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THE RELATION BETWEEN WEALTH AND LABOUR MARKET TRANSITIONS: AN EMPIRICAL STUDY FOR THE NETHERLANDS

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THE RELATION BETWEEN WEALTH AND LABOUR MARKET TRANSITIONS: AN EMPIRICAL STUDY FOR THE NETHERLANDS[1]

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Abstract

We study the relationship between wealth accumulation and labour market transitions. Point of departure is a structural life cycle model which serves as a basis for an empirical reduced form specification. The life cycle model describes the behaviour of an expected utility maximizing individual who is faced by uncertainty in the availability of jobs and by risk of lay-off. These types of uncertainty introduce income uncertainty, which in turn provides a motive for precautionary saving. The structural model generates two empirically implementable relationships. First, there is an Euler equation and the model implies that it should include labour market status as an

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explanatory variable. Second, the model implies that the probability of a labour market transition depends on the amount of wealth lagged one period. Under certain assumptions, the structural model implies a negative effect of the amount of wealth on the probability of becoming or staying employed. A reduced form model of labour market transitions is specified in order to test for this implication. Estimation of various specifications reveal that unobserved heterogeneity plays an important role in explaining the relation between transitions and wealth.

1 Introduction

In this paper we assess the relationship between wealth accumulation and labour market transitions.

Many studies have appeared in which the life cycle model is used as a basis for explaining consumption and saving behaviour over time, see e.g. Deaton (1992) for an overview. There are several examples in the literature (MaCurdy (1983), Hotz, Kydland and Sedlacek (1988)) that include labour supply in the life cycle model. In these models the availability of a job is certain, and the individual can choose the optimal amount of working hours within each period. Estimation of these models is usually based on the Euler equations, which define an orthogonality condition based on the first order condition for optimal consumption and labour supply, making use of GMM as developed by Hansen and Singleton (1982).

These models do not describe the process of transitions between different labour market states: A process that is subject to restrictions on the demand side of the labour market and in which non-working individuals may be involuntarily unemployed, and employed individuals are faced by a lay-off risk.

Uncertainty about future labour market status is closely related to income unceraínty. Income uncertainty is often used as an explanation for the presence of precautionary savings, and as an explanation for deviations of the consumption pattern from the pattern implied by the standard life cycle model, see e.g. Zeldes (1989). Someone's labour market opportunities and risk of lay-off probably are the most tangible components of income uncertainty.

Reduced form models of labour market transitions are relatively easy to estimate. It is problematic, however, to explain both the saving decision and the labour market transition process in one structural model and estimate the parameters simultaneously. In structural search models that explain labour market transitions, savings are generally set to zero, even though these models claim to explain intertemporal behaviour, see e.g. Bloemen (1992).

There are a few studies in which attention is focussed on the relation between savings (wealth accumulation) and labour market state. In the model by Danforth

(1979), an individual maximizes intertemporal utility, which is a function of consumption in each period. Moreover, the individual can choose each period whether or not to work. The latter decision influences the budget available for consumption. The emphasis is on the implications of the assumption of decreasing absolute risk aversion on the relation between wealth and choice of labour market state. It is shown that under this assumption, a higher amount of wealth decreases the probability of job acceptance.

Blundell, Magnac and Meghir (1994) specify a model of expected life time utility maximisation. Here, utility not only depends on consumption, but on labour market state as well. They introduce job offers as a random process, and allow for risk of lay-off. Under the assumption that leisure is a normal good, they are able to derive a negative relation between wealth at the beginning of the period and the probability of staying or becoming employed. They also show that an Euler equation holds. Their emphasis is on finding conditions under which all the structural model parameters can be identified without needing to solve the whole dynamic programming problem. The latter is complicated because of the mixed discrete-continuous nature of the problem. Dynamic models of discrete choice are complicated to solve, but more and more methods of estimation are becoming available (Keane and Wolpin (1994a), Hotz and Miller (1993)). A model of mixed discrete-continuous type is almost impossible to solve because of the infinite number of values the continuous variable can take. Keane and Wolpin (1994b) deal with this problem by discretizing the continuous variable and dividing it into classes. Nevertheless, the number of alternatives to evaluate for the solution of the dynamic programming problem will be numerous.

