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Private Wealth and Job Exit at Older Age: A Random Effects Model

Hans G. Bloemen

VU University Amsterdam, and Tinbergen Institute.

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Hans G. Bloemen[1,2,3]

Department of Economics
Free University Amsterdam
De Boelelaan 1105
1081 HV Amsterdam
The Netherlands

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Abstract

Private wealth holdings are likely to become an increasingly important determinant in the job exit decision of elderly workers. Net wealth may correlate with worker's characteristics that also determine the exit out of a job. It is therefore important to include a rich set of observed characteristics in an empirical model for retirement in order to measure the (marginal) effect of wealth on the job exit rate. But even with a rich set of regressors the question remains whether there are unobservable worker's characteristics that affect both net wealth and the job exit rate. We specify a simultaneous equations model for job exit transitions with multiple destinations, net wealth, and the initial labour market state. The job exit rates and the net wealth equation contain random effects. We allow for correlation between the random effects of job exit and net wealth, and the initial labour market state.

[1] We are greatly indebted to Statistics Netherlands for providing the data.
[2] email: hbloemen@feweb.vu.nl, phone: +31 20 5986037, fax: +31 20 5986005
[3] Tinbergen Institute, Netspar, IZA.

1 Introduction

While population aging puts current pension systems under financial strain, older cohorts accumulate more private wealth than their predecessors until just a couple of decades ago. Private wealth becomes an increasingly important financial resource for the retired compared to social security wealth. Pension arrangements become more flexible owing to institutional and financial innovation. It therefore becomes increasingly important to know if the private wealth holdings of households influence the flow out of work of elderly workers.

Economic models (such as exposed in Blundell et al. (1997), or Woolley (2004)) assign a positive impact of the level of private wealth holdings on the flow out of work. Bloemen (2006) empirically analyses the impact of the private wealth level of households on the job exit rate of elderly male workers in the Netherlands. The analysis shows that workers with higher levels of net wealth have higher retirement probabilities. The analysis was carried out with a rich set of regressors and includes a sensitivity analysis of the results, such as the use of different measures of net wealth (including or excluding housing equity and mortgage debt), checking for the impact of possible outliers in net wealth, and varying the flexibility of the age pattern. However, the analysis is based on the assumption that, after controlling for all the observable regressors, there is no correlation in unobservables between the level of net wealth and the job exit rate. The question remains whether the estimated positive impact of wealth on retirement is a causal effect.

There are various reasons for a possible correlation in unobservables between the level of net wealth and the event of job exit. Unobservables can affect the relation between net wealth and retirement in different directions. First, planned behaviour of households may play a role. Workers with a strong preference to retire early may have accumulated savings throughout their working life in anticipation of the early retirement. For such workers, we expect to see a positive relation between the level of net wealth and retirement, but this is not a causal effect of net wealth on retirement. In Bloemen (2006), the implicit assumption is that this correlation can be 'explained away' by the observable characteristics of the worker, such as the level of education, the working sector, or the household composition. To the extent that observables cannot capture this correlation, the impact of net wealth on retirement that has been found is not completely causal. Next, as pointed out by Bloemen (2002), the level of net wealth may be correlated with (favourable) worker's characteristics that also influence job attachment, layoff rates, and the attractiveness of pension schedules. Finally, there may be observable variables that are not observed in our data that can affect both the level of net wealth and the exit out of a job. A good example is the health status of the worker. In his review, Smith (1999) mentions a positive relationship between net wealth and health status. In addition, health status can influence the exit out of work along different exit routes, including disability and retirement. If low health-low wealth workers are more likely to exit a job by disability, the estimated impact of net wealth on job exit along this route will be biased downward. In the present analysis, we make use of subjective survey indicators of the general health status of workers, but these may approach the health status of individuals in a rough way. Alternatively, there may be unobserved details of the individual's pension arrangement that correlate with the level of net wealth.

In this paper we present a joint model for job exit of elderly workers and their net wealth holdings. The job exit probability and the net wealth equation both include unobserved individual specific random effects that we allow to be correlated. By allowing for this correlation, we aim to capture the aforementioned channels by which the level of net wealth and the job exit transition may be correlated. The model is completed by adding an initial condition for the labour market status of elderly workers. By incorporating initial conditions, we allow for possible selectivity of the sample: for studying job exit transitions, we use a sample of employed workers. The probability of selecting employed workers depends on past exit rates, and more specific, on past levels of net wealth. For instance, individuals with high net wealth levels may have already exited from the labour force at earlier age. On the other hand, if wealth levels correlate with unfavourable individual characteristics, individuals with low wealth levels are likely selected in a sample of workers.

In section 2 we present the data that are used in the analysis. Section 3 presents the model. Section 4 presents the results of the estimation of the model. The final section concludes.

2 The data

We use data from the Dutch Socio-Economic Panel collected by Statistics Netherlands (SEP) for the years 1995 through 2002. Survey waves are available on a yearly basis, and refer to the month May each year. For the construction of our data on job exit transitions we use employed individuals who are observed in at least two consecutive survey waves, such that we can observe changes in the labour market state from one year to another. Our model includes initial conditions for the labour market state. Therefore, we add observations on non-employed individuals, for which we apply the same selection criteria. We selected male individuals appearing in any of the survey waves in 1995 through 2001 in the age range of 48 through 64 who report to be employed. We use the subsequent wave to check the labour market state of the same individuals in the next year.[4] The first wave of observation of the employed individual will be used in the estimation of the initial condition. The same holds for non-employed individuals.

We add information on the individuals' background characteristics from the first wave of each pair of waves, except for income. For instance, if we select an employed individual in the age range 48-64 in the year 1995, we use the wave in 1996 to check whether a job exit took place, and use information on net wealth, marital status, pension scheme participation, etc, from the May 1995 wave. However, since information on income refers to the previous fiscal year, we use income information from the May 1996 wave, which refers to the calendar year (January-December) 1995. Since the survey in May 1996 collects information on the wage income earned in 1995 and also on the number of months worked in that year, we can determine the monthly earnings of each individual in the year 1995, which is assigned to the monthly wage income earned in May 1995. For the estimation of the net wealth equation and the initial condition we will use 'lagged'

[4] An important condition is that information on the same individual is present in the next wave. Individuals that are subject to attrition of any kind are dropped from the data. This requires the assumption that unobserved factors in the attrition process are uncorrelated with unobservables in the determination of the labour market state.

income information. We use information on income from the May 1995 wave, which refers to the year 1994. This example is for the years 1995-1996 but the same holds for any other pairs 1996-1997 through 2001-2002. Self-employed individuals are excluded: the survey does not apply the questions on wealth to the self-employed.[5]

The longitudinal dataset of the Socio-Economic Panel (SEP) provides aggregate measures of assets and debts. The aggregate measures are computed by aggregating information on several asset and debt categories. The value of total liquid assets is obtained by Statistics Netherlands by aggregating the amounts on the current accounts and savings accounts, bonds, stocks, money lent, value of jewelry, antiques, and cars.[6] Total debts (excluding the value of mortgage debt outstanding) are obtained by aggregating personal loans at banks and credit institutions, loans to finance purchases, and remaining (including money borrowed from family and friends). Net liquid wealth is computed by the difference between liquid assets and total debts. An alternative measure of net wealth can be obtained by incorporating the value of the house and the mortgage debt. By adding the value of the house and subtracting the value of the mortgage debt from the value of net liquid wealth defined above, we obtain this alternative measure of net wealth.

The tables 1 and 2 show information on the sample that is used in the estimation of the initial conditions. With the estimation of the initial conditions we explain the labour market status of a worker the wave he has been selected into the sample. We include regressors that are typically observed for both nonemployed and employed individuals. We will not include net wealth and disposable household income among the regressors of the initial condition, but we will allow for correlation between the wealth equation and the initial condition (see next section). The lagged value of disposable household income will be included as a regressor in the net wealth equation.

