Private wealth and job exit at older age: a random effects model

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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. As instruments for wealth, we use survey information that measures 'shocks', like shocks to the household's financial situation during the previous year.

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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 Kingston (2000)) assign a positive impact of the level of private wealth holdings on the flow out of work. Bloemen (2007) 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), incorporating non-linear wealth effects, 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. 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 (2007), 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 sector of employment, 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, it is less likely that individuals with low wealth are selected in a sample of workers.

In the implementation of the model, we need variables that can serve as instruments for wealth. In our modelling framework, these instruments need to be uncorrelated

with the random effect in the wealth equation. It is extremely difficult to find suitable instruments, since many individual characteristics are potentially correlated with unobservables in wealth, being a stock variable at the end of the working life. Since we are looking for instruments that are uncorrelated with a random, time persistent, individual effect, suitable candidates can be variables that are somehow related to shocks in the business cycle or at the individual level. Our survey contains some indicators that are also generally used for constructing measures of 'consumer confidence'. For instance, we have subjective information on the individual's perception of the income development of the household in the past 12 months. The indicators are highly correlated with movements of the business cycle. They may represent shocks, or expectations about future shocks, to the household's financial situation that are unplanned and out of control of the household.[4]

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, for the remaining, 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 reporting to be employed. We use the subsequent wave to check the labour market state of the same individuals in

[4] In an earlier version of this paper we used net disposable household income as an instrument for wealth. It is highly implausible, though, that this variable is uncorrelated with the random effect in wealth. In the present version, the variable net disposable household income does not appear in the analysis.

the next year.[5] 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. In the estimation we make use of some 'lagged' income components 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.[6]

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 jewellery, antiques, and cars.[7] 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 remain-

[5] 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.

[6] 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.

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

ing (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, which we will refer to as net total wealth.

Survey respondents are asked to provide information on separate income components. This way we can construct a measure of non-labour income. Some of these income components are related to income out of assets, and are likely to be correlated with the net wealth. We therefore construct two measures of non-labour income. The first is non-labour income obtained from assets. This includes interest, dividend, and annuity payments. In the estimation of the model, we do not include the level of this variable, since it can be argued to be correlated with the random effect in wealth. The other non-labour income variable consists of income obtained from family and friends, income obtained from renting rooms, income out of alimentation payments, and housing benefits.

We split up the exposition of the descriptive statistics of our sample into separate sub samples: some observations (at the yearly level) are used in the estimation of the initial conditions, while other observations are used in the estimation of labour market transitions.[8] The Tables 1 and 2 show information on the worker-year observations that are 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 among the regressors of the initial condition, but we will allow for correlation between the wealth equation and the initial condition (see next section).

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.

[8] The whole model is estimated simultaneously, so all observations enter the estimation procedure, but their contribution to the likelihood function can be different.

These sectors can be observed for both the employed and the nonemployed.

We find that the nonemployed, within the age range from 48 through 64, are on average older, and less wealthy. 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 pooled (worker-year) observations on 1113 different workers.[9] 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

[9] 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.

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 participate 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 net liquid wealth is 62782 guilders, whereas the median is 24878. Net total wealth has a mean 282224 and a median value of 199209. The average monthly wage income is 4729 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 (2007) 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: pensions are of the defined benefit type in the Dutch pension system. If we would like to construct a value for the pension wealth, we would need to base this on the information we have on the observed earnings, the (not completely observed) properties of the employees pension system, and assumptions about future expectations, including life expectancy. By including the earnings, we may at least capture some of the impact of pension wealth. In the Netherlands, the employee pension schedules are organized by collective bargaining agreements at the sector 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,[10] 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 care of the children', and 'taking care of a family member', but none of the respondents

[10] In Dutch: 'rentenieren'.

in our sub sample 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 since the categories that survey respondents may choose from are pretty exhaustive, it seems likely that it refers to job quits, rather than job exit due to restrictions or involuntary reasons like unemployment or disability. Since quits represent a choice, we decided to include it in the category retirement. The percentage of job exiters by (early) retirement defined this way is 72.1. Finally, there are a number of job quitters reporting to have exited the job because of illness or disability. The percentage is 12.0.

Bloemen (2007) 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 (2007) 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 (2007)). 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[11] that the worker decides to leave the job is

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

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[12]

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

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 elderly 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

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

[12] 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 wealth 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.[13] 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}

[13] 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.[14] The functionality of the net wealth equation is to allow for correlation in unobservables between job exits and net wealth.[15]

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.[16] 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.[17]

[14] 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.

[15] Below we comment on exclusion restrictions.

[16] 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.

[17] 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).

3.3 Instrumenting wealth and initial conditions

To instrument net wealth, we need to include variables in z_{it} in the wealth equation (5) that are uncorrelated with the random effect ω_i. Such variables are extremely hard to find. Since we are looking for instruments that are uncorrelated with a random, time persistent, individual effect, suitable candidates can be variables that are somehow related to business cycle shocks. Our survey contains some indicators that are also generally used, for instance, by Statistics Netherlands, for constructing measures of 'consumer confidence'. The survey respondents get subjective questions about their financial situation. In a first question, they are asked to classify the development of the financial situation of their household in the past 12 months. There are five possible classifications: obviously improved; somewhat improved; remained the same; somewhat deteriorated; obviously deteriorated. A second question is more specifically related to their income: survey respondents are asked to classify the development of their income in the past 12 months into one of the same five classifications. It seems plausible that information obtained by these types of survey questions largely represents exogenous financial shocks that are not necessarily correlated to the unobserved, time persistent effect that affects the accumulation of wealth across the life cycle. In a different question respondents are asked:

"Do you belief it is a favourable time now to make large expenditures?" Respondents can answer by choosing any of the following three classes: it is a favourable time; neither favourable nor unfavourable time; it is an unfavourable time. It is plausible that the response to this survey question correlates with the level of net wealth, which actually is a desirable property for an instrumental variable (see later). But in order to use this information as an instrument, we need to assume that there is no unobserved time persistent individual effect that both drives the accumulation of wealth across the life cycle and the response to this question about purchase opportunities at a specific point in time. For the latter type of correlation, we may think of underlying psychological forces like a 'positive attitude' or so. We certainly do not want to downplay the importance of such unobserved attitude variables, but at the same time we wonder whether such forces would really be a significant joint driving force between our instrument and net wealth, also because of the time aspect in the phrasing of the expenditures question. By using this information as an instrument, we make the implicit assumption that such unobservable correlation is not present. The previous three survey questions are also used by Statistics Netherlands to construct an index of 'consumer confidence', as an indicator of the business cycle. Usually the answers to these questions show a large variation across the business cycle. They represent 'shocks' in the household's financial situation, and the perception of the individual about the developments in the economy.

Another question that is asked to survey respondents is "How well are you able to make ends meet with your total (household) income?" Respondents can answer by choosing any of the following six classes: very difficult; difficult; somewhat difficult; somewhat easy; easy; very easy. We think it is far less plausible to assume that there are no unobservable variables that both drive the accumulation of net wealth and the ability of a household to make ends meet. Those who are clumsy in dealing with financial matters may very well both experience a low accumulation of net wealth across the life cycle and problems in making ends meet. Note that the phrasing of the survey question also does not, unlike the previous three question, contain a specific time dimension or period context that make it plausible that this information represents shocks. However, the outcome may also be related to household's financial restrictions that are exogenous

to the household. It is unlikely that a poor ability of households to make ends meet is a situation that is strongly persistent across the life cycle, and the outcome of the survey question may also expose variation with shocks and business cycle fluctuations. In the empirical implementation, for reasons that we explain below, we will do a separate analysis and estimate the model both with and without this additional information as an instrument for net wealth.