Stancanelli (1995) estimates a reduced form empirical specification with UK data, motivated by the work of Danforth (1979).

In the present paper, the model by Blundell, Magnac and Meghir (1994) is taken as point of departure. We estimate the Euler equation and a reduced form model of labour market transitions on Dutch data from the Socio-Economic Panel (SEP), collected by Statistics Netherlands (CBS). An extensive description of the dataset can be found in Alessie, Pradhan and Zandvliet (1993).

In section 2 we describe the model and indicate the empirical specification that can be derived form it. In section 3 empirical results are presented. First of all we present the results of estimating the Euler equation, after which various specifications of a model of labour market transitions are estimated. Section 4 concludes.

2 The model

2.1 Preferences, budget constraint and arrival rates

In this section we formulate the model of consumption and labour market transitions, following Blundell, Magnac and Meghir (1994). Point of departure is the rational, forward looking individual, who maximizes life-time utility, subject to the intertemporal budget constraint, and subject to the job offer arrival process, both specified below. We now specify the main ingredients, which are the utility function, the budget constraint and the job offer arrival process.

- Utility

  The utility function in period t is assumed to be a function of

  - period t consumption, c_t
  - labour market state d_t, with

$$\begin{array}{ll} d_t = 1 & \text{if employed} \\ d_t = 0 & \text{if unemployed} \end{array}$$

  The period t utility function can be written as

$$u_t = u(c_t, d_t) \tag{1}$$

  The intertemporal utility function is a discounted sum of intratemporal utility functions. The objective is to maximize expected life time utility, subject to the job offer arrival process and the intertemporal budget constraint. The choice variables are consumption and labour market status. At time zero, the individual faces the following decision problem:

$$\max_{\{c_t,d_t\}_{t=0}^{T}} E_0 \sum_{t=0}^{T} \beta^t u(c_t, d_t) + W_{T+1}(A_{T+1}) \tag{2}$$

subject to

- job offer arrival process
- budget constraint

in which β respresents the subjective rate of discount, and T represents working life-time. $W_{T+1}(A_{T+1})$ is the terminal value function.

- The budget constraint

  It is assumed that at time t, the individual knows the wage income, w_t, that can be earned while employed, and the benefit income, b_t, that can be earned while unemployed. Furthermore, assume that there is an amount of state independent, or non-labour, income μ_t. The stock of assets at the beginning of period t is denoted by A_t, and the interest rate r is assumed to be known and time invariant. The budget constraint for period t is

$$A_{t+1} = (1+r)A_t + d_t w_t + (1-d_t)b_t + \mu_t - c_t \tag{3}$$

  Due to the constraint, choosing (c_t, d_t) is equivalent to choosing (A_{t+1}, d_t). The choice variables in period t are the state variables for the next period decision. A different labour market state in period t implies a different level of wealth A_{t+1}.

- The job offer process

  Let e_t denote a dummy variable indicating whether or not a job is offered in period t:

$$e_t = 1 \quad \text{if a job offer is received}$$
$$\quad = 0 \quad \text{if no job offers are received}$$

Similarly, let f_t denote a dummy variable indicating whether or not a job offered is acceptable:[2]

$$f_t = 1 \quad \text{if the job is acceptable}$$
$$\quad = 0 \quad \text{if not}$$

The relationship between transitions, offers and acceptance is summarized by $d_t = e_t f_t$. Throughout it is assumed that e_t is independent of c_t, A_{t+1} and f_t. This assumption implies that the transition probability can be written as the product of an arrival probability and a job acceptance probability. The job offer arrival probability in period t is given by

$$E(e_t|d_{t-1}) = \lambda_t^{d_{t-1}} \tag{4}$$

$\lambda_t^{d_{t-1}}$ is the probability of obtaining at least one job offer in period t, conditional on the labour market state d_{t-1} in the period before. For individuals with $d_{t-1} = 1$, $\sigma_t = 1 - \lambda_t^1$ may be interpreted as the probability of being laid off in period t.

If individuals obtain a job offer, they have to decide whether or not to accept the offer. In making this decision, they take into account that the current labour market state affects the next period labour market opportunities, as the period $t+1$ arrival rate $\lambda_{t+1}^{d_t}$ depends on d_t.