[5] In the waves of 1995 through 2001, information on income in the previous fiscal year is expressed in guilders. In the year 2002, the information on income has been collected in euro. We have converted this information in euro to guilders by multiplying the amount by 2.20371 which is the euro to guilder exchange rate.

[6] Not every household has possesions in each category. Money in current and savings account is most common. Jewelry and antiques applies to few households only. In this paper we only consider aggregate wealth and not the relation between portfolio composition and retirement.

We use indicators for the level of education ranging from primary education (level 1) to university (level 5). In addition, we use indicators for the sector that respondents have been educated for, including technical, economic/administrative, general, and services. These sectors can be observed for both the employed and the nonemployed.

We find that the nonemployed in the age range from 48 through 64 are on average older, less wealthy, and have a lower total disposable household income. We also find that the spouse is employed less often, and if she is employed, her earnings are lower. There are more lower educated and less higher educated individuals among the nonemployed. The percentage of married men is lower among the nonemployed, whereas the percentages of single, divorced, and widowed men all are higher.

To summarize the information on job exit transitions, we have pooled the (pairs of) waves with information on job exits. This results in 3711 observations on 1113 different workers. Note that we use more observations on workers in the estimation of the initial conditions, since we use less regressors, and consequently the requirements for observability are less stringent. We will discuss the variables that we observe in our sample by looking at tables 3 and 4. The tables contain sample descriptives on continuous and count variables (table 3) and dummy indicators (table 4). The descriptives of the demographic characteristics are very similar to those for the workers in the tables 1 and 2.

There is limited information on participation in pension schemes in the survey. Each respondent is asked to report whether he participates in an employee pension scheme. Table 4 shows that this is the case for 89.8 per cent of the respondents, whereas 1.8 per cent does not know the answer to this question. Usually, the pension premium is withheld automatically from the salary by default. However, 4.1 per cent of the individuals claims to pay a pension premium directly. For these individuals, information is collected on the premium contribution paid: the average contribution is 253 guilders. In 73.8 per cent of the cases the employer contributes to the payment of the premium, according to the survey respondents.

Some individuals participate in an individual pension scheme, initiated by themselves. The motives for participating in an individual pension scheme can be quite diverse and are not recorded in the survey. We can imagine that poor employee pension schemes or many job changes in the past may add to the participation in individual pension schemes, but an alternative motive may come from high income people who have more financial means to invest in individual pension schemes. In any case, someone participating in an individual pension scheme has a certain awareness of his financial situation after retirement, and including information on participation in individual pension schemes in the job exit rate may proxy this awareness as well as the 'true' impact of the pension scheme itself. We see that 15.6 per cent of the respondents participates in an individual pension scheme. The sample average of the monthly contribution is 407 guilders.

We have included some other properties of the job. We see that 32.0 per cent of the respondents characterize themselves as a civil servant. Early retirement schemes of civil servants are known to be more generous and wide spread than for workers in the private sector. At this age, most workers (96.0 per cent) have a 'permanent' job.

The mean value of total net liquid wealth is 62782 guilders, whereas the median is 24878. The alternative measure for net wealth, that includes the value of the house and the mortgage debt, has a mean 282224 and a median value of 199209. The avarage monthly wage income is 4729 guilders and the other income is 240 guilders. The value of the monthly wage is important not only because it measures current earnings, but in the Netherlands, pension benefit systems are typically of the defined benefit type and the future pension benefits are directly based on the final earnings. Bloemen (2006) shows explicitly that the impact of the worker's earnings on the job exit can have opposing effects on the job exit decision, since on the one hand higher earnings increase the incentive to stay on the job, but on the other hand future pension benefits will also be higher if earnings are higher, generating a life cycle income effect. We do not include an explicit measure for pension wealth in the regression model. We do not observe pension wealth in the data, but any constructed present value measure of future pension benefits would be a function of the observed final earnings. By including the earnings, we therefore can identify the impact of private wealth from the impact of pension benefits. In the Netherlands, the employee pension schedules are organized by collective bargaining agreements at the sectoral level. Replacement rates and age of eligibility to early retirement benefits vary by sector. The survey contains detailed information on the industrial sector of workers. Given the number of transitions observed, we have aggregated information on industrial sectors in 12 categories. In addition, we use indicators for the sector that respondents have been educated for. In the empirical analysis we estimate our base specification with these broad sectors, and we do a sensitivity analysis with the more detailed industry dummies.

The survey contains subjective measures of the health status of individuals. Survey respondents are asked "how, in general, is your health condition?". They select one answer out of the following 5 possibilities: 'very good', 'good', 'reasonable', 'bad', and 'very bad'. A majority of 61.4 per cent answers to be in good health, while 17.3 per cent report to be in very good health, and 19.7 per cent call their health reasonable. A minority reports their health to be bad (1.5 per cent) or very bad (0.08 per cent). In the model, we will merge these two categories of bad health and use it as the reference class.

For the 3711 pooled observations of 1113 different individuals we have tracked the labour market state the next year: 208 (5.6 per cent) of them are observed not to have a job the next year. Respondents that left their job are asked to report the reason for their job exit from a list of possibilities. The most important reasons for job exit listed are being fired, end of contract, shut down of firm, illness/disability, early retirement/living of one's investments,[7] pensioned, remaining (not specified any further). We have merged several of these categories. We made a category 'unemployed' for being fired, termination of contract, and shut down of a firm: 15.9 per cent of the job exiters indicate that unemployment is the reason for job exit. We also merged several categories of retirement. Note that the retirement categories are self-reported, and that we cannot distinguish whether someone goes on early retirement according to the narrow definition of the early retirement system, or whether someone decides to live on interest. Moreover, the category 'pensioned' is also recorded by some job exiters younger than 60, so it can indicate that the reported 'being pensioned' may also include early retirement in the narrow sense. There is a category 'remaining' which does not further specify the reason for job exit. The respondents could also report job exit for reasons like 'marriage', 'taking

[7] In Dutch: 'rentenieren'.

care of the children', and 'taking care of a family member', but none of the respondents in our subsample reported any of these categories as the reason for their job exit. The category 'remaining' does not include these types of reasons for job exit, and it seems likely that it refers to job quits. We decided to merge it with the category retirement. The percentage of job exiters by (early) retirement defined this way is 72.1. Finally, there is a number of job quitters reporting to have exited the job because of illness or disability. The percentage is 12.0.

Bloemen (2006) showed that job exit rates varied with age, with very low exit rates until the age of 54 and a clear peak at the age of 60, which coincides with the most common early retirement age. Moreover, before the age of 54 unemployment or disability are more often reported as reason for job exit, while thereafter (early) retirement becomes an increasingly important reason for job exit.

3 The model

3.1 The job exit rate: theoretical background

Blundell et al. (1997) and Bloemen (2006) show that net wealth enters the job exit probability in a life cycle model that allows for consumption, wealth accumulation and savings, the trade-off between retirement and work, and uncertainty in the availability of jobs. The choice to exit the job or to stay is based on comparing the levels of the value functions associated with the alternatives. Let $V_t(A_t, y_t; d_{t+1})$ denote the value of choosing labour market state d_{t+1} at the end of period t, ($d_t = 1$ indicating employment and $d_t = 0$ indicating retirement) for someone employed at the beginning of period t ($d_t = 1$). A_t denotes the level of net wealth at the beginning of period t and y_t is the income in the current job, that enters the function since it affects the level of pension benefits in typical defined benefit plans (see the model formulation in Bloemen (2006)). The worker decides to exit the job if $V_t(A_t, y_t; 0) > V_t(A_t, y_t; 1)$. The labour market state affects the value function since it can affect the accumulation of pension wealth, the eligibility to retirement benefits, the level of income, and it can have a direct effect on utility. The probability[8] that the worker decides to leave the job is

$$P(d_{t+1} = 0 | d_t = 1, A_t, y_t) = P(V_t(A_t, y_t; 0) > V_t(A_t, y_t; 1)) \qquad (1)$$

Under some regularity conditions the probability of exiting the job in a period t, conditional on the level of wealth at the beginning of the period, is increasing in the level of wealth. We may want to extend the model with job exit due to demand side shocks. If uncertainty in the availability of jobs is expressed by an exogenous lay-off rate δ_t then the probability that the worker exits the job in year t, conditional on being employed at time t, can be expressed as[9]

$$P(d_{t+1} = 0 | d_t = 1, A_t, y_t) = \delta_t + (1 - \delta_t) P(V_t(A_t, y_t; 0) > V_t(A_t, y_t; 1)) \qquad (2)$$

The expression for the job exit rate (2) shows that according to economic theory net wealth enters the job exit rate by the choice to exit the job, and not by the layoff rate δ_t. For this reason we will in the empirical analysis make a distinction between different exit routes, and distinguish *retirement* from alternative reasons for job exit, like *unemployment* and *disability*. Kapteyn and De Vos (1998) argued that alternative exit routes for eldery workers, like unemployment and disability, are financially attractive, and job exit by these routes may occur in good harmony between the worker and the employer. Therefore, choice may not be completely absent as a factor determining the job exit by any of these routes, and net wealth may affect the exit rate.

