.29	10.98	100.00
UI	26.84	3.97	53.50	15.69	100.00	4.69	1.25	72.93	21.13	100.00
IA	3.96	3.12	1.05	91.87	100.00	1.32	1.58	0.56	96.53	100.00
Total	69.80	12.92	2.22	15.06	100.00	38.02	10.31	3.80	47.87	100.00

Table 3: Average year-to-year transitions, women

Year 1989-2003 (control period)	Age 50-57 (control group) Year t					Age 58-63 (treatment group)				
Year $t-1$	PE	SE	UI	IA	Total	PE	SE	UI	IA	Total
PE	90.46	1.52	1.40	6.63	100.00	72.63	1.95	2.18	23.24	100.00
SE	6.89	83.00	0.15	9.96	100.00	4.96	71.45	0.09	23.49	100.00
UI	14.89	1.85	64.78	18.48	100.00	2.56	0.92	79.67	16.85	100.00
IA	2.50	1.28	0.17	96.05	100.00	0.85	0.60	0.06	98.48	100.00
Total	32.62	7.31	1.66	58.40	100.00	9.93	3.35	1.73	85.00	100.00
Year 2004-2009 (treatment period)	Year t									
Year $t-1$	PE	SE	UI	IA	Total	PE	SE	UI	IA	Total
PE	94.81	1.17	1.06	2.96	100.00	81.56	1.45	1.06	15.93	100.00
SE	4.93	89.82	0.09	5.16	100.00	3.45	84.73	0.09	11.73	100.00
UI	21.04	4.10	55.74	19.13	100.00	6.27	1.42	72.93	19.37	100.00
IA	3.07	1.77	0.54	94.62	100.00	0.80	1.07	0.15	97.98	100.00
Total	53.03	9.92	1.69	35.37	100.00	21.32	7.43	2.02	69.22	100.00

Table 4: Estimation results baseline model[a] (men)