So far, it remains to be questioned whether the available survey information really represents 'shocks' and whether these 'shocks' are truly exogenous. The latter question is hardest to answer, and undoubtedly one can think of arguments why they are not. But this is the available information that we will have to work with, and we will first check whether, at the aggregate, the variation in the outcomes of the survey questions is similar to observed variation in business cycle indicators. To show how these outcomes vary year by year, Table 6 shows for our sample the sample frequencies of the outcomes by wave, for the years 1995 through 2001. Since these are unweighted sample frequencies, the exposed year to year variation combines pure time effects and wave to wave sample variation. To compare the observed time pattern in our sample indicators with indicators for the business cycle, the lower part of Table 6 shows two aggregate time series obtained from Statistics Netherlands, Statline. It shows series for consumer confidence and a series of index numbers of the prices of shares of mutual and real estate funds (1993=100). We have chosen consumer confidence as a series for comparison because the consumer confidence measured by Statistics Netherlands is partly based on the same underlying questions as we observe in our sample, like the development of the financial situation in the past 12 months, and the view whether it is a suitable time to make large expenditures. Shocks in prices of shares are often viewed as a source of exogenous variation to households' financial wealth. Needless to say, across households there is quite some heterogeneity in portfolio composition and many households do not even own shares, but to compare our sample indicators with the observed changes in wealth gives us an indication whether there is a similar year to year pattern observed. To further enhance the comparison, we have summarized the information of our sample

indicators by showing the balance of positive and negative outcomes[18] to the questions (see row 'Summary' in Table 6).

Over all, we can say that the observed year to year variation in our indicators resembles the pattern observed in the aggregate time series: we see a recovery in the years 1995 and 1996, flattening around 1998-1999, and a further rise in 2000. For both the aggregate time series and the sample indicators for the time to make large expenditures and whether households can make ends meet, we see a decrease in the final year 2001. We do not observe this decrease for the indicators of the income and financial situation in the past 12 months, but these indicators are by definition lagged indicators for the business cycle. A priori we thought it less likely that the sample information displaying whether households are able to make ends meet represents shocks, but Table 6 shows yearly variation with the business cycle in this series as well.

The descriptive indicators in Table 6 show that the indicators we aim to use as instruments for wealth seem to vary with the business cycle and may capture shock effects. To be valid instruments, the indicators still need to be correlated with wealth. We have done some exploratory first stage regressions for wealth to compute F-statistics for testing whether the indicators add anything to the explanation of wealth. For this purpose, we estimated the wealth equation (5) by OLS with parameter θ restricted to 1.[19] We included the same right hand side variables as we will use in the estimation of the random effects model (see later). We constructed dummy variables corresponding to the information in Table 6: for the questions referring to the income and the financial situation in the past 12 month we included four dummy variables for both in the regression; for the question about the time to make large expenditures we included two dummy variables; for the question how well the household manages to make ends meet, we also included four dummy variables, since we merged the categories 'very difficult' and 'difficult'. We first did a first stage OLS regression including only the variables that are most likely to be related to shocks, i.e. the information about income and financial

[18] This is a procedure that is also followed by Statistics Netherlands in producing figures of aggregate consumer confidence.

[19] In the estimation of the simultaneous equations model by simulated maximum likelihood, we estimate the parameter θ.

situation in the past 12 months, and whether it is a favourable time to make large expenditures. We did the analysis both for net financial wealth and for net total wealth (including the value of the house and the mortgage debt outstanding). In the text below we report numbers in brackets for the latter concept of net wealth. The F-statistic for testing the null hypothesis whether the 10 coefficients associated with these variables are jointly zero is 18.1 (24.4). With a p-value < 0.00 this indicates that the null hypotheses is rejected and the dummy indicators do add to the explanation of wealth. Including the variables increased the R-squared of the regression by 0.03 (0.03), which is not a very large addition. This can be viewed both as good and as bad news. It is good news for the interpretation of our instruments as shock variables: in general, explaining a stock variable with shock variables leads to a low R-squared. The small addition to the R-squared makes it less likely that our indicators may be correlated to the random effect. The flip side is that a small explanatory power of the instruments may make it harder to identify the causal effect of net wealth on job exit from the effect that is running through the unobservable random effect: this can result in relatively high standard errors of the coefficients of interest. Next, we have, in addition to these instruments, also added the information on how well the household is able to make ends meet. This leads to an F-statistic of 718.0 (52.8), whereas the R-squared further increases with 0.07 (0.07), meaning that now the total set of 14 variables explain an additional 0.10 (0.10) of the R-squared. Again, the relatively large increase in the R-squared achieved by adding this final information has two sides. We have already expressed our a priori concerns about this information on how well the household is able to makes ends meet: it is not a pure shock variable, although the aggregate year to year variation exposed in Table 6 shows that the information is not insensitive to business cycle movements either. The higher explanatory power of the information in explaining wealth may make it easier to disentangle the causal wealth effect on job exits from the effect running through the unobserved random effect. However, if our instrument is correlated with the random effect in wealth, it may 'explain away' the random effect in wealth, and bias downwards (towards zero) a possible correlation in random effects between wealth and job exits, while biasing upwards (away from zero) the causal effect. In the empirical analysis, we

will both estimate the model with the restricted set of instruments and with the extended set of instruments to see whether outcomes are sensitive to this. In conclusion we may say that the outcomes of the survey question display a time pattern corresponding to business cycle movements, and moreover the exploratory first stage regressions show the low additions to the R-squared that are typical for explaining variation in stocks from information on shocks.

An additional problem is to find instruments for the initial for the initial labour market state, described by equation (6). Note that we would not need a separate initial condition like (6) if we would observed the entire job history of the individuals: the probability of showing someone employed at a point in time would be the survivor function, implied by the transition probabilities. In this ideal situation, we would not even need to instrument the initial labour market state: the probability of the initial state were defined by the model and we would need to observe the history of all the time varying explanatory variables. The initial condition (6) may be interpreted as an approximation for the true expression of the survivor function. This suggests that we would need to include variables from the past. By nature of the problem and the available data, we do not observe variables from the past. We may use the non-labour income nonlabour income in period $t-1$ among the regressors m_{it} for explaining the initial labour market state in period t.

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 simulate 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, and we

refer to it as 'net total wealth' in the sequel. Table 7 displays the estimation results for net liquid wealth, while Table 8 shows the results for net total wealth. As instruments for wealth we have included the indicators for income development and financial situation in the past 12 months, and the indicators for the feeling whether it is a good time to make large expenditures (see Table 6).[20] We have also estimated the model with an extended set of instruments, adding the indicators for how well the household is able to 'make ends meet' (see Table 6). We do not show estimation results of the latter results in any tables, but we report on the outcomes in the sequel.