2.2 The Bellman equation

Having specified the utility function, the budget constraint and the arrival process, we can specify the Bellman equation. The decision process is of a mixed discrete-continuous type. Conditional on the labour market state d_t, the

[2] If more than one job offer is received, the job with the highest value determines acceptance.

optimal consumption level $c_t^{d_t}$, or, equivalently, the optimal asset level $A_{t+1}^{d_t}$, can be determined. If a job offer is available, the individual can determine the optimal labour market state by comparing the conditional value functions (conditional on labour market state d_t) and choosing the labour market state yielding the higher value. Let $V_t^{d_t}(A_t, d_{t-1})$ denote the conditional value function, conditional on labour market state d_t, and state variables A_t and d_{t-1}:[3]

$$V_t^{d_t}(A_t, d_{t-1}) = \max_{c_t} \left\{ u(c_t, d_t) + \beta E_t V_{t+1}^{d_{t+1}}(A_{t+1}, d_t) \right\} \text{ subject to (3)} \tag{5}$$

Denote the solution of c_t and A_{t+1}, conditional on labour market state d_t, by

$$\begin{aligned} c_t^{d_t} &= c_t^{d_t}(A_t, d_{t-1}) \\ A_{t+1}^{d_t} &= A_{t+1}^{d_t}(A_t, d_{t-1}) \end{aligned} \tag{6}$$

Then we may write

$$V_t^{d_t}(A_t, d_{t-1}) = u(c_t^{d_t}, d_t) + \beta E_t V_{t+1}^{d_{t+1}}(A_{t+1}^{d_t}, d_t) \tag{7}$$

Using the specification of the job offer process we can write the expectation at the right hand side of (7) as

$$E_t V_{t+1}^{d_{t+1}}(A_{t+1}^{d_t}, d_t) = E_t \left[\lambda_{t+1}^{d_t} \max \left(V_{t+1}^1(A_{t+1}^{d_t}, d_t) - V_{t+1}^0(A_{t+1}^{d_t}, d_t), 0 \right) \right] + E_t V_{t+1}^0(A_{t+1}^{d_t}, d_t) \tag{8}$$

2.3 Choice of labour market state

If a job offer arrives in period t, i.e if $e_t = 1$, then the choice of labour market state is made by comparing the value functions for the different alternatives. The decision rule is

$$\begin{aligned} d_t &= 1 \quad \text{if } V_t^1(A_t, d_{t-1}) > V_t^0(A_t, d_{t-1}) \\ &= 0 \quad \text{otherwise} \end{aligned} \tag{9}$$

[3]Note that the value of d_{t-1} does not affect the level of the value function $V_t^{d_t}(A_t, d_{t-1})$. It does, however, affect the expected level of the value function, conditional on period $t-1$ information, as arrival rates depend on d_{t-1}.

The labour market state affects the value functions, and consequently the choice rule, in different ways. First of all it affects current period utility, both directly, as it appears as an argument in the utility function, and indirectly, as a different labour market state leads to a different consumption level. Then it affects next period's value through the wealth variable, and moreover, it affects next period's expected value through the job offer arrival probability. Differences in arrival rates play a role in the choice of labour market state. If the arrival rate for employed individuals is higher than the arrival rate for nonparticipants, labour market perspectives are better if you are in the state of employment. This may be an additional incentive for a nonparticipant to accept a job, as accepting a job means that you enter the state with the better perspectives.

Using (9) and the arrival rate, we can specify staying-on and transition probabilities, which we shall denote by $\theta_t^{d_{t-1}}(A_t)$.

$$\theta_t^{d_{t-1}}(A_t) = \lambda_t^{d_{t-1}} P\left(V_t^1(A_t, d_{t-1}) > V_t^0(A_t, d_{t-1})\right) \qquad (10)$$

The second factor of (10) is the job offer acceptance probability, which is determined by randomness in job offer characteristics (e.g. by the wage). Job offer characteristics are assumed to be independent across job offers.

