Netspar

Network for Studies on Pensions, Aging and Retirement

Netspar DISCUSSION PAPERS

Hans Bloemen

Private Wealth and Job Exit at Older Age

A Random Effects Model

DP 03/2014-010

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

Hans G. Bloemen[1,2,3]

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

This version March 2014

Keywords: Retirement, Life Cycle Models and Saving, Models with Panel Data
JEL code: J26, D91, C33

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 time-invariant 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. Results show an upward bias in the effect of net liquid wealth on retirement, but a small bias and a positive causal effect if net total wealth (including housing equity and mortgage debt) is used. Both measures of wealth show a signficant positive effect on retirement. For an average individual with age 58 an increase in net liquid wealth by 64,000 Euro, or in net total wealth by 110,000 Euro, raises the exit rate into retirement by 1 percentage point.

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

1 Introduction

While population aging puts current pension systems under financial strain, older cohorts accumulate more private wealth than their predecessors until just a couple of decades ago. Private wealth becomes an increasingly important financial resource for the retired compared to social security wealth. Pension arrangements become more flexible owing to institutional and financial innovation. It therefore becomes increasingly important to know whether 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. French (2005) and Gustman and Steinmeier (2005) estimate structural models of retirement based on the life cycle framework, including wealth accumulation.[4] Van Ooijen, Mastrogiacomo and Euwals (2010) empirically analyzed the relationship between wealth and subjective information on planned retirement with data from the DNB household survey (DHS), finding a small but significant impact. Bloemen (2011) 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, incorporating non-linear wealth effects, checking for the impact of possible outliers in net wealth, and varying the flexibility of the age pattern. Results appeared robust. However, throughout the analysis the maintained assumption is 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.

In this study we analyze the role of unobservables in estimating the impact of wealth on retirement outcomes. As we will see, both job exit rates and wealth exhibit strong time persistent individual specific effects. As long as these random effects in wealth and job exit rates are uncorrelated, a regression framework, as was carried out in Bloemen

[4] There is related literature about the influence of wealth on job exit rates and search behaviour of the unemployed (Danforth, 1979, Lentz and Tranaes, 2005).

(2011) to analyze the impact of wealth on job exit rates, remains valid and even desirable because of its simplicity. However, to relax the maintained assumption, we need a different modelling framework. This modelling framework needs, first, to incorporate correlation in time-invariant unobservables between job exit rates and private wealth. Secondly, we need to find instruments for private wealth. It is difficult to find suitable instruments, as the (limited amount of) literature on instrumenting wealth addresses diverse topics and is not very conclusive in suggesting possible instruments. Thirdly, a model framework that allows for random effects also requires correction for selection into the sample, since the analysis of job exit naturally applies to the employed. Our aim is to set up a model framework that allows us to decompose the total effect of private wealth into a *causal* effect and an effect that is channeled through correlation in time-invariant unobservables. In the end, we will be able to present elasticities of the *total effect*, the *causal effect* and the *bias* due to correlation in unobservables.

Before setting up such a model framework, we discuss the various a priori reasons for 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. If this mechanism of correlation in unobservables prevails, we expect an *upward bias* in the estimated effect of wealth on retirement if we do not incorporate such correlation in the estimation. 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. Neglecting unobservable correlation is expected to *bias downward* the estimated impact of wealth on job exit, which may be particularly important for job exit states like unemployment and disability. 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. For instance, in the data we do not observe details of individual pension arrangements.

In the analysis we use data for the Netherlands from the Socio Economic Panel (SEP).

We study the impact of wealth on job exit rates of elderly workers, distinguishing 're-tirement' and 'unemployment' and 'disability'[5] as states of destination. We make this distinction since wealth a priori affects job exit rates to different states of destination differently if 'choice' and 'restriction' play different roles. In the analysis two different net wealth measures are used. The first is 'net liquid wealth' and the second, 'net total wealth' adds the value of the house and subtracts the outstanding mortgage debt.

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. These variables are shown to have predictive power for the level of wealth. To test whether they also provide valid exclusion restrictions, we exploit the availability of multiple instrumental variables, and apart from estimating the basic model variant that excludes all of the instruments from the job exit rates, we estimate for each instrumental variable a model variant in which we drop the exclusion restriction and include the instrument in the job exit rates. This way we can test the validity of the exclusion restrictions. None of the exclusion restrictions is rejected.

Results show that the *total effect* of wealth which adds up both the *causal* effect and the *bias* are quite similar to results obtained by Bloemen (2011) using a much simpler regression framework without unobservables.[6] It shows a positive and significant effect of both measures of private wealth on exit into retirement while no significant effect is

[5] Labelled as 'involuntary' job exit later on.

[6] Even though in the present analysis some additional variables are added. Particularly interesting is the inclusion of subjective indicators for health status.

found for exit into unemployment or disability. But with the present model framework we are able to decompose the *total effect* into a *causal effect* and a *bias*. Decomposing the total effect into a causal effect and a bias, we find that the sign of the bias is in accordance with the expectation spelled out above: the bias is positive (upward) for exit into retirement and negative (downward) for exit into unemployment and disability. For net liquid wealth a correlation in unobservables with job exit is found, but the bias is not estimated precisely, whereas the causal effect is significant neither. Thus, it remains hard to assign the total effect either to a causal effect or to a bias. For net total wealth (including housing equity and mortgage debt) correlation in unobservables is smaller and not significant. For net total wealth, a positive causal effect on retirement remains while for exit into unemployment and disability a positive causal effect appears, once the downward bias has been corrected for. One possible explanation for the more pronounced effect of net total wealth on retirement is that net total wealth contains more variation than net liquid wealth.[7] Another explanation may lay in the nature of housing equity and mortgage debt itself. A higher outstanding mortgage debt may provide an additional incentive to stay on the job.