		Self-employment		Unemployment		Inactivity	
Effects relative to paid-employment		Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Mobility							
γ_1	SE_{t-1}	3.40***	0.40			2.68***	0.36
γ_2	UI_{t-1}	2.66**	1.06	2.51***	0.43	2.60***	0.47
γ_3	IA_{t-1}	2.77***	0.45			4.93***	0.24
Age groups							
γ_4	PE_{t-1}·Age 54-57	-0.18*	0.10	0.07	0.08	-0.38***	0.06
γ_5	SE_{t-1}·Age 54-57	-0.07	0.11			-0.19	0.12
γ_6	UI_{t-1}·Age 54-57	0.58	0.37	1.70***	0.15	0.21	0.17
γ_7	IA_{t-1}·Age 54-57	0.49***	0.14			0.01	0.08
γ_8	PE_{t-1}·Age 58-63	-0.40**	0.16	0.81***	0.11	0.55***	0.07
γ_9	SE_{t-1}·Age 58-63	-0.19	0.14			-0.24*	0.13
γ_{10}	UI_{t-1}·Age 58-63	1.44***	0.45	3.94***	0.21	0.92***	0.22
γ_{11}	IA_{t-1}·Age 58-63	0.17	0.16			0.17*	0.09
Time periods							
γ_{12}	PE_{t-1}·Year 94-98	-0.28**	0.13	-0.63***	0.09	0.49***	0.06
γ_{13}	SE_{t-1}·Year 94-98	0.85***	0.14			1.66***	0.15
γ_{14}	UI_{t-1}·Year 94-98	0.31	0.59	-0.07	0.22	0.91***	0.25
γ_{15}	IA_{t-1}·Year 94-98	0.52***	0.16			1.40***	0.09
γ_{16}	PE_{t-1}·Year 99-03	-0.22	0.19	-1.05***	0.12	1.20***	0.09
γ_{17}	SE_{t-1}·Year 99-03	0.72***	0.20			2.05***	0.21
γ_{18}	UI_{t-1}·Year 99-03	-1.07	0.80	0.10	0.29	1.56***	0.32
γ_{19}	IA_{t-1}·Year 99-03	0.51**	0.24			1.73***	0.14
γ_{20}	PE_{t-1}·Year 04-09	-0.22	0.22	-0.90***	0.15	2.26***	0.12
γ_{21}	SE_{t-1}·Year 04-09	1.36***	0.22			3.42***	0.22
γ_{22}	UI_{t-1}·Year 04-09	0.06	0.71	-0.24	0.29	2.36***	0.31
γ_{23}	IA_{t-1}·Year 04-09	0.91***	0.25			3.27***	0.15
Unemployment rate (UR)							
θ_1	UR	0.09**	0.04	0.10***	0.03	-0.10***	0.02
θ_2	$SE_{t-1} \cdot UR$	-0.07	0.06			-0.02	0.06
θ_3	$UI_{t-1} \cdot UR$	-0.25*	0.15	0.18***	0.06	0.01	0.07
θ_4	$IA_{t-1} \cdot UR$	-0.17**	0.07			-0.11***	0.04
Treatment							
δ_1	PE_{t-1}· treatment	0.09	0.20	-0.50***	0.14	0.08	0.08
δ_2	UI_{t-1}· treatment	-0.62	0.57	-0.81***	0.25	-0.17	0.28
Personal and household characteristics							
β_1	Birth year	0.00	0.02	0.02	0.02	-0.14***	0.01
β_2	Immigrant	-0.45***	0.12	0.28***	0.07	-0.08	0.05
β_3	Partner	-0.06	0.09	0.30***	0.09	0.20***	0.05
β_4	Number of children	0.05	0.06	0.03	0.05	0.14***	0.03
β_5	Age youngest child	0.00	0.01	-0.03***	0.01	-0.02***	0.00
β_0	Constant	-14.37	43.38	-46.08	37.30	262.87***	23.18
σ^2_{se}		4.05***	0.24				
$\sigma_{se,ui}$		0.34**	0.14				
$\sigma_{se,ia}$		-0.79***	0.07				
σ^2_{ui}		0.03	0.03				
$\sigma_{ui,ia}$		-0.04	0.03				
σ^2_{ia}		0.37***	0.05				
		Age 50-53		Age 54-57		Age 58-63	
Necessity-hypothesis I: year 89-93		1.90[b]***	0.72	2.67[c]***	0.73	3.74***	0.73
Necessity-hypothesis I: year 94-98		2.49[d]***	0.56	3.25***	0.57	4.33***	0.58
Necessity-hypothesis I: year 99-03		1.05**	0.48	1.81***	0.50	2.89***	0.50
Necessity-hypothesis I: year 04-09		2.18***	0.33	2.95***	0.34	4.02***	0.46
Necessity-hypothesis II: year 04-09		-	-	-	-	3.32***	0.41
Necessity-hypothesis III: year 89-93		-0.37[e]	0.73	-0.27[f]	0.74	0.90	0.74
Necessity-hypothesis III: year 94-98		-0.59[g]	0.58	-0.49	0.59	0.69	0.59
Necessity-hypothesis III: year 99-03		-1.95***	0.49	-1.86***	0.50	-0.68	0.50
Necessity-hypothesis III: year 04-09		-1.22***	0.34	-1.12***	0.35	0.06	0.45

[a] * Significant at the 0.10 level; ** at the 0.05 level; *** at the 0.01 level. The log-likelihood of the estimations on the subsample and the complement are -27,215.74 and -22,063.05 respectively providing an *LR* χ^2 of 1,094.63 and 892.83. Initial conditions corrections are included in the estimation. Necessity hypothesis I tests whether unemployed individuals have a higher probability to enter SE than paid-employed individuals. Hypothesis II is the same as hypothesis I, but includes the treatment. Necessity hypothesis III tests whether unemployed individuals have a higher probability to enter SE than inactive individuals. In the hypotheses we assume an unemployment rate of 3%.

[b] $H_0 : \gamma_2 + 3 \times \theta_3 = 0$

[c] $H_0 : \gamma_2 + (\gamma_6 - \gamma_4) + 3 \times \theta_3 = 0$

[d] $H_0 : \gamma_2 + (\gamma_{14} - \gamma_{12}) + 3 \times \theta_3 = 0$

[e] $H_0 : (\gamma_2 - \gamma_3) + 3 \times (\theta_3 - \theta_4) = 0$

[f] $H_0 : (\gamma_2 - \gamma_3) + (\gamma_6 - \gamma_7) + 3 \times (\theta_3 - \theta_4) = 0$

[g] $H_0 : (\gamma_2 - \gamma_3) + (\gamma_{14} - \gamma_{15}) + 3 \times (\theta_3 - \theta_4) = 0$