Blundell, Magnac and Meghir (1994) derive conditions for separate identification and estimation of the arrival and lay-off rates from longitudinal data. The conditions for the separate identification of arrival and lay-off rates rely on the assumption that there is no correlation across time in unobserved preference errors. The estimation method of Hotz and Miller (1993) provides another method to obtain separate estimates for arrival and lay-off rates[4]. This method also requires the absence of unobserved randomness that is correlated across time. In the present paper, the emphasis is on the reduced form estimation of transition probabilities. In the application we will check for the presence of individual effects, which causes correlation across time.

Finally, Blundell, Magnac and Meghir (1994) show that if leisure is a normal

[4]Bloemen (1994) describes how this method can be applied to the present model.

good, there exists a reservation asset level: If assets at the beginning of the period are above the reservation asset level, a job offer will not be accepted.

2.4 The Euler equation for consumption

The Bellman equation (7) can be used to derive the Euler equation for consumption:

$$\frac{\partial u(c_t^{d_t}, d_t)}{\partial c_t} = \beta(1+r)E_t \frac{\partial u(c_{t+1}^{d_{t+1}}, d_{t+1})}{\partial c_{t+1}} \tag{11}$$

Blundell, Magnac and Meghir (1994) propose to use this equation as a basis for the estimation of the parameters of the utility function. Job offer arrival and lay-off rates cannot be identified from this Euler equation.

3 Empirical analysis

3.1 Data

The data are drawn from the Dutch Socio Economic Panel (SEP), collected by the CBS. In the survey, no direct measure of consumption is available. From 1987 on, extensive information is available on various asset and debt components, which can be used to construct net total wealth. Information on assets and debts is collected on a yearly basis. Alessie, Pradhan and Zandvliet (1993) provide a descriptive analysis on the various wealth measures in the SEP. Alessie and Zandvliet (1993) comment on the measurement of household saving obtained from first differencing wealth measures.

The different asset components that are used to calculate total net wealth are the balance on savings or deposit account, savings certificates, value of bonds. stocks and options, the value of the own house and other real estate, value of own car, amount of money lent and the credit balance on checking account (positive or negative). The debt components are debt loan or credit, amount of hire purchase, amount of mortgage and other loans and debts. These values are added up to obtain total net wealth A_t.

Alessie and Lusardi (1993) measure consumption in period t by $c_t = rA_t + y_t - S_t$, in which A_t is net total wealth at the beginning of period t, y_t is income[5] in period t, and $S_t = \Delta A_{t+1}$ is saving in period t. The interest rate r is assumed to be 3%. This value roughly coincides with the value of the real rate of interest during the period. In the present paper, we basically use the same measure of consumption. The available data are from 1987 up to 1991. Self-employed and retired persons are excluded from the sample.

Assets are measured at the household level. The labour market state variable d_t represents tha labour market state of the head of the household.

The data will be used to estimate the Euler equation and the labour market transitions model. For the Euler equation, we can only use individuals who are in the sample for three subsequent periods, due to the first differencing in wealth to obtain the consumption measure and the first differencing in the Euler equation. Consquently, we can estimate the Euler equation for three periods.

Tables 1A and 1B show the descriptive statitics of the dataset that is used in the estimation of the Euler equation. The notation in the table coincides with the notation defined in section 2. The total number of observations is 6373 over 3014 different households. The tables shows the sample mean and standard deviation of the consumption measure in two subsquent periods, the level of wealth in three subsquent period, and the change in level of wealth for two periods. The upper part of table 1A shows the statistics for the whole sample. The middle and lower section of the table show the statistics for individuals who are respectively nonparticipant and employed in the first of two subsequent periods of observation. Employed individuals have higher levels of assets, consumption and savings than nonparticipants. Table 1B shows the same statistics, but here the sample is split up with respect to state of destination as well. The first section of the table shows the statistics on nonparticipants who remain nonparticpant in two subsequent periods. The second section shows nonparticipants experiencing a transition into employment. The third part displays the statistics of employed persons with a

[5]In the notation of equation (3): $y_t = d_t w_t + (1 - d_t) b_t + \mu_t$

transition into nonparticipation, and the fourth part is on employed persons who keep their job.

For nonparticipants who become employed in the next period, there is an increase in the level of savings, which is not observed for individuals who remain nonparticipant, even though the initial level of savings is about the same for the two subgroups of the sample. For the employed individuals something similar is going on. For those who become nonparticipant there is a decrease in the level of saving. Note that nonparticipants who become employed have lower values of assets than nonparticipants who remain nonparticipant. Similarly, employed individuals who become nonparticipant have lower values of assets than employed individuals who remain employed.