We start by discussing the results obtained with net liquid wealth. Table 7a shows the parameter estimates of involuntary job exits. In the left columns, we show restricted estimation results, obtained by setting all correlations in the random effects between job exits, wealth, and initial labour market state equal to zero. The right columns show the estimates that allow for an unrestricted correlation in the unobserved random effects. 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 7a are in accordance with that view. Net wealth has a positive but insignificant effect on involuntary job exits, irrespective of whether or not we allow for correlation in unobservables. The parameters γ_I measures the impact of the random effect α_i on the job exit rate (see the expression for the job exit rates in (3)). We see that the parameters γ_I is 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. To see whether the random effects affecting involuntary job exit are correlated with the random effects in wealth and initial conditions, we check the estimates of the correlation coefficients corresponding to (7), shown in Table 7e. There is a negative correlation between the random effect in wealth and the random effect of job exits (see coefficient $\rho_{\alpha\omega}$). Together with the positive coefficient γ_I, this implies a negative correlation between unobservables in wealth and

[20] In this respect the analysis is different from an earlier version of the paper where we included net disposable income in the wealth equation. A priori, it is very implausible that this variable is not correlated with the random effect in wealth, and that is it not correlated with the initial labour market state.

involuntary job exits. This also explains the somewhat higher coefficient for the causal effect of wealth on involuntary job exits in the right columns of Table 7a, once we allow for this negative correlation in unobservables. Apparently there are negative unobserved worker's characteristics that go together with lower wealth levels and a higher probability of involuntary job exit. But in total, this negative correlation is not so strong, since both the estimates with and without allowing for correlation in random effects show an insignificant positive causal effect of wealth on involuntary job exit.

In the estimation, we have separated non-labour income obtained from assets from non-labour income obtained from other resources (see discussion in the data section). In the job exit probabilities, we include non-labour income from other resources in levels, while we include the first difference of non-labour income from assets, to difference out any possible random effects, as an instrument.[21] To avoid endogeneity issues, we have not included non-labour income in the wealth equation. We include a lagged level of non-labour income from other resources in the initial labour market state.

Looking at the parameters of the involuntary job exit rate in Table 7a, we see that 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 7b contains the estimates of the job exit rate into retirement. Here we see a difference in the coefficient of wealth, depending on whether or not we allow for correlation

[21] In this respect, the analysis is different from an earlier version of this paper, where we included the level of total non-labour income, including income from assets and income from other sources.

in random effects between wealth and the job exit probability. If we restrict correlations in unobservables to zero, net financial wealth has a positive significant effect on the job exit rate into (early) retirement (with a p-level of 0.06).

If allow for correlation, the coefficient of wealth gets somewhat smaller and gets more imprecise. Parameter γ_R learns us something about the impact of random effects on job exit into retirement. We see that it is negative and significant at the 10% level once we allow for correlation in random effects. The negative value of γ_R, together with the negative correlation $\rho_{\alpha\omega}$ (Table 7e), show that there is a positive correlation in unobservables between wealth and job exit into retirement. Apparently there are unobserved individual worker effects that go together with both higher wealth levels and a higher job exit probability into retirement. Once we allow for correlation in unobservables between wealth and job exit into retirement, we cannot detect a significant positive 'causal' effect of wealth on retirement anymore (interpreting the coefficient of wealth in the job exit probability as the 'causal' effect). Now the question is whether the lack of detecting a causal effect of wealth on job exit into retirement may be the result of the instruments used. Recalling the discussion of the exploratory first stage regression in section 3.3, the instruments add significant to the explanation of wealth according to the F-statistic, but their addition to the R-squared is small, which is typical for shock variables (our instruments) that are used to explain a stock variable (wealth). The small addition to the R-squared makes it less likely that the instruments are correlated with the random effect in wealth (a desirable property), but may also make it more difficult to identify the causal effect of wealth from the effect running through observables. Therefore, we have also estimated the model with an extended set of instruments, adding information about how well households are able to 'make ends meet' (see Table 6 and its discussion). This information adds more to the R-squared in the exploratory first stage wealth regression. The a priori fear was that this information may more likely be correlated with the random effect in wealth. In that case, the use of this instrument will bias upward (away from zero) the causal effect. We estimated the three equations random effects model including this additional instrument in the wealth equation. However, we found little difference with the results shown in Table 7: the coefficient of wealth in the

probability of job exit into retirement remained insignificant at the 10% level, while the correlation in random effects between job exits and wealth remained significant at the 10% level.

Looking at the parameter estimates of the observable characteristics affecting the job exit into retirement, we see 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.

Table 7c contains the estimates of the net wealth equation (5). The instrumental variables included in the wealth regression are all significant, as we already reported before from the exploratory first stage regressions with OLS (section 3.3). The level of wealth is lower the worse is the development of the financial situation in the past 12 months. At first sight it seems counterintuitive that wealth levels are higher the worse is the income development in the past 12 months. In exploratory regressions, we found out that the variable actually measures differences between the financial situation in the past 12 months and the income development in the past 12 months: these variables are highly correlated, but 'income' generally shows larger shocks than the 'financial situation'. Households whose income increases, but whose financial situation increases less, do worse than households whose income increases, and whose financial situation increases as well.

The level of financial wealth increases with age, and decreases with the level of education. Net financial wealth differs with the marital status of the worker. Divorced men have the lowest level of net wealth. For single and widowed men we do not find much difference. We see a monotonically increasing pattern in the year dummies: there remain time effects, even though we include the indicators from Table 6 that are highly correlated with the business cycle.

Table 7d contains the results for the initial labour market state. Before, we discussed that the initial labour market state is an approximation of the survivor function. The latter can be interpreted as a summary of the worker's labour market history. We had included non-labour income lagged of worker and spouse as the variable that we did not enter elsewhere, to capture this past. Unfortunately, these variables do not show much significance. As a result, identification leans on functional form, so the cynical can score a point here. On the other hand, recall that in order to estimate the initial condition, we also bring in a sub sample of non-employed individuals, which are not used in the estimation without an initial condition: thus, the estimation implicitly includes a comparison between a sub sample of employed and non-employed individuals, and sees whether differences in unobservables between the two sub samples can be detected. A typical symptom of poor identification would be a large (that is, bounded away from zero) correlation coefficient of unobservables in initial conditions with the random effects in job exits and wealth, accompanied by equally large standard errors. If we inspect Table 7e, though, we observe that correlation coefficients $\rho_{\alpha\epsilon}$ and $\rho_{\omega\epsilon}$ are small and close to zero, and not significant, suggesting that selectivity into non-employment based on unobservables that correlate with wealth and job exits does not seem to be very relevant here. Indeed, job exit rates before the age of 48 are still very small, and the results in Table 7d show that health, age, and having a low education level, are important observed characteristics explaining selection into (non)-employment.

Throughout the discussion, we have already referred to Table 7e, showing us the parameter estimates of the covariance matrix in (7). For ease of interpretation we have reparametrized the covariances into their corresponding correlation coefficients. What remains to be noted from this table is that 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 0.64. 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.