Economic theory formulates the effect of private wealth on retirement as a marginal effect: when comparing two workers (or situations) that only differ in their level of private wealth, the worker with the highest level of net wealth will have the highest probability to retire. To measure this impact of net wealth on job exits empirically in a regression framework, we include controls for demographics (age, household composition, level of education), financial conditions (income, participation in pension schemes), factors that influence the layoff rate (sectors, industry), factors that determine the pension wealth

[8] Here we have left the source of uncertainty unspecified, but income uncertainty is the usual source of uncertainty specified in life cycle models.

[9] Note that the probability to stay on the job is $(1 - \delta_t) P(V_t(A_t, y_t; 0) \leq V_t(A_t, y_t; 1))$ which adds with (2) to 1.

(the current earnings, industry), etc. But there may remain factors that cannot be controlled for by observables. The level of net wealth can be endogenous if a worker has accumulated wealth in the past with the aim to retire early. Workers with the same observable characteristics may have different preferences for the age of retirement. The level of net wealth may correlate with favourable unobserved characteristics that affect the layoff rate δ_t negatively. There can be characteristics that are both correlated with the retirement decision and the level of net wealth, but are not observed in our data. For these reasons it can be important to allow for correlation in unobservables between the exit rate and the level of net wealth in the empirical model specification.

To estimate a basic specification of job exit rates, without unobserved individual effects, a sample of elderly workers can be selected in one period and their labour market status in the next can be recorded to determine whether or not retirement took place. However, if there are unobserved individual specific effects that may be correlated over time periods, selectivity of the sample becomes an issue. The probability of finding someone in the state of employment can be a complex function of past outflow, inflow, and staying-on rates. For instance, the probability of finding someone in employment at the time of selection into the sample may depend on the level of wealth. In the empirical specification, we specify an initial condition for the labour market state that we allow to be correlated with unobserved individual random effects in the job exit rates and the level of net wealth.

3.2 The empirical model

Our empirical model describes transitions out of work into different destinations, along with model equations for net wealth and the initial labour market state.

We use a multinomial logit model to analyse the impact of net wealth on the job exit rate. To have a reasonable number of observations in each state of destination, we made a combined exit route unemployment/disability. This combined exit route represents job exit through other reasons than retirement. It represents job exits induced by restrictions in either labour market conditions or health status. We are aware that job exit for these reasons may contain a choice element, as discussed above, but for ease of terminology we will label this exit route 'involuntary job exit' in the sequel. For an individual i selected in the sample in period t and whose labour market state we keep track of in period $t+1$, we have three possible values for the outcome variable d_{it}: staying employed (E), retirement (R), and involuntary job exit (I). The state of employment is our base category, such that the probabilities we specify below are job exit probabilities. If x_{it} is a vector of explanatory variables, we specify the probability of job exit to state J as

$$P(d_{i,t+1} = J | d_{it} = E, x_{it}, \alpha_i) = \frac{\exp(x_{it}\beta_J + \gamma_J \alpha_i)}{1 + \exp(x_{it}\beta_R + \gamma_R \alpha_i) + \exp(x_{it}\beta_I + \gamma_I \alpha_i)}, J = R, I \tag{3}$$

with $\beta_J, J = R, I$ the parameter vectors measuring the impact of the explanatory variables x_{it} on the probability of job exit to state J. The level of net wealth at the beginning of period t, A_{it}, is included among the regressors x_{it}. In (3) α_i represents the unobserved individual specific variation in job exit rates. We include one individual specific random effect α_i, irrespective of the state of destination, as we typically observe only one realized exit route for the job exiters in our sample. The impact of the random effect on job exit is measured by γ_R and γ_I, depending on the state of destination.

Next, we formulate an equation for the level of net wealth. Since the empirical distribution of net wealth is highly skewed, Burbidge, Magee, and Robb (1988) propose to use the inverse hyperbolic sine transformation to transform the level of net wealth. The inverse hyperbolic sine transformation $g(A_{it}, \theta)$ on net wealh A_{it} is

$$g(A_{it}, \theta) \equiv \frac{\ln[\theta A_{it} + (\theta^2 A_{it}^2 + 1)^{1/2}]}{\theta} \tag{4}$$

with θ a parameter.[10] The transformation (4) has some convenient properties:

- If θ tends to zero, then $g(A_{it}, \theta)$ tends to A_{it}.

- Sign$(g(A_{it}, \theta))$ = Sign(A_{it})

- $g(A_{it}, \theta)$ is monotonically increasing in A_{it}

[10] The parameter θ will be estimated. In applications, the parameter θ is often set to 1. Note, however, that it is not a priori clear whether this is an appropriate choice. Expression (4) shows that the appropriate level of θ is influenced by the scale of net wealth. Since we estimate all the model parameters simultaneously by maximum likelihood, there is no need to set the value of θ a priori, especially since (4) is a well behaved function of θ. In computing the likelihood, we have to be aware of the Jacobian of the transformation (4), as shown in (11) in the appendix.

- $g(A_{it}, \theta)$ is symmetric in θ, so we can restrict $\theta \geq 0$ without loss of generality.

The equation for net wealth now becomes

$$g(A_{it}, \theta) = z_{it}'\delta + \omega_i + u_{it} \tag{5}$$

The net wealth equation contains an individual specific random effect ω_i and an idiosyncratic error u_{it}. We do not wish to interpret the equation for net wealth as a structural, behavioural equation for wealth.[11] The functionality of the net wealth equation is to allow for correlation in unobservables between job exits and net wealth.[12]

The model is completed by adding an equation for the initial labour market state d_{it}, with $d_{it} = 1$ if individual i, selected in the sample in period t, is employed and $d_{it} = 0$ if individual i is not employed.

$$\begin{aligned} d_{it}^* &= m_{it}'\eta + \epsilon_{it} \\ d_{it} &= \iota(d_{it}^* > 0) \end{aligned} \tag{6}$$

with m_{it} the explanatory variables, η the parameter vector that measures the impact of the explanatory variables on the labour market state, ϵ_{it} the error term, and ι is the indicator function.[13] Note that an initial condition of the type we apply here is an approximation for the 'true' probability that someone is working at the time of selection into the sample. The latter probability depends on the entire labour market history of individuals, and is a result of transitions in the past. Thus, it would also depend on all past net wealth levels. We do not observe the entire life of individuals, and we follow the usual approach in the literature here.[14]

[11] A more structural equation, for instance, may call for the inclusion of (transformed) lagged net wealth among the regressors. If this approach is followed, an initial condition (that does not include lagged net wealth) for net wealth needs to be added. But since the coefficient of lagged net wealth will be close to 1, it will wipe out the random effect ω_i in (5). The consequence would be that any correlation in unobservables between net wealth and the job exit probability would run through the initial condition for net wealth. But then the approach becomes largely equivalent to estimating a net wealth equation that does not include lagged wealth.