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.[8] Survey waves are available on a yearly basis, and refer to the month of May in each year. For the construction of our data on job exit transitions we select employed individuals who are observed in at least two consecutive

[7] In particular, there are relative few elderly workers with financial (non-mortgage) debt.

[8] The SEP originates from 1984. Only in 1987 information about wealth holdings was collected. In 1990 a reform of the SEP took place, having a major impact on the collection of income data (from net to gross), the frequency of the data collection (from every six months to annually) and the month of data collection. Only from 1995 on survey questions remained relatively stable, and in particular, for our purpose we use a survey question on an extensive range of reasons for job exit, that was included from that year. In 2002, the SEP survey stopped existing.

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 requiring observations on non-employed individuals. The first year of observation will be used in the estimation of the initial condition for both the employed and non-employed individuals. 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 the next year.[9] The upperbound of 64 was chosen since the usual retirement age in the Netherlands is 65.

Our main outcome variable is job exit, but since net wealth has a potentially different impact on different states of destination (see the discussion in section 3.1) we split up job exit by state of destination. To distinguish states of destination we use a specific question from the survey.[10] 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,[11] pensioned, remaining (not specified any further).

Pooling the (pairs of waves) with information on job exits results in 3711 pooled (worker-year) observations on 1113 different workers. 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. We merged states of

[9] 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. Van den Berg and Lindeboom (1998) (and a couple of other studies by the same authors) address the issue of attrition in panel data in the context of the estimation of labor market transition models, motivating that workers experiencing labor market transitions are more likely to leave a panel survey. Here we have not corrected for attrition bias.

[10] This survey question is available from 1995, which is an important reason why we start our analysis in this particular year.

[11] In Dutch: 'rentenieren'.

destination into categories 'retired',[12] 'unemployed'[13] and 'disability'. The percentages of job exiters exiting by these channels are 72.1, 15.9, and 12.0, respectively (see Table 5).

Selecting observations for the estimation of the initial conditions (selection into the sample by the first year someone is observed in the survey) results in 572 and 1187 observations for non-employed and employed individuals, respectively. 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. Adding together the observation for the initial conditions and the transitions together, we use observations on 1759 different individuals and 4357 individuals-years.

Sample statistics for the sample of job exiters are in Tables 3 (continuous and count variables) and 4 (dummy indicators). For the initial conditions sample statistics can be found in Tables 1 and 2. The background characteristics for job exiters come from the year before the (potential) transition: if we use year $t+1$ to determine whether someone exited, the variables are from year t.[14]

[12] 'Retired' includes job exit for the reason of 'early retirement/living of one's investments', 'pensioned', and 'remaining'. 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 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 category include 5.8% of the job exiters. A sensitivity analysis with the multinomial logit model showed that the coefficients of wealth are hardly affected by reassigning those observations to the other exit route.

[13] Job exit for the reasons of being fired, termination of contract, and shut down of a firm.

[14] 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. In the waves of 1995 through 2001, information on income in the previous fiscal year is expressed in guilders. In the year 2002, the

The longitudinal dataset of the Socio-Economic Panel (SEP)[15] 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.[16] Total debts (excluding the value of mortgage debt outstanding) are obtained by aggregating personal loans at banks and credit institutions, loans to finance purchases, and remaining (including money borrowed from family and friends). Net liquid wealth is computed by the difference between liquid assets and total debts. An alternative measure of net wealth can be obtained by incorporating the value of the house and the mortgage debt. By adding the value of the house and subtracting the value of the mortgage debt from the value of net liquid wealth defined above, we obtain this alternative measure of net wealth, 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 alimony payments, and housing benefits.

In Table 1 we find that the nonemployed, within the age range from 48 through 64, are on average older, and less wealthy than the employed. The final column of Table

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.

[15] The SEP is provided both in a compact longitudinal form and more extensive wave by wave. Both variants are available to us so any choice made in selecting the sample are not led by limitations of the longitudinal data. We only use the longitudinal data to aggregate wealth variable according to the definition set by Statistics Netherlands.

[16] 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.

1 reports the results of a pairwise comparison of the means of the two groups. The difference in age is significant, while the (on average younger) employed also have a significantly higher number of children living in the household. The difference in means between the employed and the nonemployed for net liquid wealth is not significant, but the employed have, on average, a higher net total wealth than the nonemployed. (In the estimation results presented in section 4 a significant correlation between the unobservables in net total wealth and the initial labour market state is found, while such a correlation is does not appear for net liquid wealth. This is consistent with the descriptives in Table 1). We also find that the spouse is employed less often, and if she is employed, her earnings are lower.

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

There are more lower educated and less higher educated individuals among the nonemployed (Table 2). The percentage of married men is lower among the nonemployed, whereas the percentages of single, divorced, and widowed men all are higher.

For the job exiters (Tables 3 and 4) 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.[17]

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 in-

[17] 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.