[h] $H_0 : \gamma_2 + (\gamma_{10} - \gamma_8) + (\gamma_{22} - \gamma_{20}) + 3 \times \theta_3 + (\delta_2 - \delta_1) = 0$

Table 5: Estimation results baseline model[a] (women)

		Self-employment		Unemployment		Inactivity	
Effects relative to paid-employment		Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Mobility							
γ_1	SE_{t-1}	3.47***	0.44			2.69***	0.42
γ_2	UI_{t-1}	1.20	1.23	1.44***	0.50	0.63	0.57
γ_3	IA_{t-1}	1.01**	0.40			3.81***	0.22
Age groups							
γ_4	PE_{t-1}·Age 54-57	-0.35***	0.11	0.06	0.10	-0.32***	0.06
γ_5	SE_{t-1}·Age 54-57	-0.21*	0.12			-0.22	0.14
γ_6	UI_{t-1}·Age 54-57	1.08***	0.40	1.13***	0.17	0.45**	0.19
γ_7	IA_{t-1}·Age 54-57	0.23**	0.11			-0.07	0.07
γ_8	PE_{t-1}·Age 58-63	-0.18	0.17	0.89***	0.16	0.42***	0.08
γ_9	SE_{t-1}·Age 58-63	-0.09	0.16			0.13	0.16
γ_{10}	UI_{t-1}·Age 58-63	1.53***	0.55	3.30***	0.26	1.37***	0.27
γ_{11}	IA_{t-1}·Age 58-63	0.46***	0.15			0.35***	0.09
Time periods							
γ_{12}	PE_{t-1}·Year 94-98	0.65***	0.15	-0.74***	0.11	0.53***	0.08
γ_{13}	SE_{t-1}·Year 94-98	1.25***	0.19			0.99***	0.20
γ_{14}	UI_{t-1}·Year 94-98	0.86	0.68	-0.09	0.25	1.87***	0.30
γ_{15}	IA_{t-1}·Year 94-98	0.87***	0.14			1.05***	0.09
γ_{16}	PE_{t-1}·Year 99-03	-0.06	0.21	-1.41***	0.14	0.88***	0.11
γ_{17}	SE_{t-1}·Year 99-03	0.62**	0.24			0.94***	0.27
γ_{18}	UI_{t-1}·Year 99-03	0.23	0.87	0.14	0.33	2.06***	0.40
γ_{19}	IA_{t-1}·Year 99-03	0.70***	0.21			1.42***	0.12
γ_{20}	PE_{t-1}·Year 04-09	0.34	0.23	-1.17***	0.17	1.43***	0.13
γ_{21}	SE_{t-1}·Year 04-09	1.63***	0.26			1.88***	0.27
γ_{22}	UI_{t-1}·Year 04-09	1.58*	0.83	0.54	0.35	3.53***	0.39
γ_{23}	IA_{t-1}·Year 04-09	1.49***	0.23			2.52***	0.14
Unemployment rate (UR)							
θ_1	UR	-0.09*	0.04	0.06	0.04	-0.12***	0.02
θ_2	$SE_{t-1} \cdot UR$	-0.07	0.07			-0.17**	0.07
θ_3	$UI_{t-1} \cdot UR$	-0.14	0.18	0.35***	0.08	0.08	0.09
θ_4	$IA_{t-1} \cdot UR$	0.06	0.06			0.07**	0.03
Treatment							
δ_1	PE_{t-1}· Treatment	-0.02	0.20	-0.80***	0.19	0.18*	0.09
δ_2	UI_{t-1}· Treatment	-1.02	0.69	-1.19***	0.32	-0.91***	0.35
Personal and household characteristics							
β_1	Birth year	0.02	0.02	0.01	0.03	-0.14***	0.01
β_2	Immigrant	-0.32***	0.12	0.32***	0.10	0.04	0.06
β_3	Partner	0.00	0.10	0.40***	0.14	0.34***	0.07
β_4	Number of children	0.05	0.08	0.04	0.14	0.05	0.06
β_5	Age youngest child	0.00	0.01	-0.04**	0.02	-0.01*	0.01
β_0	Constant	-43.30	44.32	-26.69	49.71	267.45***	28.05
σ^2_{se}		3.10***	0.19				
$\sigma_{se,ui}$		0.27*	0.14				
$\sigma_{se,ia}$		0.62***	0.09				
σ^2_{ui}		0.55***	0.13				
$\sigma_{ui,ia}$		0.15**	0.07				
σ^2_{ia}		1.50***	0.08				
		Age 50-53		Age 54-57		Age 58-63	
Necessity-hypothesis I: year 89-93		0.77[b]	0.82	2.20[c]***	0.81	2.49***	0.89
Necessity-hypothesis I: year 94-98		0.99[d]	0.64	2.41***	0.64	2.70***	0.73
Necessity-hypothesis I: year 99-03		1.07**	0.45	2.49***	0.43	2.78***	0.50
Necessity-hypothesis I: year 04-09		2.02***	0.40	3.45***	0.35	3.73***	0.55
Necessity-hypothesis II: year 04-09		-	-	-	-	2.74***	0.47
Necessity-hypothesis III: year 89-93		-0.41[e]	0.82	0.44[f]	0.81	0.66	0.89
Necessity-hypothesis III: year 94-98		-0.42[g]	0.65	0.43	0.64	0.65	0.73
Necessity-hypothesis III: year 99-03		-0.88*	0.45	-0.03	0.43	0.19	0.50
Necessity-hypothesis III: year 04-09		-0.32	0.40	0.53	0.35	0.76	0.54