We see some interesting differences between the results with the alternative measure of net total wealth (Table 8), and the results obtained with net liquid wealth (Table 7).[22] Table 8a shows that once we allow for correlations in unobservables, the coefficient estimate of wealth in the probability of involuntary job exit becomes positive and significant at the 10% level. We again see that the coefficient γ_I is positive and significant, showing that time persistent unobservable effect play a role in the involuntary job exit rate. Table 8d tells us something about the correlations in unobservables between the job exit rates, wealth, and initial conditions. We see that for net total wealth, the correlations with the initial condition are more important. Between wealth and the initial condition we see a positive and significant correlation coefficient. This correlation is possibly due to a relationship between employment status and home-ownership, as we did not find such correlation for net liquid wealth. The estimate for the correlation between initial employment and involuntary job exit is negative, but not very precise. The same holds for the correlation between wealth and the involuntary job exit.

Results for the job exit rate into retirement shows a positive and significant effect of net total wealth, which becomes somewhat less precise once we allow for correlations in unobservables, but still it is significant at the 10% level. The parameter estimate of γ_R is negative but insignificant. The latter suggest that job exiters into retirement are, in terms of unobservables, comparable to job stayers.

Results for the wealth equation (Table 8c) show comparable effects as before: wealth decreases with education level and increases with health. The separate coefficients of the instrumental dummies are not always significant for all response classes, but recall from the exploratory first stage regressions that also here the F-statistics reveal joint

[22] For reasons of conciseness, we do not display the estimates for the initial condition in Table 8. For the case with correlation restricted to zero the estimates are the same as in Table 7, while for the unrestricted case they are not much different.

significance. Also for net total wealth we have estimated the model with the extended set of instruments, which add more to the explanation of the wealth level, but there were no qualitative differences in the outcomes.

Table 8d shows the complete results for the covariance structure. The correlation across time in unobservables for net total wealth, $\sigma_\omega^2/(\sigma_\omega^2 + \sigma_\nu^2)$, is 0.85, which shows a higher persistence in net total 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.

4.2 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 with respect to the level of wealth. In Appendix B we show in (18) that we can split up the derivative of the exit probability with respect to wealth into different terms. The first term is the effect of wealth on the job exit probability that is determined by the regression coefficients of wealth: this is the effect that we interpret as the 'causal' effect of wealth. This is the effect that we are actually interested in. The second part of the derivative (consisting of a second and third term) is the effect of wealth that arises because of correlation in the random effects between job exits and wealth and initial conditions. This effect vanishes if these correlation coefficients are restricted to zero. Adding up of the two effects gives the total effect, which may be interpreted as the effect of wealth on job exit that we get if we ignore the distinction between the 'causal' effect and correlation through unobservables. Therefore, the wealth effect on job exits that appears by correlation through unobservables may be interpreted as the 'bias'. Table 9 shows the outcomes. The computed elasticities are based on the estimates with unrestricted correlations between random effects (the right part of the tables). We have evaluated the elasticities in their sample means. The upper part of the table displays the results for net liquid wealth. Standard errors are in brackets. The elasticity for the 'causal' effect of wealth on job exit is not significant for either exit route. The same holds for the elasticity for the unobservable correlation. For job exits into retirement, the

elasticity for effect of wealth running through the unobservables is just somewhat larger than the 'causal' effect. Interestingly, adding the two effects together shows a positive and significant association between net liquid wealth and the transition into retirement. This indicates that there is a negative correlation between the estimates of the separate parts, which leads to a smaller standard error for the sum. The results show that it is difficult to disentangle the 'causal' effect of wealth from the random effect, although the separate coefficients in Table 7 seemed to indicate that the impact of wealth running through unobservables is somewhat more important than the 'causal' impact. For the involuntary job exit we see a negative value of the elasticity of the wealth effect running through the unobservables, which is quite a bit larger than the 'causal' effect. In all cases, the elasticities of the involuntary job exit probabilities with respect to net liquid wealth are estimated imprecisely, such that we cannot conclude that there is any impact of wealth on involuntary job exit.

The lower part of Table 9 shows the results for net total wealth. For this measure of wealth, we find a 'causal' elasticity for the probability of exit into retirement of 0.15, that is estimated significantly at the 10% level. There is also a positive value assigned to elasticity job exit due to unobservables, but this is much smaller than the 'causal' effect, and not significant. The value of the total elasticity is 0.18 and significant at the 5% level, somewhat larger than the estimated elasticity for the 'causal' effect, but given the standard errors, we would not make a large mistake here if the distinction between 'causal' effects and effects running through unobservables were ignored. Interestingly, for the 'causal' elasticity of the involuntary job exit probability with respect to net total wealth we find a value of 0.13, which is significant at the 10% level. The effect of unobservables is negative, and the estimated total elasticity is quite close to zero.

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, which 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. Neglecting 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 se-

lect 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.

It is extremely difficult to find suitable instruments for net wealth. We use survey information that represents developments in income and the financial situation of the household in the past 12 months. This information is suitable to construct instruments for net wealth if it represents exogenous financial shocks to the household. We also use survey information about whether the household thinks that it is a good time now to make large expenditures, and we have discussed the plausibility of using this variable as an instrument. We show that the responses to these survey questions exhibit year to year variation that resembles observed variation in aggregate business cycle indicators. This adds to the plausibility that the survey information is related to shocks. The F-statistics of exploratory first stage regressions show that the instruments correlate with the level of net wealth, but make a small addition to the explanation of the total variation in net wealth. As a sensitivity check, we use additional survey information that is less likely to satisfy regularity conditions for being a valid instrument, but adds more to the explanation of the total variation in net wealth. This survey information is based on questioning survey respondents whether they are able to make ends meet. Outcomes of our analyses are robust to adding this final source of information to our set of instruments.

For estimating the effect of net wealth on job exit rates we use two different definitions

of net wealth: net liquid wealth, and net total wealth, where net total wealth includes net liquid wealth, but is extended by adding the value of the house and subtracting the outstanding mortgage debt. We find differences in outcomes depending on which definition of net wealth we use.

For net liquid wealth we find that we cannot identify a positive effect on the retirement probability once we allow for possible correlation in unobservables between retirement and net wealth. In total, adding the 'causal' effect and the unobservable effect together, we find a significant positive effect of net liquid wealth on retirement, but this positive effect turns out to be partly due to unobservable correlation, and we cannot find a precisely estimated positive 'causal' effect. For involuntary job exits, we do not find any trace of a significant effect of net liquid wealth. Interestingly, the effect running through unobservables is estimated to be negative (although imprecise), a sign that is consistent with the interpretation that there may be favourable unobserved characteristics affecting wealth, which correlate positively with job attachment and negatively with lay off rates.

For net total wealth, incorporating real estate equity, we find a positive 'causal' impact on the retirement probability. There is a small and negligible positive correlation in unobservables. Interestingly, we also find some preciseness for the 'causal' effect of net total wealth on involuntary job exits. In total, adding together the 'causal' effect and the unobservable correlation, there is hardly any effect of net total wealth on involuntary job exit, but the unobservable correlation is negative, while the 'causal' effect is positive. However, although the positive 'causal' effect shows significance at the 10% level, the negative unobservable correlation is estimated imprecisely. As opposed to net liquid wealth, there seems to be a correlation between net total wealth and the initial labour market state, possibly stemming from a positive correlation between home-ownership and employment status.