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

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

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.[18] 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 affects the accumulation of pension wealth, the eligibility to retirement benefits, the level of income, and it has a direct effect on utility. The probability[19] that the worker decides to leave the job is

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

[18] We do not explicitly specify an economic model, but the value function can be interpreted as part of a dynamic programming model, as for instance formulated in Kingston (2000), French (2005), and Gustman and Steinmeier (2005). It may also be interpreted as an option value, conform Stock and Wise (1990), although this model does not incorporate private wealth.

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

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[20]

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

The expression for the job exit rate (2) shows that according to economic theory net wealth enters the job exit rate by the choice to exit the job, and not by the layoff rate δ_t. For this reason we will make a distinction between different exit routes in the empirical analysis, 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.

Accordingly, we specify an empirical model for (2), controlling for observable and unobservable characteristics to isolate the causal effect of wealth, and distinguishing different states of destination.

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

[20] 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.

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. An implicit assumption of the multinomial logit model is Independence of Irrelevant Alternatives (IIA). A practical implication for this assumption is that the two exit routes that we distinguish, ‘involuntary exits’ and ‘retirement’, should not be (too close) substitutes to each other. The reason why we make a distinction between these two exit routes in the first place is that we a priori expect that our variable of interest has a different impact on job exit in these different directions, because the one direction is more governed by choice while the other follows from health and unemployment shocks. Moreover, eligibility conditions for exit in either direction are not the same. In the model below, we also include random effects, and after averaging over random effects, IIA in its pure form does not hold anymore (only conditional on the random effect).

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.[21] Since (3) is a nonlinear model, it suffers from the incidental parameter problem (Neyman and Scott, 1948; Greene, 2004) if α_i were treated as a fixed effect.

[21] The variance of α_i, σ_α will be normalized to one accordingly.

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.[22] The transformation (4) has some convenient properties:

- If θ tends to zero, then $g(A_{it}, \theta)$ tends to A_{it}.
- $\text{Sign}(g(A_{it}, \theta)) = \text{Sign}(A_{it})$
- $g(A_{it}, \theta)$ is monotonically increasing in A_{it}
- $g(A_{it}, \theta)$ 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.[23] The functionality of the net wealth equation is to allow for correlation in unobservables between job exits and net wealth.[24]

Supposing that we observe individual i for periods $t = 0$ through T equations (3) and (5) constitute a simultaneous dynamic panel data model with random effects. The

[22] 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 Appendix A.

[23] 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.

[24] Below we comment on exclusion restrictions.

random effects α_i in the job exit rate and ω_i in the wealth equation are allowed to be correlated. For period $t = 0$ equation (3) cannot be specified as it requires the labour market state $d_{i,-1}$ and wealth level $A_{i,-1}$ in period $t = -1$. If there were no random effects in the model, we could safely ignore the likelihood contribution for labour market state d_{i0} and use the job exit probabilities for periods $t = 1$ through T. Since we include a random effect selectivity into employment at $t = 0$ becomes an issue, and we need to specify an initial condition for the labour market state d_{i0} at $t = 0$. Bhargava and Sargan (1983) advocate the use of simultaneous equations estimators in the context of linear dynamic random effects models and discuss the initial condition problem. Wooldridge (2005) provides solutions for the initial condition problem in nonlinear dynamic panel data models with random effects, and our model fits in this class of models. According to Wooldridge (2005) we formulate an equation for the labour market state d_{i0}, conditional on the random effect. This equation does not contain $d_{i,-1}$ (as it is not observed), so it is an equation for the labour market state as opposed to equation (3) which specifies a transition probability. Because we are estimating transition probabilities for the employed this initial condition has the interpretation of a selection equation: its estimation requires data on nonemployed individuals, not selected into the sample for transitions. The equation naturally also does not include the unobserved $A_{i,-1}$, but, conform Wooldridge (2005), the initial condition contains correlation with the random effect ω_i in the wealth equation (as well as with the random effect α_i in the job exit equation) so this way selectivity into a labour market state related to wealth holdings is incorporated in the model.

The equation for the initial labour market state d_{i0}, with $d_{i0} = 1$ if individual i, selected in the sample in period $t = 0$, is employed and $d_{i0} = 0$ if individual i is not employed.

$$\begin{aligned} d_{i0}^* &= m_{i0}'\eta + \epsilon_{i0} \\ d_{i0} &= \iota(d_{i0}^* > 0) \end{aligned} \tag{6}$$

with m_{i0} the explanatory variables, η the parameter vector that measures the impact of the explanatory variables on the labour market state, ϵ_{i0} the error term that is allowed to be correlated with α_i and ω_i. Wooldridge (2005) suggests the inclusion of the same exogenous variables[25] in m_{i0} as in the job exit rate for $t = 1$. However, some of the variables in the job exit rate are specific to the state of employment (like job characteristics) and are not observable for the nonemployed.

To allow for correlation in the unobservables α_i, ω_i and ϵ_{it} we assume they 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). Conform Wooldridge (2005), we first specify likelihood contributions for individual i for periods $t = 0$ through T conditional on the random effects (α_i, ω_i) using (7) after which we integrate over the random effects. Details are shown in Appendix A.