[a] * Significant at the 0.10 level; ** at the 0.05 level; *** at the 0.01 level. The log-likelihood of the estimations on the subsample and the complement are -23,215.31 and -20,049.67 respectively providing an *LR* χ^2 of 1,008.45 and 756.42. Initial conditions corrections are included in the estimation. Necessity hypothesis I tests whether unemployed individuals have a higher probability to enter SE than paid-employed individuals. Hypothesis II is the same as hypothesis I, but includes the treatment. Necessity hypothesis III tests whether unemployed individuals have a higher probability to enter SE than inactive individuals. In the hypotheses we assume an unemployment rate of 3%.

[b] $H_0 : \gamma_2 + 3 \times \theta_3 = 0$

[c] $H_0 : \gamma_2 + (\gamma_6 - \gamma_4) + 3 \times \theta_3 = 0$

[d] $H_0 : \gamma_2 + (\gamma_{14} - \gamma_{12}) + 3 \times \theta_3 = 0$

[e] $H_0 : (\gamma_2 - \gamma_3) + 3 \times (\theta_3 - \theta_4) = 0$

[f] $H_0 : (\gamma_2 - \gamma_3) + (\gamma_6 - \gamma_7) + 3 \times (\theta_3 - \theta_4) = 0$

[g] $H_0 : (\gamma_2 - \gamma_3) + (\gamma_{14} - \gamma_{15}) + 3 \times (\theta_3 - \theta_4) = 0$

[h] $H_0 : \gamma_2 + (\gamma_{10} - \gamma_8) + (\gamma_{22} - \gamma_{20}) + 3 \times \theta_3 + (\delta_2 - \delta_1) = 0$

Table 6: Main income source and income level for those moving from inactivity to self-employment

	Age 50-53			Age 54-57			Age 58-63		
	%[a]	Median income[b]		%	Median income		%	Median income	
Men		SE_t	All_t		SE_t	All_t		SE_t	All_t
$Disability_{t-1}$	18	18,645	22,006	27	19,616	22,452	26	17,863	23,082
$Early\ retirement_{t-1}$	7	17,788	30,424	8	26,620	35,015	16	29,240	35,453
$Social\ assistance_{t-1}$	17	6,423	13,670	5	3,199	13,462	5	8,1401	13,016
$Wealth_{t-1}$	32	47,982	38,164	39	54,470	40,581	43	44,307	27,687
$Income\ spouse_{t-1}$	26	0	0	21	0	0	11	0	0
Women									
$Disability_{t-1}$	3	14,108	13,776	6	13,029	13,723	6	8,743	13,735
$Early\ retirement_{t-1}$	5	14,085	21,426	3	11,846	21,340	16	10,144	19,672
$Social\ assistance_{t-1}$	5	16,279	15,076	5	18,587	15,002	2	11,735	14,897
$Wealth_{t-1}$	8	37,246	17,020	10	7,476	17,363	10	11,516	20,197
$Income\ spouse_{t-1}$	79	0	0	76	0	0	66	0	0

[a] % refers to the percentage of inactive persons in $t-1$ who enter self-employment from a certain category.
[b] The table shows median total income in period $t-1$ for those individuals moving from a certain inactivity category to self-employment and for all individuals in that inactivity category in $t-1$.