Evaluating the reasons for possible correlation between unobservables in net wealth and job exit rates, we can say that for net liquid wealth we find some evidence that there may be correlation between wealth and retirement through preferences for retirement. At the same time unobservables that correlate positively with wealth, correlate negatively with involuntary job exits. Not correcting for this correlation may bias downward the

estimated impact of net wealth on involuntary job exit, as suggested by the results for net total wealth.

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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

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

and

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

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 $l_i(\alpha_i, \omega_i)$[23] is

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

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

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

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

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

[23] 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.

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 $R = 60$.

B Evaluating the transition probability for computing the elasticity

To evaluate elasticities of job exit rates with respect to the level of wealth, we can take the derivative of the job exit probability with respect to wealth. The expression for the exit probability as modelled in (3), though, contains the unobserved random effect and is conditional on employment as the initial labour market state. We therefore need to integrate over the random effect to obtain a 'marginal' expression for the transition probability (marginal with respect to the random effect). Keeping the same notation as in Appendix A, the expression for the probability becomes

$$P(d_{i,t+1} = J | d_{it} = E, x_{it}) =$$

$$\frac{\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} P(d_{i,t+1} = J | d_{it} = E, x_{it}, \alpha_i) f(A_{it} | z_{it}, \omega_i) P(d_{it} = 1 | m_{it}, \alpha_i, \omega_i) f(\alpha_i, \omega_i) d\alpha_i d\omega_i}{\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(A_{it} | z_{it}, \omega_i) P(d_{it} = 1 | m_{it}, \alpha_i, \omega_i) f(\alpha_i, \omega_i) d\alpha_i d\omega_i} \tag{17}$$

The expression in the denominator appears because the probability of interest is a conditional probability, conditional on net wealth A_{it} and conditional on the initial labour market state of employment. If the random effect α_i in the transition probability is uncorrelated with the random effect ω_i in wealth and the initial condition, we can write the double integral as a multiplication of two single integrals and the denominator in (17) cancels against part of the numerator. For computing the elasticity, we take the derivative of (17) with respect to wealth, realizing that wealth A_{it} is included among the

regressors x_{it} in the transition probability: $\partial P(d_{i,t+1} = J|d_{it} = E, x_{it})/\partial A_{it} =$

$$\frac{\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\frac{\partial P(d_{i,t+1}=J|d_{it}=E,x_{it},\alpha_i)}{\partial A_{it}}f(A_{it}|z_{it},\omega_i)P(d_{it}=1|m_{it},\alpha_i,\omega_i)f(\alpha_i,\omega_i)d\alpha_i d\omega_i}{\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}f(A_{it}|z_{it},\omega_i)P(d_{it}=1|m_{it},\alpha_i,\omega_i)f(\alpha_i,\omega_i)d\alpha_i d\omega_i}$$

$$+\frac{\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}P(d_{i,t+1}=J|d_{it}=E,x_{it},\alpha_i)\frac{\partial f(A_{it}|z_{it},\omega_i)}{\partial A_{it}}P(d_{it}=1|m_{it},\alpha_i,\omega_i)f(\alpha_i,\omega_i)d\alpha_i d\omega_i}{\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}f(A_{it}|z_{it},\omega_i)P(d_{it}=1|m_{it},\alpha_i,\omega_i)f(\alpha_i,\omega_i)d\alpha_i d\omega_i} \tag{18}$$

$$-P(d_{i,t+1} = J|d_{it} = E, x_{it})\frac{\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\frac{\partial f(A_{it}|z_{it},\omega_i)}{\partial A_{it}}P(d_{it}=1|m_{it},\alpha_i,\omega_i)f(\alpha_i,\omega_i)d\alpha_i d\omega_i}{\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}f(A_{it}|z_{it},\omega_i)P(d_{it}=1|m_{it},\alpha_i,\omega_i)f(\alpha_i,\omega_i)d\alpha_i d\omega_i}$$

The first term of the derivative in (18) actually measures the 'causal' effect of net wealth on the transition probability. It is the effect that is measured by the size of the regression coefficient of net wealth in the transition probability. The final two terms of the derivative (18) measure the impact of wealth on the transition probability that is due to the correlation in unobservables between the job exit probability, wealth, and the initial condition. This latter effect is zero if $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = 0$. So if we want to evaluate the elasticity of the causal effect of wealth, we need to base computations on the first term only. It can be fun, though, to see how large will be the total effect of wealth on the transition probability, adding the 'causal' effect and the effect due to unobservables together, and how large is the separate effect due to unobservables. This will give us a feeling of the 'bias' in quantifying the effect of wealth on job exit that is made in an analysis where no correction for selectivity on basis of unobservables takes place.

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 liquid wealth (guilders)	53110	126191	60504	146294
(Median):	(15177)		(21710)	
Net total wealth (liquid + illiquid)	184256	267331	269514	498213
(Median):	(85044)		(170600)	
Non-labour income (excl. asset inc.)	345	3565	495	6890
lagged (monthly) (Median):	(0)		(0)	
Earnings spouse (monthly, if employed)	1737	2762	1938	2815
(Median)	(1299)		(1641)	
Non-labour income (excl. asset inc.)	68	6379	95	1259
spouses (lagged) (Median)	(0)		(0)	

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 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)	
Non-labour income from assets (monthly)	144	(931)
(Median):	(0)	
Non-labour income (other)	96	(1664)
(Median):	(0)	
Earnings spouse (monthly, if employed)	1918	(2317)
(Median)	(1608)	
Non-labour income from assets, spouse	831	(6868)
(Median)	(0)	
Non-labour income (other) spouse	112	(1367)
(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 individual 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 6: Instruments for wealth

Financial situation in the past 12 months:	1995	1996	1997	1998	1999	2000	2001
Obviously improved	2.0	3.7	3.7	4.3	4.9	6.3	8.2
Somewhat improved	14.8	17.5	22.8	27.0	26.9	31.7	37.4
Remained the same	59.2	59.7	57.4	55.7	53.2	50.9	44.3
Somewhat deteriorated	17.5	13.8	12.9	10.7	11.6	9.0	7.7
Obviously deteriorated	6.6	5.3	3.2	2.3	3.5	2.2	2.5
Summary:	-7	2	10	18	17	27	35
Income in the past 12 months:	1995	1996	1997	1998	1999	2000	2001
Obviously improved	3.2	5.0	3.9	3.6	5.4	6.0	9.1
Somewhat improved	20.4	25.2	26.2	35.0	32.9	36.5	44.9
Remained the same	57.7	56.9	60.4	50.0	49.2	49.5	37.4
Somewhat deteriorated	13.2	9.9	6.7	9.5	9.7	5.8	6.5
Obviously deteriorated	5.5	3.0	2.8	1.9	2.9	2.2	2.0
Summary:	5	17	21	27	26	34	46
Time to make large expenditures:	1995	1996	1997	1998	1999	2000	2001
Favourable	30.5	35.0	49.9	61.6	60.1	62.8	48.4
Neither favourable, nor unfavourable	46.0	43.5	38.9	27.9	32.6	28.4	37.8
Unfavourable	23.5	21.6	11.2	10.6	7.4	8.8	13.8
Summary:	7	13	39	51	53	54	35
Can make ends meet:	1995	1996	1997	1998	1999	2000	2001
Very difficult	2.1	1.3	0.9	0.9	0.5	1.3	0.5
Difficult	7.7	4.6	3.2	2.9	4.2	3.0	3.3
Somewhat difficult	16.8	13.8	12.5	10.0	9.9	9.0	9.7
Somewhat easy	21.3	25.4	26.7	23.7	23.0	25.0	21.0
Easy	42.7	44.0	44.3	49.0	49.8	46.9	48.6
Very easy	9.4	10.9	12.3	13.5	12.6	14.8	17.0
Summary:	47	61	67	72	71	74	73
Aggregate time series on:	1995	1996	1997	1998	1999	2000	2001
Consumer confidence**	4	1	15	17	14	24	-1
Index numbers prices in May of mutual and real estate funds, 1993=100**	85	109	143	176	199	285	242