Having introduced the technical specification, it is important to discuss the interpretation of the unobserved time-invariant variables α_i and ω_i and address the underlying assumptions. First, the time-invariant individual specific variable α_i may represent unobserved individual-specific preferences concerning the trade-off between leisure and consumption. Individuals may have a certain life-time preference for retiring early or late and their wealth accumulation may have been set accordingly. This mechanism would mainly affect the impact of wealth on the retirement exit route, and leads to an upward bias. Next, individuals may have a certain ability to deal with the planning of life cycle events which may correlate with both with job attachment and the level of accumulated wealth. An individual specific rate of time preference and the degree of risk aversion can be part of the story. More specific, individuals with unfavourable personal characteristics having a low level of wealth may be more likely to exit the labour via

[25] It is important to note that the initial condition (6) does not require exclusion restrictions as it needs not to be instrumented: d_{i0} is not a right hand side variable in the job exit rate, but a left hand side variable in the chain of labour market states d_{it}.

unemployment or disability. This could potentially bias downward the impact of wealth on job exit in these directions.

In this framework we allow for correlation in the unobservable individual-specific and time-invariant variable in wealth and the job exit rate, but we make the assumption that the remaining explanatory variables are uncorrelated with these unobservables. Nevertheless, some of these variables are also part of a life cycle framework. For instance, the level of education is usually set at the beginning of working life, but the choice for education may very well be made under consideration of similar leisure and consumption trade-offs. If someone with a high preference for life-cycle consumption chooses to invest in a high degree of education before entering the labour force, this affects the accumulation of wealth during working life and also the attachment to the job. However, in this study we treat educational attainment as predetermined, as we only look at job exit near the end of working life. Another variable that we assume to be uncorrelated with the random effects is marital status and family composition. These are variables that also may be part of a life-cycle plan, as family composition will interact with job attachment, while also savings motives are likely to be affected by family composition (think, for instance, of the bequest motive). These are issues that are not explicitly incorporated in the current approach. In a linear model, a standard way of testing whether explanatory variables are correlated with the random effect is to employ a Hausman test that compares the more robust but inefficient fixed effects estimator with the efficient random effects estimator. Since a fixed effects model suffers from the incidental parameter problem, as noticed before, a Hausman test cannot be implemented here.

3.3 Instrumenting wealth

We need instruments that predict wealth, but do not affect job exit rates independently from wealth. In our model the random effect is the main source of correlation between wealth and job exit rates. Thus, to instrument net wealth, we need to include variables in z_{it} in the wealth equation (5) that are uncorrelated with the unobservables in this equation. Such variables are extremely hard to find. There are some examples known in the literature studying wealth in different contexts. Carroll and Samwick (1998) instrumented wealth with occupation, education and industry, in a study of precautionary savings. Bover (2006) uses geographical variation in housing prices and inheritance information about real estate properties, in a study of wealth effects on consumption, with an emphasis on housing wealth. Dvornak and Kohler (2007) study the the impact of housing wealth and stock market wealth on consumption expenditures and use first and second income lags as instruments. If we think that it is plausible that the main source of correlation between unobservables in exit rates and wealth are individual specific random effects, a guideline to look for suitable candidates is to search for variables that are somehow related to business cycle shocks. Such variables can effect wealth in a specific period, but have little impact on the planned stock level of wealth resulting from unobserved leisure-consumption trade-offs and preferences for (early) retirement.

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 believe 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 variable that both drives the accumulation of wealth and the response to this question about purchase opportunities at a specific point in time. Since we have several instrumental variables in our data, we are able to test for the exclusion restrictions statistically. In section 4 we present estimates for the basic model, that imposes exclusion restrictions for all the instrumental variables, but for each instrumental variable separately we will also relax the exclusion restriction by including the instrument in the job exit rates and re-estimating the model. Since our method of estimation is maximum likelihood of the equation system for job exit rates and wealth, this way we can compute the likelihood ratio test statistic to test whether the exclusion restriction for the instrument is valid. Results are presented in section 4 and show that none of the exclusion restrictions are rejected. Thus, we test the validity of the exclusion restriction, irrespective of whether the underlying channel runs via time-invariant unobservables or time-varying unobservables.

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 that, a priori, 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, on the other hand, 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. But also for this instrumental variable we can test for the exclusion restriction. In the empirical implementation we will use this latter instrument more as a robustness check and estimate the model both with and without this additional information as an instrument for net wealth. It turns out that results are robust with respect to the inclusion of this instrument. The bottom part of Table A shows the aggregate survey information of the instrumental variables covary with business cycle indicators (consumer confidence and an index for stock prices), which is consistent with the assumption that these variables capture shocks.

With first stage regressions[26] for wealth F-statistics were computed for testing whether the indicators add anything to the explanation of wealth. 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 A: 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 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

[26] Note that our eventual method of estimation is full information maximum likelihood for the simultaneous system of equations of job exit rates, net wealth, and initial conditions, rather than instrumental variable estimation. In this context, the terminology *first stage regression* is not appropriate, because there is no first and second stage in estimating a model by full information maximum likelihood. However, we first like to explore the performance of the instrumental variables by estimating a single equation model for wealth, before estimating the full model. This single equation model is estimated by OLS, ignoring the random effect in (5), but it should be noted that the parameters of the wealth equation can be estimated consistently (although not efficiently) as a single equation model by OLS, under the same assumptions as hold for the full model. For this purpose, we estimated the wealth equation (5) by OLS with parameter θ restricted to 1. In the estimation of the simultaneous equations model by simulated maximum likelihood, we estimate the parameter θ.

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.

4 Results

The parameter estimates of the multinomial logit model are presented in section 4.1. In a multinomial logit model, the parameters of the choice probabilities measure the relative change in the choice probability as a result of a change in the explanatory variables. To gain more insight in the size of the wealth effect, we present computations of the marginal effects of wealth on the exit rates in section 4.3. In this section we also present a decomposition of the total effect of wealth into a causal effect and a 'bias'. We present this decomposition both in terms of marginal effects and in terms of elasticities. Section 4.2 presents the outcomes of the tests for the exclusion restrictions.