Table 7: Estimation results extended models[a]

		Self-employment		Unemployment		Inactivity	
Effects relative to paid-employment		Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Panel A. Financial variables							
Men[b]							
β_6	Homeowner$_{t=0}$	0.23***	0.07	-0.30***	0.06	-0.08**	0.03
β_7	Mortgage$_{t=0}/10^6$	0.21	0.21	-0.03	0.27	-0.35**	0.18
β_8	Financial wealth$_{t=0}/10^5$	0.70***	0.25	-0.40	0.66	-0.02	0.16
β_9	Net housing wealth$_{t=0}/10^5$	-0.14	0.48	0.09	0.84	0.38	0.36
β_{10}	Risky assets$_{t=0}/10^3$	0.43	0.47	0.06	0.37	-0.39*	0.20
δ_1	PE$_{t-1}\cdot$ Treatment	0.13	0.21	-0.53***	0.14	0.08	0.08
δ_2	UI$_{t-1}\cdot$Treatment	-0.52	0.59	-0.76***	0.26	-0.12	0.28
Women[c]							
β_6	Homeowner$_{t=0}$	0.42***	0.07	-0.29**	0.07	0.00	0.05
β_7	Mortgage$_{t=0}/10^6$	0.18	0.30	-0.07	0.29	-0.56**	0.23
β_8	Financial wealth$_{t=0}/10^5$	0.26	0.25	-0.30	0.72	-0.01	0.20
β_9	Net housing wealth$_{t=0}/10^4$	0.08	0.08	-0.03	0.10	0.03	0.06
β_{10}	Risky assets$_{t=0}/10^2$	0.18	0.28	0.14	0.28	0.15	0.19
δ_1	PE$_{t-1}\cdot$ Treatment	0.05	0.21	-0.86***	0.20	0.16*	0.10
δ_2	UI$_{t-1}\cdot$Treatment	-1.08	0.70	-1.27***	0.33	-1.03***	0.37
Panel B. Health							
Men[d]							
β_6	Bad health$_{t=0}$	-0.42***	0.09	0.71***	0.07	0.75***	0.04
δ_1	PE$_{t-1}\cdot$ Treatment	0.12	0.20	-0.50***	0.14	0.10	0.08
δ_2	UI$_{t-1}\cdot$Treatment	-0.62	0.57	-0.65***	0.25	-0.02	0.28
Women[e]							
β_6	Bad health$_{t=0}$	-0.54***	0.12	1.22***	0.09	0.70***	0.06
δ_1	PE$_{t-1}\cdot$ Treatment	-0.02	0.20	-0.88***	0.19	0.17*	0.09
δ_2	UI$_{t-1}\cdot$Treatment	-1.05	0.69	-1.01***	0.32	-0.78**	0.35

[a] * Significant at the 0.10 level; ** at the 0.05 level; *** at the 0.01 level. All regressions include the variables from the baseline regression.
[b] Financial variables are jointly significant with $\chi^2(15) = 95.87$ and $p-value = 0.000$. The log-likelihood of the estimations on the subsample and the complement are -24,793.58 and -22,030.97 respectively providing an *LR* χ^2 of 980.40 and 901.99.
[c] Financial variables are jointly significant with $\chi^2(15) = 99.08$ and $p-value = 0.000$. The log-likelihood of the estimations on the subsample and the complement are -19,339.93 and -20,029.29 respectively providing an *LR* χ^2 of 889.92 and 767.43.
[d] The log-likelihood of the estimations on the subsample and the complement are -27,076.24 and -21,939.01 respectively providing an *LR* χ^2 of 1,056.45 and 866.57.
[e] The log-likelihood of the estimations on the subsample and the complement are -23,100.08 and -19,991.02 respectively providing an *LR* χ^2 of 993.69 and 743.59.