[12] Below we comment on exclusion restrictions.

[13] Note that we have added subscript t to (6) but the initial condition is applied to individual i the year he is selected in the sample in the given labour market state.

[14] Equilibrium search models (see e.g. Van den Berg and Ridder, 1998) sometimes 'correct' for selection in the sample using structural model parameters by making use of steady state employment rates implied by the model. In the context of a life cycle model in which net wealth has a typical life cycle pattern, we cannot to rely on steady state assumptions. Alternatively, in duration models stock sampling may be accounted for by conditioning on backward recurrence times (see e.g. Lancaster, 1979, or Bloemen, 2005 for applications). This requires information about job tenure as well as information on past levels of net wealth during the elapsed duration of the current job.

We allow for correlation in the unobservables α_i and ω_i appearing in the job exit rate and the net wealth equation respectively. Moreover, we allow for correlation between α_i and ω_i and the unobserved error ϵ_{it} appearing in the initial condition (6). More specific, we assume that α_i, ω_i, and ϵ_{it} follow a joint normal distribution, independently and identically distributed across individuals:

$$\begin{pmatrix} \alpha_i \\ \omega_i \\ \epsilon_{it} \end{pmatrix} \sim N \left[\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \sigma_{\alpha\omega} & \sigma_{\alpha\epsilon} \\ \sigma_{\alpha\omega} & \sigma_{\omega}^2 & \sigma_{\omega\epsilon} \\ \sigma_{\alpha\epsilon} & \sigma_{\omega\epsilon} & 1 \end{pmatrix} \right] \tag{7}$$

The formulated model allows for correlation in unobservables between net wealth, as a regressor included in x_{it} in (3), and the unobservables α_i. The remaining regressors are assumed to be uncorrelated with the unobservables in the exit rates. Moreover, we assume that the regressors z_{it} in the wealth equation and m_{it} in the initial condition are uncorrelated with $\alpha_i, \omega_i, \epsilon_{it}, u_{it}$ and the errors governing (3).

To estimate the model we need to decide on exclusion restrictions. Good exclusion restrictions are notoriously hard to find in a life cycle model in which variables are jointly determined.[15] Expression (2) for the job exit probability suggests that the job exit rate, for a job exit from period t to $t+1$, depends on net wealth at the beginning of the period and on the earnings on the job. In the equation for net wealth (5) we include the net disposable household income in period $t-1$ among the regressors in z_{it} to explain net wealth in period t. This variable is not included among the regressors x_{it} of the job exit probailities (3). In the equation (6) for the initial labour market state at period t, we include nonlabour income in period $t-1$ among the regressors m_{it}, which we do not include in x_{it}.

4 Results

4.1 Parameter estimates

The model equations (3), (5), and (6) with the covariance structure in (7) have been estimated simultaneously by simulated maximum likelihood using 60 replications to sim-

[15] For this reason, Bloemen (2006) emphasizes the importance of including a rich set of observable regressors in the model.

ulate the integration over unobserved random effects. Appendix A shows the details of the likelihood function.

We have done the analysis with two measures of net wealth. The first measure we refer to as 'net liquid wealth'. It is defined in the data section. The second measure adds the value of the house and subtracts the amount of the mortgage debt outstanding. In the tables with estimation results, the first column(s) refer to the analysis with net liquid wealth. The final columns show the results with the alternative measure that includes housing equity and the mortgage debt.

We start by discussing the results obtained with net liquid wealth. Table 6a shows the parameter estimates of involuntary job exits. Theoretical considerations in section 3.1 suggest that involuntary job exits are mainly led by demand side factors and health status, and are not the (direct) result of choice. The estimates in table 6a are in accordance with that view. Net wealth has a positive but insignificant effect on involuntary job exits. Having a permanent job reduces involuntary job exits. Also the subjective health indicators add to the explanation of the involuntary job exit rate. Workers with a very good health have a significantly lower involuntary job exit rate than workers in bad health (the reference group). The same holds for workers in good health and reasonable health. We also see that the size of the coefficients of the health indicator increases monotonically if health status decreases. We see a negative effect of marital status on involuntary job exits. Further sensitivity analysis with information on the spouse's labour market state and the earnings of the spouse (not shown in the table) showed that this effect is caused by workers with an employed spouse: workers with an employed spouse have a lower probability to exit involuntarily. Class endogamy and polarization may be an explanation for this phenomenon.

Table 6b contains the estimates of the job exit rate into retirement. Net financial wealth has a positive significant effect on the job exit rate into (early) retirement, even though we allow for correlation in unobservables. Age plays an important role, showing that the job exit rate increases with age. The level of education has an impact here. The coefficients are not all significant, but show that workers with lower levels of education have higher job exit rates into retirement. This may reflect preferences, but also job properties (jobs for higher educated may be more interesting). Workers with a permanent job also have a higher exit rate into retirement, which reflects eligibility to (early) retirement schemes of workers with a permanent contract. We do not find significant effects of the health indicators. This does not mean that health does not influence the job exit rate by retirement at all. There is an indirect effect: involuntary job exit rates are higher for workers with lower health status, so once an involuntary exit has been realized due to poor health, no exit into retirement can take place, since the different exit routes are competing risks. But in comparing job exiters into retirement with job stayers, no impact of health is found. The information on pension premiums shows no significant effect on the exit rate on retirement.

The parameters γ_I and γ_R measure the impact of the random effect α_i on the job exit rates (see the expression for the job exit rates in (3)). We see that the parameters γ_I and γ_R have an opposite sign, and both are significantly different from zero. This indicates that there are unobservable factors that make workers that exit involuntarily different from workers that stay on the job during the sample period and from workers that exit into retirement. Also job stayers and exiters into retirement seem to be different, conditional on the observable variables.

Table 7 contains the estimates of the net wealth equation (5). The level of financial wealth increases with age, and decreases wih the level of education. Net disposable household income in the previous year has a positive and significant effect on the level of wealth. Net financial wealth differs with the marital status of the worker. Divorced men have the lowest level of net wealth, followed by married men. For single and widowed men we do not find much difference. We see a monotonically increasing pattern in the year dummies. This may be the result of inflation or booming financial markets in the period.

Table 8 contains the results for the initial labour market state. Age and education level seem to be the most important determinants here. We do not find effects of the lagged nonlabour incomes, and also family composition and marital status do not matter.

Table 9 shows the parameter estimates of the covariance matrix in (7). For ease of interpretation we have reparametrized the covariances into their corresponding correlation coefficients. Random effects play an important role in the explanation of the level of net wealth, as shown by the parameter estimate σ_ω. The correlation across time periods in the net wealth level, due to the random effect, is $\sigma_\omega^2/(\sigma_\omega^2+\sigma_\nu^2)$ and takes the value 0.61. This shows that there is a lot of household specific correlation in the net wealth level that cannot be explained by the observable characteristics that appear in the net wealth equation.

Very important for the aim of our analysis is the parameter $\rho_{\alpha\omega}$ that measures the correlation between unobservables in the net wealth equation and unobservables in the job exit rates. We have already seen that random effects in the net wealth equation are very important, and that unobservable random effects cause involuntary job exiters and job exiters into retirement to be different from each other. The coefficient estimate of $\rho_{\alpha\omega}$ is -0.27, which is negative but not significantly different from zero at the 5% level. It is, though, on the edge of significance at the 10% level. Since the parameter γ_R is negative, the unobservables in net wealth correlate positively with job exit into retirement. This means that there are unobervables that cause both higher net wealth levels and higher retirement rates. Such a positive correlation is, for instance, consistent with behaviour of workers that accumulate high wealth because they prefer to retire early. In spite of the positive correlation in unobservables, a positive and significant impact of net wealth on the retirement rate remains. The unobservables in net wealth correlate negatively with involuntary job exits. A negative correlation is consistent with the phenomenon that workers with a low level of net wealth may have unfavourable characteristics that make them more likely to exit involuntarily.