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 6 displays the estimation results for net liquid wealth, while Table 7 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. 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'. 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 6a 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 6a 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 parameter 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 parameter γ_I is significantly different from zero. This indicates that there are time-invariant unobservable factors that make workers that exit involuntarily different from workers that stay on the job during the sample period. As discussed before, workers that exit may have unfavourable characteristics, like a lower productivity possibly, that make them more likely to end up in the state of unemployment or disability. 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 6e. 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 time-invariant unobservables in wealth and 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 6a, once we allow for this negative correlation in unobservables. Apparently there are negative unobserved time-invariant worker's characteristics that go together with lower wealth levels and a higher probability of involuntary job exit. We may think of lower job attachment attitude and low productivity. 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. 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 parameter estimates of the involuntary job exit rate in Table 6a, 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 6b 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 in random effects between wealth and the job exit probability. If we restrict correlations in unobservables to zero, net liquid wealth has a positive significant effect on the job exit rate into (early) retirement (with a p-level of 0.06).

If we 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 6e), 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). As a robustness check we also estimated the model with an extended set of instruments, adding information about how well households are able to 'make ends meet'. 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 6: 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 6c 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 net liquid wealth increases with age and with the level of education. Net liquid 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 6d contains the results for the initial labour market state, while Table 6e shows the correlation coefficients $\rho_{\alpha\epsilon}$ and $\rho_{\omega\epsilon}$ of the unobservables in the initial state with the exit rates and wealth, respectively. The estimates of the correlation coefficients 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 6d 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 6e, 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.[27]

We see some interesting differences between the results with the alternative measure of net total wealth (Table 7), and the results obtained with net liquid wealth (Table 6).[28] Table 7a shows that once we allow for correlations in unobservables, the coefficient estimate of wealth in the probability of involuntary job exit becomes 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 7d 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

[27] This is also the reason why results for the model in this paper can be different from results obtained in Bloemen (2011), who relies on a rich set of regressors in the exit rates: the observable regressors cannot absorb all the individual specific correlation across time in exit rates.

[28] For reasons of conciseness, we do not display the estimates for the initial condition in Table 7. For the case with correlation restricted to zero the estimates are the same as in Table 6d, while for the unrestricted case they are not much different.

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 7c) 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 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 7d 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 Testing the exclusion restrictions

Exploiting the fact that we have multiple instruments, we test the exclusion restrictions. For each instrumental variable, we re-estimate the model, including the instrument in the job exit rates, and we compute the likelihood ratio test statistic. As an example, consider the instrumental variable derived from the survey question whether it is the right time to make large expenditures. The survey information was transformed into dummy indicators for the outcomes 'favourable' and 'neither favourable, nor unfavourable', so we add these two dummy variables to the two job exit probabilities, implying that we need to test whether the corresponding four coefficients are jointly zero. We test this by computing the likelihood ratio test statistic and comparing it to critical values of the chi-squared distribution with 4 degrees of freedom. For the exclusion restrictions to be valid, they should not show a separate impact on the exit rates. By including a set of instruments in the exit rates, while maintaining the exclusion restrictions for the remaining instruments, we can test whether they have a separate impact on the exit rates. The principle of the test is similar to an overidentifying restrictions or Sargan test, where the availability of multiple instrumental variables is exploited. An important caveat of these type of tests is that, while for one set of instruments the exclusion restrictions are being tested, the assumption is maintained that the remaining instruments are valid. We try to deal with this as best as possible by circulating the role of the instruments in the tests, and testing for each set of instruments the overidentifying restrictions.

Tests are performed both for the model variant with net liquid wealth and for the model variant with net total wealth. Table 8 shows the test statistics for each instrumental variable. It also shows the relevant number of degrees of freedom and the corresponding critical values of the chi-squared distribution at the 10 and the 5 per cent level. For all the instruments, the value of the likelihood ratio test statistic is below the critical value, both at the 5 and at the 10 per cent level.[29] Thus, the exclusion restrictions are not rejected.

4.3 Decomposition into 'causal effect' and 'bias': marginal effects and elasticities

Section 4.1 presented the parameters estimates, and the parameter estimates of multinomial choice probabilities are related to the relative change in probabilities due to a change in the variable. In this section we gain further insight in the sensitivity of the

[29] This also holds for the instrumental variable 'can make ends meet' about which we had the biggest a priori worries (section 3.3). We do see that this the LR test statistic for testing the exclusion restrictions is the biggest of all instrumental variables, but its value is still well below the critical value at the 5 and even the 10 per cent level.

job exit rates with respect to the level of wealth, by both computing the marginal effects of wealth on exit rates and by evaluating elasticities. Both the marginal effect and 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 decompose up the derivative of the exit probability with respect to wealth into a *causal* effect and a *bias*. In Appendix B we show that the derivative consists of three terms: the first term corresponds to the causal effect, and the second and third term to the bias. The latter two terms represent the effect of wealth on job exits that arises because of correlation in the random effects between job exits and wealth and initial conditions. The expression measuring this effect is zero 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 the effect that arises due correlation through unobservables (the *bias*).