Table 8: Robustness checks[a]

	Self-employment		Unemployment		Inactivity	
Effects relative to paid-employment	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Panel A. Placebo tests						
Men: placebo age 56-57						
δ_1 $PE_{t-1}\cdot$ Treatment	0.20	0.27	0.29	0.19	-0.08	0.13
δ_2 $UI_{t-1}\cdot$Treatment	-0.39	0.96	0.28	0.33	0.17	0.38
Women: placebo age 56-57						
δ_1 $PE_{t-1}\cdot$ Treatment	-0.06	0.16	0.01	0.14	0.07	0.07
δ_2 $UI_{t-1}\cdot$Treatment	-0.12	0.52	-0.04	0.25	0.13	0.29
Men: placebo year 2000-2003						
δ_1 $PE_{t-1}\cdot$ Treatment	-0.23	0.31	0.18	0.21	0.21**	0.09
δ_2 $UI_{t-1}\cdot$Treatment	0.36	1.40	0.32	0.44	0.20	0.47
Women: placebo year 2000-2003						
δ_1 $PE_{t-1}\cdot$ Treatment	-0.11	0.24	0.34	0.21	0.18**	0.09
δ_2 $UI_{t-1}\cdot$Treatment	-12.91	556.15	0.34	0.34	-0.04	0.40
Panel B. Smaller time window						
Men						
δ_1 $PE_{t-1}\cdot$ Treatment	-0.02	0.32	0.05	0.22	0.10	0.11
δ_2 $UI_{t-1}\cdot$ Treatment	-0.44	1.12	-0.70*	0.41	-0.43	0.43
Women						
δ_1 $PE_{t-1}\cdot$ Treatment	0.06	0.24	0.06	0.21	0.36***	0.10
δ_2 $UI_{t-1}\cdot$Treatment	-0.92	0.75	-0.79**	0.35	-0.47	0.39
Panel C. Single						
Men						
δ_1 $PE_{t-1}\cdot$ Treatment	0.07	0.21	-0.51***	0.14	0.09	0.08
ϑ_1 $PE_{t-1}\cdot$ Treatment $\cdot$ Single	0.16	0.35	0.06	-0.09	0.09	0.11
δ_2 $UI_{t-1}\cdot$ Treatment	-0.42	0.61	-0.67***	0.27	-0.03	0.30
ϑ_2 $UI_{t-1}\cdot$ Treatment $\cdot$ Single	-0.80	0.93	-0.52	0.35	-0.52	0.40
Women						
δ_1 $PE_{t-1}\cdot$ Treatment	0.11	0.21	-0.87***	0.21	0.21**	0.09
ϑ_1 $PE_{t-1}\cdot$ Treatment $\cdot$ Single	-0.81**	0.37	0.27	0.26	-0.13	0.11
δ_2 $UI_{t-1}\cdot$Treatment	-1.37*	0.71	-1.43***	0.34	-1.05***	0.39
ϑ_2 $UI_{t-1}\cdot$Treatment $\cdot$ Single	-11.47	310.90	0.63	0.49	0.69	0.56

[a] * Significant at the 0.10 level; ** at the 0.05 level; *** at the 0.01 level. Results of the different robustness checks are estimated separately. All regressions include the variables from the baseline regression including the initial conditions correction and correlated random effects parameters. *Single* is a binary variable with a value of one for single individuals and zero otherwise.

Table 9: Simulation results[a,b]

	Men				Women			
	Year t							
Year $t-1$	PE	SE	UI	IA	PE	SE	UI	IA
PE	73.13	0.19	2.77	23.90	48.86	1.09	1.71	48.34
	(1.41)	(0.03)	(0.34)	(1.44)	(2.37)	(0.19)	(0.32)	(2.43)
SE	12.67	4.58	0.52	82.23	7.94	17.34	0.36	74.36
	(1.34)	(0.57)	(0.07)	(1.57)	(1.01)	(1.84)	(0.06)	(2.14)
UI	2.14	0.29	81.95	15.61	1.19	1.12	36.10	61.59
	(0.75)	(0.12)	(1.97)	(1.88)	(0.32)	(0.59)	(5.55)	(5.61)
IA	1.75	0.22	0.07	97.95	0.63	0.28	0.03	99.06
	(0.12)	(0.03)	(0.00)	(0.13)	(0.05)	(0.03)	(0.00)	(0.06)
Treatment effects								
PE	-0.61	0.01	-1.12	1.72	-3.86	-0.11	-1.01	4.97
	(2.01)	(0.04)	(0.35)	(1.42)	(2.18)	(0.21)	(0.29)	(2.24)
UI	2.00	0.00	-11.85	9.84	1.96	-0.08	-6.70	4.81
	(0.75)	(0.16)	(2.83)	(2.73)	(0.71)	(0.71)	(5.11)	(5.34)

[a] This table presents a simulated transition matrix for a reference individual, which is a native male or female with a partner, without children in the same household, and of age 60 in the year 2006.
[b] Standard errors in parentheses (1500 bootstrap replications).