The correlations with the initial conditions are small and insignificant. The descriptives in tables 1 and 2 showed that workers and nonworkers are quite different in terms of observed charactertistics. For instance, their levels of net wealth are quite different. The correlation coefficient $\rho_{\omega\epsilon}$ which measures the correlation in unobservables between the level of net wealth and the initial labour market state is -0.016 and is not significant, indicating that the observables included in the net wealth equation can explain any correlation between labour market states and net wealth levels.

The results with the alternative measure of net wealth, that includes the value of the house and accounts for mortgage debt, are comparable to the results obtained with net liquid wealth, but there are also important differences. First, the tables 6a and 6b show that net wealth has a positive but insignificant effect on involuntary job exits, and a positive and significant effect on job exits into retirement. We see a positive and significant value for γ_I, the coefficient of unobserved random effects on the involuntary job exit rate, and an opposite but insignificant estimate of γ_R, the coefficient of random effects in the job exit rate into retirement. For the alternative measure of net wealth, involuntary job exiters seem to be different from stayers and job exiters into retirement, whereas the latter two groups are more comparable in terms of unobservables, given the observables that have been included. The net wealth equation (table 7) again shows a negative impact of divorce on the net household wealth, which makes divorced men less wealthy than single men or widowed. The estimates for initial conditions do not show much difference with the earlier results. However, we do find differences in the covariance matrix. First, the standard deviation of random effects σ_ω and the standard deviation σ_ν of the time varying error are of different order of magnitude, due to the fact that the net wealth measure with housing equity itself is of a different order of magnitude. The correlation across time in unobservables, $\sigma_\omega^2/(\sigma_\omega^2+\sigma_\nu^2)$, now is 0.84, which shows an even higher persistence in net wealth that is assigned to unobservables compared to net liquid wealth. This reflects both the relatively large value of housing equity and mortgage debt and the relatively illiquid nature of housing equity. The correlation coefficient $\rho_{\omega\epsilon}$ now is significantly positive, taking the value 0.084. This is not a large correlation, but is shows that there is a selectivity effect in net wealth if we select only working individuals. By allowing for a nonzero value of $\rho_{\omega\epsilon}$, we have corrected for this selectivity effect. We also see a selectivity effect between the initial labour market state and the random effect in the job exit rates: the parameter $\rho_{\alpha\epsilon}$ takes the value -0.278 and differs significantly from zero. This correlation is negative, indicating that unobservable factors that make someone more likely to be employed also make someone less likely to exit involuntarily (due to the positive value of γ_I). The correlation with exit into retirement is positive (due to a negative $\rho_{\alpha\epsilon}$ and a negative γ_R) but since γ_R is not significant we have to be careful in drawing firm conclusions. The direct correlation between random effects in job exit rates and random effects in net wealth, measured by $\rho_{\alpha\omega}$, is not significant. This implies that if there is any correlation in unobservables between net wealth and job exit, it will run through the selectivity effect of the initial conditions, and moreover, it affects the involuntary job exit rate rather than the job exit rate into retirement. The computations of the elasticities in section 4.3 shed more light on this.

4.2 Likelihood ratio test

We have already seen that the estimated correlation coefficients of the unobservables do not show up significantly at the 5% level in the specification with net liquid wealth. To further evaluate the impact of the inclusion of the random effects in the model, we compare the likelihood value of the full model we have estimated with two alternative, simpler variants. The simplest variant is the model without any random effects: in this model variant we have set $\gamma_U = \gamma_R = \sigma_\omega = 0$ and as a consequence the correlations in unobservables do not appear either. In the second variant we have included the random effects, but we have set the correlations in unobservables equal to zero: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$. All models include the same set of observables in the different model equations. Table 10 shows the likelihood values. The first column shows the values for the specification with net liquid wealth. The large differences in likelihood values between the simplest version without any random effects and the specifications with random effects are indicative for the important role of random effects in the wealth equation and in the transition equation. It should be clear that if there is no correlation in unobservables, both the specification without random effects and the specification with random effects lead to consistent estimates. However, ignoring random effects leads to a loss in efficiency.[16] From the numbers in the table we can conclude that the value of the likelihood ratio test for testing the null hypothesis $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$ is 2.9. The null hypothesis is not rejected at the 5% level, since the critical value of the χ^2 distribution with three degrees of freedom is 7.8.

The second column contains the likelihood value for the specification with liquid and illiquid net wealth. For this specification, table 9 showed evidence of selection on

[16] Conditional on the hypothesis that the random effect specification is correct.

unobservables through the initial labour market state. The value of the likelihood ratio test for testing the null hypothesis $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$ is 10.5. The null hypothesis is therefore rejected at the 5% level.

4.3 Elasticities

To gain insight in the sensitivity of the job exit rates with respect to the level of wealth, we have evaluated the elasticities. The elasticities are based on the derivative of the exit rate in (3) with respect to the level of wealth. We have evaluated the elasticities in their sample means. We have computed the elasticities for the three different model specifications: (i) without random effects; (ii) with random effects, but correlations between unobservables restricted to zero; and (iii) with random effects and correlations between unobservables unrestricted. The third variant corresponds with the estimates in tables 6 through 9.

The values of the elasticities can be found in table 11. The upper panel shows the results for the specification with net liquid wealth. The elasticity of the job exit rate into retirement with respect to net liquid wealth hardly differs across specifications. If we allow for correlation in unobservables between the level of net wealth and job exit rates, we see that the numerical value of the elasticity is smallest, 0.13, which is in accordance with the positive correlation in unobservables that we have found. However, the difference is very small. Between brackets are the standard errors which show the variation in the elasticities that comes from the variation in the parameter estimates.

The elasticity of the involuntary job exit rate shows more variation between the different variants, but in any case the elasticity is not significantly different from zero. The numerical value of the elasticity is largest if we allow for random effects and for correlation in unobservables between job exit rates and the level of net wealth. This corresponds with the negative correlation in unobservables between the level of net wealth and the involuntary job exit rate.

The lower panel shows the elasticities for the alternative measure of net wealth. The estimation results showed that for this measure of net wealth, correlation in unobservables may matter, but mainly run through the initial conditions (selectivity effect) and are likely to affect the involuntary job exit rate most. This is confirmed by the values of the elasticities in table 11. The values of the elasticity of job exit into early retirement hardly differ with the inclusion or exclusion of random effects, and with the inclusion or exlusion of correlation between the unobservables. The elasticity of the job exit rate into unemployment and disability with respect to wealth differs most, ranging from 0.064 in the specification without random effects to 0.14 in the specification with random effects and correlations in unobservables. However, the estimate of the elasticity remains insignificant, although the t-value amounts to over 1.5.

5 Conclusions

Private wealth may become an increasingly important factor in the decision to retire. The level of private wealth relative to social security wealth is much higher than it was a few decades ago. Pension arrangements become more flexible, assigning a larger role to decisions by individual workers. Measuring the impact of net wealth on job exit therefore is a relevant issue. The measurement of the impact of net wealth on job exit at older age is complicated, as wealth and job exit may be correlated by many factors. As far as these factors are observable, we can correct for them by the inclusion of regressors. But there may be unobserved factors by which net wealth and the exit out of a job are correlated that cannot be 'explained away' by observables. An analysis to measure the impact of net wealth on job exit, that does not account for correlation in unobservables, may leave us with an estimated impact of net wealth that is not completely a 'causal' effect.

We may distinguish three main reasons for correlation in unobservables. The first is the (economic) behaviour of the individual: someone with a preference for an early retirement may have exposed forward looking behaviour during working life and may have saved specifically for retirement. Therefore, we may see workers with a high level of net wealth to retire early. But this is not the causal effect we are looking for. The impact of net wealth on retirement would be biased upwards. A second source of correlation by unobservables may be that net wealth can serve as a proxy for favourable individual characteristics that correlate positively with job attachment and negatively with layoff rates. This possible source of correlation by unobservables may be particularly important for involuntary job exits. Neglectance may bias downward the impact of net wealth on job exits. Finally, there may be missing information, like details of the worker's pension arrangement.