**: This is aggregate time series information, obtained from Statistics Netherlands, Statline
The line 'Summary' provides the balance of positive and negative answers

Table 7a: Estimates of the random effects model with net liquid wealth:
The Involuntary Job Exit Rate

	No correlations: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$		Unrestricted correlations	
Variable	Estimate	St. Err.	Estimate	St. Err.
Intercept	1.08	1.09	0.99	1.09
Ln (Age/48)	14.56	7.64	14.69	7.66
Ln (Age/48) Squared	-50.94**	33.38	-50.91**	33.38
Education (reference level 5, highest)				
Education level 1 (lowest)	0.40	0.92	0.31	0.91
Education level 2	-1.39*	0.79	-1.34*	0.79
Education level 3	-0.37	0.58	-0.29	0.59
Education level 4	-0.40	0.62	-0.34	0.62
Education sector (reference: services)				
Technical	0.38	0.44	0.38	0.44
Economic/administrative	0.31	0.46	0.30	0.47
General	-0.34	0.64	-0.26	0.64
No Children in household	-0.10	0.33	-0.13	0.33
Marital status (reference: single)				
Married	-1.28**	0.58	-1.31**	0.59
Divorced	-1.30	0.83	-1.35	0.83
Widow	-0.51	1.09	-0.61	1.12
Civil Servant	-0.55	0.41	-0.57	0.41
Part. in employee pension scheme	-0.96	0.68	-0.96	0.68
Unknown whether part. in pens. scheme	0.68	0.70	0.70	0.69
Worker pays premium directly	1.87**	0.90	1.87**	0.90
Pension premium (if paying directly)	-0.005	0.005	-0.005	0.005
Missing premium amount (if paying directly)	-0.33	1.89	-0.47	1.90
Employer attributes to premium	0.83	0.56	0.88	0.57
Permanent job	-2.38**	0.45	-2.40**	0.45
Part. in individual pension scheme	0.38	0.50	0.43	0.49
Amount premium individual pension scheme	-0.0003	0.001	-0.0004	0.001
Health (reference: bad)				
Very good health	-3.26**	0.69	-3.33**	0.69
Good health	-2.67**	0.53	-2.73**	0.53
Reasonable health	-2.33**	0.57	-2.39**	0.58
Years (reference: 2001)				
1995	0.42	0.49	0.46	0.50
1996	0.16	0.51	0.19	0.51
1997	-0.18	0.52	-0.15	0.52
1998	-0.50	0.54	-0.51	0.54
1999	-0.51	0.53	-0.55	0.53
2000	-0.68	0.55	-0.68	0.55
Monthly earnings	0.020	0.037	0.022	0.036
Non-labour income excl. asset inc./1000	0.019	0.075	0.011	0.075
Δ Non-labour income/1000	0.0094	0.020	0.0091	0.019
Net liquid wealth/10000	0.0016	0.011	0.0093	0.011
γ_I (parameter random effect)	0.98**	0.33	1.02**	0.34

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

Table 7b: Estimates of the random effects model with net liquid wealth:
The job Exit Rate with Destination (Early) Retirement

	No correlations: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$		Unrestricted correlations	
Variable	Estimate	St. Err.	Estimate	St. Err.
Intercept	-13.04**	1.77	-13.14**	1.80
Ln (Age/48)	34.92**	10.12	35.15**	10.19
Ln (Age/48) Squared	-13.11	29.61	-13.01	29.86
Education (reference level 5, highest)				
Education level 1 (lowest)	1.35**	0.67	1.37**	0.68
Education level 2	1.70**	0.59	1.69**	0.60
Education level 3	1.69**	0.56	1.65**	0.56
Education level 4	0.85	0.56	0.83	0.56
Education sector (reference: services)				
Technical	0.01	0.28	0.01	0.28
Economic/administrative	0.11	0.31	0.11	0.31
General	0.36	0.37	0.34	0.38
No Children in household	0.41*	0.24	0.40*	0.24
Marital status (reference: single)				
Married	1.39	1.11	1.41	1.12
Divorced	1.07	1.15	1.10	1.16
Widow	1.69	1.23	1.71	1.25
Civil Servant	0.37	0.24	0.38	0.24
Part. in employee pension scheme	-0.14	0.42	-0.14	0.42
Unknown whether part. in pens. scheme	0.76	0.62	0.78	0.62
Worker pays premium directly	0.50	0.56	0.51	0.56
Pension premium (if paying directly)	0.001	0.002	0.001	0.002
Missing premium amount (if paying directly)	2.37**	1.20	2.37**	1.22
Employer attributes to premium	-0.22	0.27	-0.23	0.28
Permanent job	1.50**	0.61	1.56**	0.62
Part. in individual pension scheme	0.03	0.45	0.03	0.45
Amount premium individual pension scheme	0.00	0.00	0.00	0.00
Health (reference: bad)				
Very good health	0.14	0.73	0.18	0.81
Good health	0.00	0.69	0.06	0.77
Reasonable health	-0.03	0.71	0.03	0.78
Years (reference: 2001)				
1995	0.96**	0.40	0.95**	0.40
1996	0.44	0.41	0.42	0.41
1997	1.01**	0.37	1.00**	0.37
1998	0.56	0.38	0.56	0.38
1999	0.25	0.39	0.25	0.39
2000	0.27	0.37	0.27	0.37
Monthly earnings	0.030	0.026	0.027	0.026
Non-labour income excl. asset inc./1000	-2.96**	1.25	-2.97**	1.25
Δ Non-labour income/1000	0.052	0.039	0.058	0.043
Net liquid wealth/10000	0.012*	0.007	0.009	0.007
γ_R (parameter random effect)	-0.36	0.22	-0.39*	0.21

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

Table 7c: Estimates of the random effects model with net liquid wealth
The Wealth equation, Dependent variable: inverse hyperbolic sine of wealth/10000