Table 9 shows the marginal effects of wealth. We have evaluated the marginal effects for a worker of the age of 58. The values of the remaining explanatory variables are set to their sample means. To compare the order of magnitude of the impact of wealth on the job exit probabilities, we also present the marginal effect for other variables. We show marginal effects for age, education, health, having a permanent job, and the absence of children in the household.

The upper part of Table 9 shows the marginal effects on the involuntary exit rate, while the lower part shows job exits due to retirement. The left two columns show the results for net liquid wealth while the results for net total wealth are shown in the columns at the right side.

Conform the estimation results in Tables 6a and 7a, no significant causal effect of wealth is found on the involuntary exit rates. The impact is also small in magnitude. It is interesting to see that the bias effect of wealth on involuntary job exits is negative. This is consistent with the story that a higher level of wealth may proxy for favourable personal characteristics, making it less likely that the workers exit by the involuntary exit route. The opposite signs in bias and causal effect make the total effect negative. Having opposite signs for bias and causal effect may be a reason why it is difficult to find accurate estimates of wealth on involuntary exits. The table shows the bigger (negative) effects of a better health and having a permanent job on involuntary exits.

For the retirement exit rate we find both for net liquid wealth and for net total wealth a positive and significant total effect, but results differ if we look at the decomposition. For net liquid wealth we see that is difficult to distinguish the causal effect from the bias on job exit into retirement. The total effect is positive and significant, but the causal effect and the bias are roughly of equal size. To interpret the magnitude of the causal effect, we may do a simple back-of-the-envelope calculation to answer the question how big an increase in net liquid wealth we need to raise the retirement rate by 1 percentage point: we approximately need an increase in wealth by 0.01/0.00071 (in units of 10,000 guilders) which corresponds to an increase in wealth by roughly 64,000 Euro. This is a large number, but falls well within the sample variation that we reported in Table 1.

For net total wealth, the bias is much smaller compared to the causal effect, and the causal effect is more precisely estimated. Doing a similar calculation for the magnitude of the causal effect of net total wealth on the retirement rate, to get an increase in the retirement rate by 1 percentage point, we roughly need an increase in net total wealth by 0.01/0.00040 (in units of 10,000 guilders) corresponding to an increase in net liquid wealth by roughly 110,000 Euro, which is a large number but at the same time a number that is well within the limits of the sample variation. This order of magnitude can easily measure the difference between someone with a below average valued house, and someone with a more expensive house.

For some other covariates we find bigger effects: we find an increasing impact of age, and individuals with university level of education are more likely to stay on the job longer. It matters whether there are no children in the household anymore, and workers with a regular, permanent, job are more likely to make use of the retirement exit route. Health does not have much impact on exit by retirement anymore.

Table 9 showed the absolute changes in the exit probability due to changes in wealth. Another way of exposing the impact of wealth is by computing elasticities. The upper part of the Table 10 displays the elasticities for net liquid wealth. Standard errors are in brackets. Conform the findings for the marginal effects, the elasticity for the causal effect of net liquid 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 of the effect of net liquid 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 value of the elasticity of the *total effect* is comparable to results obtained by Bloemen (2011), who ignores the role of unobservables. The results show that it is difficult to empirically disentangle the *total effect*, which is estimated precisely, into the *causal* effect and the *bias* which are both estimated imprecisely. Note, though, that the separate coefficients in Table 6 seemed to indicate that the impact of net liquid 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 net liquid wealth effect running through the unobservables, which is quite a bit larger than the causal effect. For both the total effect and for the causal effect and the bias, 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.[30]

The lower part of Table 10 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 (the *bias*), 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 taking the standard errors into consideration, we would not make a large mistake here if the distinction between causal effects and effects running through unobservables were ignored. The value of this total elasticity is again quite close to the value obtained in Bloemen (2011), ignoring correlation in unobservables. Interestingly, for the causal

[30] The standard errors were computed using the delta method, and represent the variation due to the variance in the parameters.

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.[31]

5 Conclusions

We analyzed the effect of private wealth on job exit at older age. We constructed a model framework that allows us to decompose the total effect of private wealth into a *causal* effect and an effect that is channeled through correlation in time-invariant unobservables, the *bias*. Our model is a simultaneous dynamic panel data model with random effects, with equations for job exit into several destinations, net wealth, and an initial condition. We instrument wealth with survey information that varies with business cycle shocks, and we perform statistical tests for the exclusion restrictions, exploiting the fact that we have multiple instrumental variables. The exclusion restrictions are not rejected by the test. We present results using net liquid wealth and net total wealth (excluding the value of the house and the outstanding mortgage debt). Results are robust if an extended set of instrumental variables is used.

Results for the total effect, adding up the causal effect and the bias, are close to results obtained in a study by Bloemen (2011), which is completely based on observable regressors and ignores potential correlation in unobservables. The total effect shows a positive and significant impact of wealth into retirement, and no effect of wealth on involuntary job exit, for both measures of net wealth. However, for net liquid wealth estimation results reveal a correlation between unobservables in exit rates and net wealth, and the total effect is biased upward for retirement and downward for involuntary job exits. The decomposition of the elasticity into a causal effect and a bias shows that we get neither a precise estimate for the causal effect nor for the bias.