In studying job exit behaviour, it is natural to select a sample of employed workers, as job exit applies to employed workers only. However, if there are unobservables correlated across time, selectivity in the state of employment becomes an issue. Especially if workers and non-workers tend to have different wealth levels. Non-workers may have quit their job because of their (high) level of net wealth. Alternatively, if net wealth correlates negatively with layoff rates or health status, non-workers may be found to have lower wealth levels. If this selectivity effect in turn is correlated with unobservables in the job exit rate, we have another reason why an analysis that neglects correlation by unobservables leads to biased estimates of the impact of net wealth on job exit.

We use data from the Dutch Socio-Economic Panel from the years 1995-2002. We select employed individuals and track their labour market state the next year to determine job exit. On job exit, we observe the state of destination. In our model we distinguish two exit states: retirement, and exit into unemployment and disability (labelled involuntary exits). Involuntary exits are more likely induced by demand side restrictions and health risks. In the analysis, we apply two alternative measures of net wealth: net liquid wealth and net wealth including housing equity and mortgage debt.

Our model consists of three parts: (i) a multinomial logit model for job exit into the two alternative states of destination; (ii) a net wealth equation; (iii) an initial condition for the labour market state. The multinomial logit model and the net wealth equation both include an individual specific, time invariant, random effect, that are allowed to be correlated with each other, as well as with the initial condition. This way we allow for the possible correlation in unobservables and the selectivity effects.

The analysis shows that unobserved random effects play a role in job exit rates. We see that involuntary job exiters are different, in terms of unobservables, from job stayers. On the other hand, we find evidence that job exiters into retirement may differ from job stayers in terms of unobservables, depending on the measure of net wealth that we use. The random effect in the net wealth equation shows that there is a large persistence in the level of net wealth that cannot be explained by the regressors in the net wealth equation.

The analysis with the alternative measures of wealth show a positive and significant effect of net wealth on job exit into early retirement. Elasticities of the job exit rate with respect to early retirement hardly vary with the inclusion or exclusion of correlation in unobservables. The effect of net wealth on involuntary job exits is never significant, but the value of its estimate is not insensitive for the inclusion of correlation in unobservables.

The analysis with net liquid wealth provides only weak evidence of any correlation in unobservables between wealth and job exit. We do not find a selectivity effect of the wealth level that is due to selecting employed workers. For the analysis with net wealth including housing equity and mortgage debt we again find no evidence for a correlation between the random effects in the net wealth equation and the job exit rates. However, a selectivity effect is detected. There is a positive correlation in unobservables between net wealth and employment, and a negative correlation in unobservables between selection into employment and involuntary job exits. As a consequence, the elasticity of the involuntary job exit rate is affected most by the correction for selectivity: it seems to be biased downward without this correction. However, the value of the elasticity remains insignificant.

Evaluating the three reasons for possible correlation between unobservables in net wealth and job exit rates, we can say that we do not find evidence that the positive effect of wealth on job exit into retirement is biased by correlation through preferences for retirement. In fact, the elasticity of the job exit rate with respect to net wealth is hardly affected by allowing for such correlation. There may be some evidence for the second reason: for net wealth including housing equity and mortgage debt we find a positive correlation in unobservables between the employment state and the level of net wealth, indicating that a high job attachment may correlate positively with the level of net wealth. At the same time unobservables that correlate positively with employment, correlate negatively with involuntary job exits. This way, there is an indirect negative correlation of unobservables in wealth and unobservables in unvoluntary job exit rates. This may bias downward the estimated impact of net wealth on job exit for this reason. That is why we see that estimators that correct for selectivity yield a higher value of the elasticity of the job exit rate into this state of destination.

A Likelihood contributions

We first determine the likelihood contributions, conditional on the random effects (α_i, ω_i) in (3) and (5). The density of the ϵ_{it} in the initial condition (6), conditional on (α_i, ω_i) follows from (7) and is normal with mean $\mu_\epsilon(\alpha_i, \omega_i)$ and variance $\sigma^2_{\epsilon|(\alpha,\omega)}$ with

$$\mu_\epsilon(\alpha_i, \omega_i) \equiv \frac{1}{\sigma^2_\alpha \sigma^2_\omega - \sigma^2_{\alpha\omega}} \left(\sigma_{\alpha\epsilon} \quad \sigma_{\omega\epsilon} \right) \begin{pmatrix} \sigma^2_\omega & -\sigma_{\alpha\omega} \\ -\sigma_{\alpha\omega} & \sigma^2_\alpha \end{pmatrix} \begin{pmatrix} \alpha_i \\ \omega_i \end{pmatrix} \tag{8}$$

and

$$\sigma^2_{\epsilon|(\alpha,\omega)} \equiv 1 - \frac{1}{\sigma^2_\alpha \sigma^2_\omega - \sigma^2_{\alpha\omega}} \left(\sigma_{\alpha\epsilon} \quad \sigma_{\omega\epsilon} \right) \begin{pmatrix} \sigma^2_\omega & -\sigma_{\alpha\omega} \\ -\sigma_{\alpha\omega} & \sigma^2_\alpha \end{pmatrix} \begin{pmatrix} \sigma_{\alpha\epsilon} \\ \sigma_{\omega\epsilon} \end{pmatrix} \tag{9}$$

Let T_{i1} be the first year in which individual i is observed and selected into the sample. The probability that the observed labour market state is employment, conditional on (α_i, ω_i), is

$$P(d_{iT_{i1}} = 1 | m_{iT_{i1}}, \alpha_i, \omega_i) = \Phi\left(\frac{m_{iT_{i1}} + \mu(\alpha_i, \omega_i)}{\sigma_{\epsilon|(\alpha,\omega)}} \right) \tag{10}$$

If the labour market state is nonemployment the assigned probability will be $P(d_{iT_{i1}} = 0 | m_{iT_{i1}}, \alpha_i, \omega_i) = 1 - P(d_{iT_{i1}} = 1 | m_{iT_{i1}}, \alpha_i, \omega_i)$. We follow the employed individuals to track whether or not a job exit occurs. The assigned transition probability $P(d_{i,t+1} = J | d_{it} = E, x_{it}, \alpha_i)$ indicates that the individual is employed in year t and is in labour market state J in the subsequent year with $J \in \{E, R, I\}$. The probability is defined in (3).

The density of wealth, conditional on the random effects, can be derived from (5) and (7). We can write

$$f(A_{it} | z_{it}, \omega_i) = \frac{1}{\sigma_u} \phi\left(\frac{g(\theta, A_{it}) - z'_{it}\delta - \omega_i}{\sigma_u} \right) \left[\frac{\partial g(\theta, A_{it})}{\partial A_{it}} \right] \tag{11}$$

with $\phi(.)$ the standard normal density function.

For an individual i who is initially employed, and observed from T_{i1} through T_{i2}, and does not make a transition during this period, the likelihood contribution $l_i(\alpha_i, \omega_i)$[17] is

$$l_i(\alpha_i, \omega_i) = P(d_{iT_{i1}} = 1 | m_{iT_{i1}}, \alpha_i, \omega_i) \prod_{t=T_{i1}}^{T_{i2}} P(d_{i,t+1} = E | d_{it} = E, x_{it}, \alpha_i) f(A_{it} | z_{it}, \omega_i) \tag{12}$$

[17] In general, a likelihood function is a function of the model parameters, conditional on the data. For reasons of conciseness, we suppress the arguments in the notation.