	No correlations: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$		Unrestricted correlations	
Variable	Estimate	St. Err.	Estimate	St. Err.
θ (parameter of transformation)	0.74**	0.03	0.74**	0.03
Intercept	2.20**	0.37	2.22**	0.37
Ln (Age/48)	2.45**	1.12	2.41**	1.12
Ln (Age/48) Squared	2.67	4.19	2.84	4.20
Education (reference level 5, highest)				
Education level 1 (lowest)	-1.27**	0.20	-1.27**	0.20
Education level 2	-0.90**	0.16	-0.90**	0.16
Education level 3	-0.85**	0.15	-0.85**	0.15
Education level 4	-0.25	0.16	-0.24	0.16
Education sector (reference: services)				
Technical	0.21**	0.10	0.21**	0.10
Economic/administrative	0.28**	0.10	0.28**	0.10
General	0.22*	0.13	0.22*	0.13
No Children in household	0.03	0.10	0.03	0.10
Number of children in household	0.10*	0.05	0.10*	0.05
Marital status (reference: single)				
Married	-0.39	0.27	-0.39	0.27
Divorced	-0.91**	0.29	-0.92**	0.29
Single	-0.06	0.32	-0.07	0.32
Health (reference: bad)				
Very good health	0.47**	0.14	0.47**	0.14
Good health	0.42**	0.13	0.41**	0.13
Reasonable health	0.32**	0.13	0.32**	0.13
Time to make large expenditures:				
Favourable	0.28**	0.07	0.28**	0.07
Neither favourable, nor unfavourable	0.22**	0.07	0.22**	0.07
Income in the past 12 months:				
Somewhat improved	0.21*	0.12	0.21*	0.12
Remained the same	0.23*	0.12	0.23*	0.12
Somewhat deteriorated	0.30**	0.14	0.29**	0.14
Obviously deteriorated	0.54**	0.19	0.54**	0.19
Financial situation in the past 12 months:				
Somewhat improved	-0.30**	0.13	-0.30**	0.13
Remained the same	-0.40**	0.13	-0.40**	0.13
Somewhat deteriorated	-0.39**	0.14	-0.39**	0.14
Obviously deteriorated	-0.65**	0.18	-0.66**	0.19
Years (reference: 2001)				
1995	-0.63**	0.08	-0.63**	0.08
1996	-0.54**	0.08	-0.54**	0.08
1997	-0.47**	0.08	-0.47**	0.08
1998	-0.36**	0.07	-0.36**	0.07
1999	-0.22**	0.07	-0.22**	0.07
2000	-0.10	0.07	-0.10	0.07

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

Table 7d: Estimates of the random effects model with net liquid wealth
Initial condition (the employment equation)

	No correlations: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$		Unrestricted correlations	
Variable	Estimate	St. Err.	Estimate	St. Err.
Intercept	0.02	0.39	0.02	0.39
Ln (Age/48)	3.61**	1.57	3.60**	1.57
Ln (Age/48) Squared	-47.11**	6.05	-47.07**	6.05
Education (reference level 5, highest)				
Education level 1 (lowest)	-0.96**	0.23	-0.96**	0.23
Education level 2	-0.48**	0.18	-0.48**	0.18
Education level 3	-0.21	0.17	-0.22	0.17
Education level 4	-0.11	0.18	-0.11	0.18
Education sector (reference: services)				
Technical	0.17	0.11	0.17	0.11
Economic/administrative	0.07	0.13	0.07	0.13
General	0.21	0.15	0.21	0.15
No Children in household	-0.04	0.15	-0.03	0.15
Number of children	0.13	0.08	0.13	0.08
Marital status (reference: single)				
Married	0.10	0.25	0.10	0.25
Divorced	-0.08	0.29	-0.08	0.29
Single	-0.17	0.30	-0.17	0.30
Non-labour income lagged	0.001	0.003	0.001	0.003
Non-labour income spouse lagged	-0.031	0.037	-0.032	0.037
Health (reference: bad)				
Very good health	1.91**	0.18	1.91**	0.18
Good health	1.86**	0.15	1.86**	0.15
Reasonable health	1.15**	0.15	1.15**	0.15
Years (reference: 2001)				
1995	-0.56**	0.17	-0.56**	0.17
1996	-0.37	0.21	-0.37	0.21
1997	-0.34	0.23	-0.34	0.23
1998	-0.26	0.21	-0.26	0.21
1999	-0.40*	0.20	-0.40*	0.20
2000	-0.02	0.20	-0.02	0.20

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

Table 7e: Estimates of the random effects model with net liquid wealth
The covariance matrix

	No correlations: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$		Unrestricted correlations	
Variable	Estimate	St. Err.	Estimate	St. Err.
σ_ω (std. dev. random effect wealth)	1.45**	0.05	1.45**	0.05
$\rho_{\alpha\omega}$ (corr. random effects job exit/wealth)			-0.30*	0.18
$\rho_{\alpha\epsilon}$ (correlation job exit and initial state)			0.03	0.13
$\rho_{\omega\epsilon}$ (correlation wealth and initial state)			0.003	0.05
σ_ν (std. dev. error wealth)	1.09**	0.03	1.09**	0.03
**: significant at 5% level; *: significant at 10% level				

Table 8a: Estimates of the random effects model with net total wealth:
The Involuntary Job Exit Rate

	No correlations: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$		Unrestricted correlations	
Variable	Estimate	St. Err.	Estimate	St. Err.
Intercept	0.72	1.10	0.62	1.11
Ln (Age/48)	13.65*	7.64	13.96*	7.75
Ln (Age/48) Squared	-46.32	33.19	-45.99	33.68
Education (reference level 5, highest)				
Education level 1 (lowest)	0.35	0.93	0.30	0.95
Education level 2	-1.15	0.77	-1.12	0.78
Education level 3	-0.28	0.59	-0.22	0.59
Education level 4	-0.33	0.63	-0.30	0.63
Education sector (reference: services)				
Technical	0.43	0.44	0.43	0.45
Economic/administrative	0.34	0.47	0.33	0.47
General	-0.19	0.63	-0.14	0.64
No Children in household	-0.08	0.33	-0.11	0.34
Marital status (reference: single)				
Married	-1.23**	0.57	-1.24**	0.58
Divorced	-1.18	0.81	-1.18	0.82
Widow	-0.46	1.06	-0.45	1.07
Civil Servant	-0.53	0.41	-0.54	0.41
Part. in employee pension scheme	-0.82	0.69	-0.78	0.69
Unknown whether part. in pens. scheme	0.63	0.70	0.73	0.71
Worker pays premium directly	1.78**	0.88	1.75**	0.89
Pension premium (if paying directly)	-0.004	0.004	-0.004	0.004
Missing premium amount (if paying directly)	0.04	1.84	0.17	1.82
Employer attributes to premium	0.77	0.56	0.78	0.56
Permanent job	-2.43**	0.47	-2.41**	0.47
Part. in individual pension scheme	0.36	0.50	0.38	0.50
Amount premium individual pension scheme	-0.0002	0.001	-0.0002	0.001
Health (reference: bad)				
Very good health	-3.24**	0.69	-3.34**	0.70
Good health	-2.58**	0.53	-2.68**	0.54
Reasonable health	-2.23**	0.58	-2.32**	0.59
Years (reference: 2001)				
1995	0.43	0.50	0.50	0.50
1996	0.16	0.51	0.19	0.51
1997	-0.19	0.53	-0.17	0.53
1998	-0.48	0.55	-0.47	0.55
1999	-0.44	0.53	-0.45	0.53
2000	-0.65	0.56	-0.67	0.56
Monthly earnings	0.013	0.038	0.015	0.038
Non-labour income excl. asset inc./1000	0.002	0.074	-0.001	0.078
Δ Non-labour income/1000	0.012	0.021	0.011	0.020
Net total wealth/10000	0.0034	0.0036	0.0051	0.0029
γ_I (parameter random effect)	1.04**	0.33	1.11**	0.33