For net total wealth the causal effect on retirement is positive, while correlation in unobservables between job exit rates and net total wealth is not detected. One possible

[31] We also computed the elasticities for the estimates obtained with the extended instrument set (adding the variable 'can make ends meet') (Table A). The values do not differ much from the results in Table 9 and conclusions remain the same.

explanation for the more pronounced effect of net total wealth on retirement is that net total wealth contains more variation than net liquid wealth. Another explanation may lay in the nature of housing equity and mortgage debt itself. A higher outstanding mortgage debt may provide an additional incentive to stay on the job. Housing wealth is illiquid in the short run, and can be made liquid only by selling the house. In this respect housing wealth is closer to pension wealth, which is also illiquid and only becomes available upon eligibility in the shape of income provision. (As opposed to pension wealth, it may be possibly to borrow against housing equity).

Computation of marginal effects revealed that we need fairly large increases in wealth levels to find an 'economically significant' impact on retirement rates (of, say, one percentage point), but on the other hand those increases are well within the sample variation. For an average individual with age 58 we computed that if net liquid wealth is increased by 64,000 Euro, or net total wealth by 110,000 Euro, the exit rate into retirement can be raised by 1 percentage point. Once pension systems become more flexible in terms of eligibility and the choice of the retirement age, net wealth may become an increasingly important factor in the choice to retire, and policy makers should be aware that policy measures to induce workers to stay on the job and retire later may be partially offset for workers with a sufficiently high net (total) wealth level. However, from a point of view of public finance, that should not be a problem if retiring earlier is accounted for in an actuarially fair way.

References

Berg, G.J. van den, and M. Lindeboom (1988), Attrition in panel survey data and the estimation of multi-state labor market models, Journal of Human Resources, Vol. 33, pp. 458-478.

Bhargava, A. and J.D. Sargan (1983), Estimating dynamic random effects models from panel data covering short time periods, Econometrica, Vol. 51, No. 6, pp. 1635-1659.

Bloemen, H.G. (2002), The Relation between Wealth and Labour Market

Transitions: An Empirical Study for the Netherlands, Journal of Applied Econometrics, Vol. 17, pp. 249-268.

Bloemen, H.G. (2007), The impact of wealth on the job exit rates of elderly workers in the Netherlands, Tinbergen Institute Discussion Paper TI2007-002/3.

Bloemen, H.G. (2011), The effect of private wealth on the retirement rate: an empirical analysis, Economica, Vol. 78, pp. 637-655.

Blundell R, T. Magnac and C. Meghir (1997), Savings and Labor Market Transitions, Journal of Business and Economic Statistics, Vol. 15, no. 2, pp. 153-164.

Bover, O. (2006), Wealth effects on consumption: microeconometric estimates from a new survey of household finances, CEPR Discussion Paper, No. 5874.

Burbidge, J.B, L. Magee, and A.L. Robb (1988), Alternative transformations to handle extreme values of the dependent variable, Journal of the American Statistical Association, Vol. 83, No. 401, pp. 123-127.

Carroll, C.D. and A.A. Samwick (1998), How important is precautionary saving?, The Review of Economics and Statistics, Vol. 80, No. 3, pp. 410-419.

Danforth, J.P. (1979), On the role of consumption and decreasing absolute risk aversion in the theory of job search. In: S.A. Lippman and J.J. McCall (Eds.), *Studies in the Economics of search*, pp. 109-131, Amsterdam: North-Holland.

Dvornak, N. and M. Kohler (2007), Housing wealth, stock market wealth and consumption: a panel analysis for Australia, Economic Record, Vol. 83, pp. 117-130.

French, E, (2005), The effects of health, wealth and wages on labour supply and retirement behaviour, Review of Economic Studies, Vol. 72, pp. 395-

427.

Greene, W. (2004), The behavior of the maximum likelihood estimator of limited dependent variables in the presence of fixed effects, Econometric Journal, Vol. 7, pp. 98-119.

Gustman, A.L. and T.L. Steinmeier (2000), Retirement in Dual-Career Families: A Structural Model, Journal of Labor Economics, Vol. 18, No. 3, pp. 503-545.

Gustman, A.L. and Steinmeier, T.L. (2005), The social security early retirement age in a structural model of retirement and wealth, Journal of Public Economics, Vol. 89, pp. 441-463.

Kapteyn, A, and K. de Vos (1998), Social Security and Labor-Force Participation in the Netherlands, American Economic Review, Vol. 88, no. 2, pp. 164-167.

Kingston, G.H. (2000), Efficient Timing of Retirement, Review of Economic Dynamics, Vol. 3, pp. 831-840.

Lentz, R. and T. Tranaes (2005), Job search and savings: wealth effects and duration dependence, Journal of Labor Economics, Vol. 23, nr. 3, pp. 467-490.

Neyman, J. and E.L. Scott (1948), Consistent estimation from partially consistent observations, Econometrica, Vol. 16, pp. 1-32.

Ooijen, R. van, M. Mastrogiacomo, and R. Euwals (2010), Private wealth and planned early retirement: A panel data analysis for the Netherlands 1994-2009. Netspar Discussion Paper 10/2010-075.

Smith, J.P. (1999), Healthy bodies and thick wallets: the dual relation between health and economic status, Journal of Economic Perspectives, Vol. 13, Nr. 2, pp. 145-166.

Stock, J.H. and D.A. Wise (1990), Pensions, the Option Value of Work, and Retirement, Econometrica, Vol. 58, no. 5, pp. 1151-1180.

Venti, S. and D. Wise (1991), Aging and the Income Value of Housing Wealth, Journal of Public Economics, Vol. 44 (3), pp. 371-397.

Wooldridge, J.M. (2005), Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity, Journal of Applied Econometrics, Vol. 20, pp. 39-54.