For an individual i who is initially employed, and observed to stay employed from T_{i1} through T_{i2} but makes a transition from year T_{i2} to $T_{i2}+1$ into state of destination $J, J = I, R$ the likelihood contribution conditional on random effects is

$$l_i(\alpha_i, \omega_i) = P(d_{iT_{i1}} = 1 | m_{iT_{i1}}, \alpha_i, \omega_i) \prod_{t=T_{i1}}^{T_{i2}-1} P(d_{i,t+1} = E | d_{it} = E, x_{it}, \alpha_i) f(A_{it} | z_{it}, \omega_i)$$
$$\times P(d_{i,T_{i2}+1} = J | d_{iT_{i2}} = E, x_{iT_{i2}}, \alpha_i) f(A_{iT_{i2}} | z_{iT_{i2}}, \omega_i) \tag{13}$$

For initially nonemployed individuals we only have the initial condition and the wealth level. Note that the likelihood contribution of the nonemployed does not involve the labour market transition probabilities (3) and therefore it can be simplified by integrating over α_i, or equivalently, by using the density of $\epsilon_{iT_{i1}}$ conditional on ω_i only. For generality of notation, we keep α_i in our expression. So for nonemployed individuals, we have:

$$l_i(\alpha_i, \omega_i) = P(d_{iT_{i1}} = 0 | m_{iT_{i1}}, \alpha_i, \omega_i) f(A_{iT_{i1}} | z_{iT_{i1}}, \omega_i) \tag{14}$$

The likelihood contribution can be completed by integrating over the joint density of (α_i, ω_i) which is normal and follows from (7). If we denote the density function by $f(\alpha_i, \omega_i)$ then the likelihood contribution l_i for individual i becomes

$$l_i = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} l_i(\alpha_i, \omega_i) f(\alpha_i, \omega_i) d\alpha_i d\omega_i \tag{15}$$

In the estimation, we replace the integration in (15) by simulation. We draw R random numbers $(\alpha_{ir}, \omega_{ir}), r = 1, ..., R$ from its joint distribution, and we compute the simulated likelihood contribution l_{iR} as

$$l_{iR} = \frac{1}{R} \sum_{r=1}^{R} l_i(\alpha_{ir}, \omega_{ir}) \tag{16}$$

In our application, we have set $R = 60$.

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Table 1: Observations used for initial conditions, sample descriptives

	Nonemployed $N = 572$		Employed $N = 1187$	
Variable	Mean	standard deviation	Mean	standard deviation
Age	57.4	5.3	51.3	3.8
# Children living in the household	0.45	0.82	1.1	1.1
Net total liquid wealth (guilders)	53110	126191	60504	146294
(Median):	(15177)		(21710)	
Net total wealth (liquid + illiquid)	184256	267331	269514	498213
(Median):	(85044)		(170600)	
Other income lagged (monthly)	371	2213	308	1520
(Median):	(0)		(0)	
Earnings spouse (monthly, if employed)	1737	2762	1938	2815
(Median)	(1299)		(1641)	
Other income spouse lagged	1240	12515	1107	10515
(Median)	(0)		(0)	
Disposable household income lagged	42168	25605	66981	27902
(Median)	(38243)		(62076)	

Table 2: Observations used for initial conditions, sample descriptives

	Nonemployed $N = 572$	Employed $N = 1187$
	Percentage	Percentage
Education Level:		
1 (lowest)	21.2	6.8
2	22.7	15.2
3	37.8	46.4
4	13.5	21.2
5	4.7	9.8
Education type:		
Technical	32.0	33.7
Economic/administrative	18.4	24.3
General	30.6	18.5
Services	19.1	23.5
No children in the household	70.3	39.8
Married	80.4	86.6
Divorced	9.8	6.7
Widowed	3.0	1.3
Single	6.8	5.5
Employed spouse (sample percentage)	25.3	51.1

Table 3: Observations used for job exits, sample descriptives

Number of observations: $N = 3711$ (worker-years)

Variable	Mean	standard deviation
Age	52.6	3.5
# Children living in the household	0.88	1.0
Pension premium (monthly, guilders) only for workers participating in employee pension system and paying premium directly	253	399
Pension premium (monthly, guilders) only for workers participating in an individual pension scheme	407	640
Net total liquid wealth (guilders)	62782	143244
(Median):	(24878)	
Net total wealth (liquid + illiquid)	282224	396281
(Median):	(199209)	
Net monthly wage income (guilders)	4729	3059
(Median):	(4250)	
Other income (monthly)	240	(1991)
(Median):	(0)	
Earnings spouse (monthly, if employed)	1918	(2317)
(Median)	(1608)	
Other income spouse	943	(7096)
(Median)	(0)	

Table 4: Observations used for job exits, sample descriptives

Number of observations: $N = 3711$ (worker-years)	
	Percentage
Education Level:	
1 (lowest)	6.0
2	14.3
3	47.6
4	21.9
5	9.5
Education type:	
Technical	32.3
Economic/administrative	24.9
General	17.6
Services	25.2
No children in the household	46.9
'Permanent' job	96.0
Civil servant	32.0
Participating in employee pension scheme	89.8
Unknown whether part. in pens. scheme	1.8
Pays contribution directly	4.1
The employer contributes to premium	73.8
Participates in individial pension scheme	15.6
Married	88.1
Divorced	6.5
Widowed	1.2
Single	4.2
Employed spouse (sample percentage)	51.4
Still employed next year	94.4
Industry:	
Agriculture, fishing	1.0
Food, textile	9.0
Chemistry, rubber	4.2
Production of Machines, instruments	7.0
Construction	8.3
Retail and trade	8.9
Transport	8.1
Finance, commercial services	11.9
Public government, education	26.1
Health care	5.8
Remaining services, public utility	4.2
Other, missing	5.5
General health condition:	
Very good	17.3
Good	61.4
Reasonable	19.7
Bad	1.5
Very bad	0.08
Wave 1995	12.6
Wave 1996	13.5
Wave 1997	13.7
Wave 1998	14.5
Wave 1999	14.7
Wave 2000	15.9
Wave 2001	15.1

Table 5: Job leavers: self-reported reasons to exit

Number of Job Leavers	208
Reason for exit	Percentage of job leavers
Became unemployed	15.9
Illness Disability	12.0
(Early) retirement/living of one's investments/quit	72.1

Table 6a: The Involuntary Job Exit Rate

	Net Liquid Wealth		Net wealth (including value house/mortgage)	
Variable	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	1.001	1.106	0.469	1.163
Ln (Age/48)	14.710*	7.682	13.427*	7.831
Ln (Age/48) Squared	-49.940	33.439	-41.349	34.049
Education level 1 (lowest)	0.292	0.914	0.425	0.997
Education level 2	-1.350	0.788	-0.986	0.812
Education level 3	-0.313	0.588	-0.192	0.620
Education level 4	-0.363	0.625	-0.302	0.656
Technical	0.369	0.443	0.407	0.462
Economic/administrative	0.278	0.469	0.329	0.493
General	-0.261	0.636	-0.130	0.690
No Children in household	-0.137	0.332	-0.113	0.352
Married	-1.395**	0.595	-1.334**	0.606
Divorced	-1.382	0.832	-1.216	0.842
Widow	-0.822	1.112	-0.467	1.104
Civil Servant	-0.573	0.409	-0.547	0.418
Part. in employee pension scheme	-0.958	0.681	-0.694	0.710
Unknown whether part. in pens. scheme	0.757	0.695	0.816	0.718
Worker pays premium directly	1.852	0.901	1.822**	0.913
Pension premium (if paying directly)	-0.004	0.005	-0.004	0.004
Missing premium amount (if paying directly)	-0.349	1.905	0.098	1.975
Employer attributes to premium	0.868	0.566	0.781	0.571
Permanent job	-2.342**	0.456	-2.393**	0.487
Part. in individual pension scheme	0.445	0.490	0.407	0.526
Amount premium individual pension scheme	-0.00036	0 0.001	0.00028	0.00074
Very good health	-3.331**	0.694	-3.291**	0.723
Good health	-2.717**	0.531	-2.649**	0.560
Reasonable health	-2.394**	0.577	-2.352**	0.606
1995	0.480	0.500	0.533	0.512
1996	0.201	0.511	0.225	0.533
1997	-0.145	0.524	-0.147	0.542
1998	-0.516	0.543	-0.486	0.555
1999	-0.556	0.534	-0.468	0.535
2000	-0.661	0.553	-0.678	0.562
Monthly earnings	0.021	0.037	0.014	0.041
Other income/1000	-0.019	0.085	-0.023	0.074
Total net liquid wealth/10000	0.0074	0.010	0.0051	0.0033
γ_U (parameter random effect)	1.068**	0.347	1.264**	0.348