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

Table 8b: Estimates of the random effects model with net total wealth:
The job Exit Rate with Destination (Early) Retirement

	No correlations: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$		Unrestricted correlations	
Variable	Estimate	St. Err.	Estimate	St. Err.
Intercept	-13.19**	1.78	-13.14**	1.79
Ln (Age/48)	36.87**	10.20	36.42**	10.14
Ln (Age/48) Squared	-20.52	29.61	-19.45	29.45
Education (reference level 5, highest)				
Education level 1 (lowest)	1.42**	0.67	1.42**	0.67
Education level 2	1.74**	0.59	1.73**	0.59
Education level 3	1.75**	0.56	1.73**	0.56
Education level 4	0.89	0.56	0.88	0.56
Education sector (reference: services)				
Technical	0.01	0.28	0.02	0.28
Economic/administrative	0.11	0.30	0.12	0.30
General	0.32	0.37	0.32	0.37
No Children in household	0.43*	0.24	0.42*	0.24
Marital status (reference: single)				
Married	1.30	1.11	1.31	1.12
Divorced	1.08	1.15	1.10	1.16
Widow	1.70	1.23	1.70	1.23
Civil Servant	0.33	0.23	0.34	0.23
Part. in employee pension scheme	-0.11	0.41	-0.11	0.41
Unknown whether part. in pens. scheme	0.84	0.60	0.84	0.61
Worker pays premium directly	0.46	0.58	0.46	0.58
Pension premium (if paying directly)	0.001	0.002	0.001	0.002
Missing premium amount (if paying directly)	2.38*	1.22	2.36*	1.22
Employer attributes to premium	-0.24	0.27	-0.25	0.27
Permanent job	1.46**	0.60	1.47**	0.61
Part. in individual pension scheme	0.04	0.44	0.03	0.44
Amount premium individual pension scheme	-0.001	0.001	-0.001	0.001
Health (reference: bad)				
Very good health	0.04	0.78	0.06	0.81
Good health	-0.03	0.74	-0.02	0.78
Reasonable health	-0.08	0.75	-0.07	0.79
Years (reference: 2001)				
1995	1.09**	0.40	1.06**	0.40
1996	0.56	0.40	0.54	0.41
1997	1.12**	0.37	1.10**	0.37
1998	0.66*	0.38	0.64*	0.38
1999	0.32	0.39	0.31	0.39
2000	0.31	0.37	0.30	0.37
Monthly earnings	0.031	0.026	0.030	0.026
Non-labour income excl. asset inc./1000	-3.13**	1.24	-3.14**	1.25
Δ Non-labour income/1000	0.048	0.038	0.05	0.04
Net total wealth/10000	0.0064**	0.0030	0.0056*	0.0034
γ_R (parameter random effect)	-0.23	0.22	-0.22	0.22

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

Table 8c: Estimates of the random effects model with net total wealth
The Wealth equation, Dependent variable: inverse hyperbolic sine of wealth/10000

	No correlations: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$		Unrestricted correlations	
Variable	Estimate	St. Err.	Estimate	St. Err.
θ (parameter of transformation)	0.15**	0.01	0.15**	0.01
Intercept	13.45**	1.15	13.46**	1.15
Ln (Age/48)	13.40**	3.42	13.13**	3.41
Ln (Age/48) Squared	-17.90	12.09	-17.43	12.08
Education (reference level 5, highest)				
Education level 1 (lowest)	-4.81**	0.73	-4.75**	0.71
Education level 2	-4.64**	0.55	-4.61**	0.54
Education level 3	-4.18**	0.51	-4.16**	0.50
Education level 4	-1.08*	0.55	-1.07*	0.55
Education sector (reference: services)				
Technical	1.04**	0.31	1.05**	0.31
Economic/administrative	1.46**	0.31	1.47**	0.31
General	0.55	0.40	0.55	0.40
No Children in household	0.50*	0.27	0.48*	0.27
Number of children in household	0.65**	0.16	0.64**	0.16
Marital status (reference: single)				
Married	-0.67	0.70	-0.65	0.72
Divorced	-2.87**	0.78	-2.87**	0.80
Single	-1.00	0.86	-1.01	0.88
Health (reference: bad)				
Very good health	0.83*	0.43	0.83*	0.43
Good health	0.75*	0.40	0.74*	0.40
Reasonable health	0.38	0.41	0.38	0.41
Time to make large expenditures:				
Favourable	0.33*	0.18	0.31*	0.18
Neither favourable, nor unfavourable	0.21	0.19	0.20	0.19
Income in the past 12 months:				
Somewhat improved	0.08	0.31	0.08	0.30
Remained the same	0.13	0.31	0.13	0.31
Somewhat deteriorated	0.34	0.37	0.34	0.37
Obviously deteriorated	1.40**	0.50	1.45**	0.50
Financial situation in the past 12 months:				
Somewhat improved	-0.08	0.32	-0.08	0.32
Remained the same	-0.20	0.33	-0.20	0.33
Somewhat deteriorated	-0.46	0.37	-0.46	0.36
Obviously deteriorated	-1.65**	0.47	-1.63**	0.47
Years (reference: 2001)				
1995	-4.47**	0.30	-4.46**	0.30
1996	-3.56**	0.28	-3.57**	0.28
1997	-3.17**	0.25	-3.17**	0.25
1998	-2.27**	0.22	-2.28**	0.22
1999	-1.58**	0.20	-1.58**	0.19
2000	-0.59**	0.17	-0.59**	0.17

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

Table 8d: Estimates of the random effects model with net total wealth
The covariance matrix

	No correlations: $\rho_{\alpha\omega} = \rho_{\alpha\epsilon} = \rho_{\omega\epsilon} = 0$		Unrestricted correlations	
Variable	Estimate	St. Err.	Estimate	St. Err.
σ_ω (std. dev. random effect wealth)	6.36**	0.25	6.35**	0.25
$\rho_{\alpha\omega}$ (corr. random effects job exit/wealth)			-0.18	0.17
$\rho_{\alpha\epsilon}$ (correlation job exit and initial state)			-0.13	0.11
$\rho_{\omega\epsilon}$ (correlation wealth and initial state)			0.11**	0.04
σ_ν (std. dev. error wealth)	2.63**	0.10	2.63**	0.10
**: significant at 5% level; *: significant at 10% level				

Table 9 Elasticities of exit probabilities with respect of wealth
evaluated in sample means

Elasticity with respect to:	'Causal' effect wealth	Effect wealth running through unobservables ('bias')	Total effect wealth (sum col. 1 + 2)
Net liquid wealth			
Exit to retirement	0.055	0.069	0.12**
	(0.041)	(0.053)	(0.06)
Involuntary Exit	0.054	-0.17	-0.12
	(0.063)	(0.11)	(0.10)
Net total wealth			
Exit to retirement	0.15*	0.035	0.18**
	(0.09)	(0.046)	(0.09)
Involuntary Exit	0.13*	-0.17	-0.044
	(0.075)	(0.17)	(0.15)
**: significant at 5 per cent level; *: significant at 10 per cent level			