Woolley, M, (2004), Optimal Consumption and Investment with Labor Income Uncertainty and Endogenous Retirement, working paper, unc.

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

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

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 $l_i(\alpha_i,\omega_i)$[32] is

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

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

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

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:

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

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

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

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

[32] 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.

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 Comparison instruments and business cycle fluctuations

A motivation for choosing the instrumental variables discussed in section 3.3 is that these variables represent shocks. In this appendix we compare the time patterns found in the aggregate descriptives of the survey variables with business cycle indicators. Table A 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 A 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[33] to the questions (see row 'Summary' in Table A).

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

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 A shows yearly variation with the business cycle in this series as well.

C 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 $N = 1187$		Differences significant
Variable	Mean	standard deviation	Mean	standard deviation	
Age	57.4	5.3	51.3	3.8	Yes
# Children living in the household	0.45	0.82	1.1	1.1	Yes
Net liquid wealth (guilders)	53110	126191	60504	146294	No
(Median):	(15177)		(21710)		
Net total wealth (liquid + illiquid)	184256	267331	269514	498213	Yes
(Median):	(85044)		(170600)		
Non-labour income (excl. asset inc.)	345	3565	495	6890	No
lagged (monthly) (Median):	(0)		(0)		
Earnings spouse (monthly, if employed)	1737	2762	1938	2815	No
(Median)	(1299)		(1641)		
Non-labour income (excl. asset inc.)	68	6379	95	1259	No
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 6a: 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
N=1759 individuals, NT=4357 individuals-years

Table 6b: 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
N=1759 individuals, NT=4357 individuals-years

Table 6c: 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 (instrument):				
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 (instrument):				
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 (instrument):				
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
N=1759 individuals, NT=4357 individuals-years

Table 6d: 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
N=1759 individuals, NT=4357 individuals-years

Table 6e: 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
N=1759 individuals, NT=4357 individuals-years

Table 7a: 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
N=1759 individuals, NT=4357 individuals-years

Table 7b: 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
N=1759 individuals, NT=4357 individuals-years

Table 7c: 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 (instrument):				
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 (instrument):				
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 (instrument):				
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
N=1759 individuals, NT=4357 individuals-years

Table 7d: 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
N=1759 individuals, NT=4357 individuals-years

Table 8 Testing the exclusion restrictions: likelihood ratio test statistics

				Model with:	
				net liquid wealth	net total wealth
Instrumental variable:	DF	$\chi^2_{0.10}$	$\chi^2_{0.05}$	LR	LR
Time to make large expenditures	4	7.8	9.5	2.9	2.5
Income in past 12 months	8	13.4	15.5	9.9	9.8
Financial situation in past 12 months	8	13.4	15.5	2.8	2.7
Can make ends meet (extended instruments set)	8	13.4	15.5	11.1	10.3

DF: degrees of freedom; LR: value likelihood ratio test statistic
χ^2_α: critical value chi-squared distribution 100α% level

Table 9 Marginal effects of selected variables
evaluated at age 58, and sample means.
Includes decomposition the total effect into causal effect and bias.

	Marginal effects on the involuntary exit rate			
	results with		results with	
Variable:	net liquid wealth		net total wealth	
Causal effect wealth	0.00010	0.00012	0.000060	0.000041
'bias' effect wealth	-0.00035	0.00022	-0.000084	0.000084
Total effect wealth	-0.00025	0.00021	-0.000024	0.000074
Age	-0.0013	0.0010	-0.0012	0.0012
Education (reference level 5, highest)				
Education level 1 (lowest)	0.0026	0.0106	0.0027	0.0121
Education level 2	-0.0166	0.0102	-0.0157	0.0107
Education level 3	-0.0045	0.0068	-0.0042	0.0076
Education level 4	-0.0045	0.0073	-0.0045	0.0081
No Children in household	-0.0018	0.0040	-0.0017	0.0045
Permanent job	-0.029**	0.010	-0.032**	0.011
Health (reference: bad)				
Very good health	-0.038**	0.013	-0.043**	0.015
Good health	-0.031**	0.011	-0.034**	0.012
Reasonable health	-0.028**	0.011	-0.029**	0.012
	Marginal effects on the (early) retirement rate			
	results with		results with	
Variable:	net liquid wealth		net total wealth	
Causal effect wealth	0.00071	0.00052	0.00040*	0.00024
'bias' effect wealth	0.00088	0.00072	0.00009	0.00013
Total effect wealth	0.00159**	0.00080	0.00050**	0.00025
Age	0.040**	0.009	0.036**	0.008
Education (reference level 5, highest)				
Education level 1 (lowest)	0.10*	0.06	0.10**	0.05
Education level 2	0.13**	0.05	0.13**	0.05
Education level 3	0.13**	0.05	0.13**	0.05
Education level 4	0.06*	0.04	0.06	0.04
No Children in household	0.031*	0.017	0.031*	0.016
Permanent job	0.12**	0.05	0.11**	0.05
Health (reference: bad)				
Very good health	0.016	0.062	0.007	0.059
Good health	0.006	0.059	0.001	0.057
Reasonable health	0.004	0.060	-0.003	0.058

Wealth in units of 10,000
**: significant at 5% level; *: significant at 10% level

Table 10 Elasticities of exit probabilities with respect of wealth evaluated in sample means.
Decomposing the total effect into causal effect and bias.

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

Table A: Observed time patterns in 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