**: significant at 5% level

*: significant at 10% level

Table 6b: The Job Exit Rate with Destination (Early) Retirement

	Net Liquid Wealth		Net wealth (including value house/mortgage)	
Variable	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	-12.700**	1.772	-12.663**	1.773
Ln (Age/48)	33.902**	10.164	37.767**	10.368
Ln (Age/48) Squared	-8.485	30.046	-23.706	30.122
Education level 1 (lowest)	1.451	0.693	1.432**	0.670
Education level 2	1.767**	0.603	1.799**	0.579
Education level 3	1.681**	0.568	1.753**	0.549
Education level 4	0.916	0.567	0.942*	0.545
Technical	-0.028	0.287	-0.011	0.192
Economic/administrative	0.135	0.312	0.174	0.283
General	0.277	0.378	0.300	0.351
No Children in household	0.439	0.243	0.447	0.235
Married	1.007	1.066	0.828	1.050
Divorced	0.652	1.119	0.631	1.095
Widow	1.404	1.209	1.287	1.178
Civil Servant	0.343	0.240	0.293	0.231
Part. in employee pension scheme	-0.135	0.423	-0.080	0.461
Unknown whether part. in pens. scheme	0.881	0.640	0.990	0.626
Worker pays premium directly	0.543	0.543	0.468	0.554
Pension premium (if paying directly)	0.001	0.001	0.001	0.002
Missing premium amount (if paying directly)	2.420	1.196	2.384**	1.188
Employer attributes to premium	-0.220	0.277	-0.241	0.279
Permanent job	1.667**	0.646	1.476**	0.616
Part. in individual pension scheme	0.059	0.453	-0.009	0.457
Amount premium individual pension scheme	-0.001-	0.001	-0.0006	0.0007
Very good health	0.002	0.653	-0.166	0.904
Good health	-0.053	0.641	-0.172	0.854
Reasonable health	-0.122	0.662	-0.254	0.865
1995	0.932**	0.402	1.031**	0.398
1996	0.418	0.410	0.510	0.403
1997	1.020**	0.368	1.090**	0.364
1998	0.617	0.379	0.689*	0.375
1999	0.217	0.398	0.283	0.395
2000	0.333	0.370	0.353	0.370
Monthly earnings	0.023	0.027	0.029	0.026
Other income/1000	-1.789**	0.532	-1.407**	0.442
Total net liquid wealth/10000	0.020**	0.0078	0.0068**	0.0028
γ_R (parameter random effect)	-0.445**	0.210	-0.215	0.214

**: significant at 5% level

*: significant at 10% level

Table 7: The Wealth equation
Dependent variable: inverse hyperbolic sine of wealth/10000

	Net Liquid Wealth		Net wealth (including value house/mortgage)	
Variable	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
θ (parameter of transformation)	0.733**	0.029	0.135**	0.006
Intercept	2.054**	0.316	12.444**	1.057
Ln (Age/48)	2.136**	1.113	11.270**	3.557
Ln (Age/48) Squared	3.831	4.194	-9.953	12.939
Education level 1 (lowest)	-1.103**	0.206	-4.140**	0.756
Education level 2	-0.679**	0.165	-3.744**	0.651
Education level 3	-0.646**	0.147	-3.545**	0.583
Education level 4	-0.122	0.154	-0.697	0.607
Technical	0.196**	0.093	1.060**	0.320
Economic/administrative	0.258**	0.096	1.316**	0.327
General	0.209	0.130	0.465	0.392
No Children in household	0.050	0.098	0.525**	0.293
Number of children in household	0.065	0.054	0.484**	0.165
Married	-0.544**	0.236	-0.784	0.706
Divorced	-1.050**	0.267	-3.218**	0.809
Single	-0.115	0.294	-1.040	0.858
Net disposable household income lagged	0.0093**	0.001	0.036	0.003
1995	-0.548**	0.079	-4.502**	0.294
1996	-0.491**	0.081	-3.685**	0.278
1997	-0.391**	0.078	-3.192**	0.254
1998	-0.285**	0.074	-2.278**	0.223
1999	-0.157**	0.071	-1.562**	0.200
2000	-0.042	0.068	-0.488**	0.178

**: significant at 5% level
*: significant at 10% level

Table 8: Initial condition: the employment equation

	Net Liquid Wealth		Net wealth (including value house/mortgage)	
Variable	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	1.466**	0.350	1.507**	0.363
Ln (Age/48)	3.250**	1.471	3.242**	1.468
Ln (Age/48) Squared	-44.576**	5.738	-44.568**	5.722
Education level 1 (lowest)	-1.161**	0.209	-1.113**	0.210
Education level 2	-0.676**	0.168	-0.679**	0.168
Education level 3	-0.263	0.156	-0.265*	0.155
Education level 4	-0.061	0.170	-0.069	0.170
Technical	0.083	0.105	0.079	0.105
Economic/administrative	0.078	0.116	0.061	0.117
General	0.176	0.140	0.150	0.140
No Children in household	0.013	0.138	0.009	0.128
Number of children	0.090	0.069	0.090	0.066
Married	0.167	0.254	0.131	0.260
Divorced	-0.084	0.282	-0.105	0.286
Single	-0.156	0.293	-0.182	0.295
Non-labour income lagged	0.002	0.002	0.0014	0.0022
Non-labour income spouse lagged	-0.003	0.003	-0.0033	0.0033
1995	-0.471**	0.151	-0.470**	0.152
1996	-0.272	0.189	-0.265	0.189
1997	-0.253	0.206	-0.247	0.205
1998	-0.184	0.193	-0.173	0.194
1999	-0.269	0.188	-0.280	0.188
2000	-0.083	0.184	-0.060	0.186

**: significant at 5% level
*: significant at 10% level

Table 9: The covariance matrix

	Net Liquid Wealth		Net wealth (including value house/mortgage)	
Variable	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
σ_ω (std. dev. random effect wealth)	1.393**	0.051	6.409**	0.245
$\rho_{\alpha\omega}$ (corr. random effects job exit/wealth)	-0.270*	0.164	-0.153	0.151
$\rho_{\alpha\epsilon}$ (correlation job exit and initial state)	-0.042	0.144	-0.278**	0.103
$\rho_{\omega\epsilon}$ (correlation wealth and initial state)	-0.016	0.048	0.084**	0.040
σ_ν (std. dev. error wealth)	1.105**	0.031	2.783**	0.096

**: significant at 5% level
*: significant at 10% level

Table 10: Likelihood values

	Likelihood values	
Model specification	Net liquid wealth	Net wealth (including value house/mortgage)
No random effects	-14438.84	-20167.16
Random effects, no correlations: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$	-13679.44	-18484.54
Complete model: random effects, unrestricted correlations	-13678.01	-18479.27

Table 11 Elasticities of exit and staying on probabilities
with respect of wealth
evaluated in sample means

Elasticity with respect to:	No random effects	Random effects no correlations in unobservables	Random effects unrestricted correlations
Net liquid wealth			
Exit to retirement	0.14**	0.15**	0.13**
	(0.06)	(0.06)	(0.06)
Involuntary Exit	0.034	0.0026	0.045
	(0.046)	(0.048)	(0.049)
Net wealth (liquid and illiquid)			
Exit to retirement	0.21**	0.20**	0.19**
	(0.07)	(0.07)	(0.08)
Involuntary Exit	0.064	0.089	0.14
	(0.091)	(0.12)	(0.09)

**: significant at 5 per cent level
*: significant at 10 per cent level