In the estimation of the reduced form transition model, a larger data set is used, as for this purpose it is sufficient to observe individuals in two subsequent periods. Table 2 shows the number of transitions from one period to another that is observed.

3.2 Estimating the Euler equation

In this section the Euler equation for consumption (11) is estimated. Following Blundell, Magnac and Meghir (1994), we specify a utility function that is quadratic in consumption:[6]

$$u(c_t, d_t) = -\frac{1}{2}(c_t - \delta d_t - \alpha' z_t)^2 \tag{12}$$

in which z_t is a vector of exogenous taste shifters, and δ and α are parameters to be estimated. Throughout, we assume the rate of time preference ρ to be equal to the interest rate r[7]. The Euler equation (11) becomes:

$$E_t\left[\Delta c_{t+1} - \delta \Delta d_{t+1} - \alpha' \Delta z_{t+1}\right] = 0 \tag{13}$$

[6]Note that we also could have included a second term in the utility function, containing labour market state, and allowing labour market state to influence the level of utility without effecting the marginal utility of consumption. However, its parameters are not identified by estimation of the Euler equation for consumption.

[7]The Euler equation has also been estimated with $\rho = 0.01$. This did not lead to basically different results.

In the vector z_t of taste shifters we include a dummy variable for marital status, the log age of head of the household and its square, and the logarithm of the total number of persons in the household.

The set of instruments includes the elements of Δz_{t+1}. This requires the assumption that its elements are known at time t, which is not unlikely, considering the variables that have been included. Apart from Δz_{t+1}, we need instruments for the endogeneously determined right hand side variable Δd_{t+1}. Various instruments are considered. First of all, there are dummy variables that are related to expectations about future income of the household and the future financial situation of the household are included. The structural model suggests that expectations with respect to the future play a role. The dummy variable incexp1 equals one if household income is expected to increase in the next 12 months, zero otherwise. Incexp2 equals one if the income is expected to stay the same. The dummy variable finexp1 equals one if the financial situation of the household is expected to improve in the next 12 months, zero otherwise. Finexp2 equals one if the financial situation of the household is not expected to change. Apart from these dummy variables, we consider the use of labour market state in period t, d_t, the sex of the head of the household, and dummy variables for the level of education. In case of correlation across time, labour market state in period t may not be exogenous, and therefore we will estimate the model both with and without d_t as an instrument. Bound, Jaeger and Baker (1993) pointed out that the (finite sample) properties of the IV estimator are unfavourable if the additional instruments do not predict well the endogenous right hand side variable. They show that in that case the IV estimates tend to the OLS estimates. Consequently, they recommend to report the F-test for testing the joint significance of the additional instruments in the first stage regression. First, we ran a first stage regression with instruments Δz_{t+1} and finexp1, finexp2, incexp1, incexp2, d_t, the sex of the head of the household, and three dummy variables for the lower three levels of education (educ1, educ2 and educ3). The F test statistic for testing the joint significance of finexp1, finexp2, incexp1, incexp2, d_t, gender, educ1, educ2 and educ3 is 72.2, which implies rejection of the null hypothesis at the 5% level. The t-values of the separate variables revealed that the dummy educ3 is not significant, the dummy finexp2 is sigificant at the 10% level, whereas the remaining additional instruments are significant at the 5% level. As d_t may not be exogenous, we also ran the first stage regression without d_t. In that case the F statistic is 1.94 implying that the null hypothesis is not rejected at the 5% level. On inspection of the t-values of the coefficients, we found that now only the dummies incexp1, incexp2 are significant. Running a first stage regression with incexp1 and incexp2 as the only additional variables yields a test statistic for testing the joint significance of their coefficients of 5.65.

As a consequence of the results of the first stage regression, we decided to estimate the Euler using two different instrument sets. The first instrument set contains Δz_{t+1}, incexp1, incexp2, finexp1, finexp2, d_t, gender, educ1, educ2 and educ3. The second set of instruments contains Δz_{t+1}, incexp1 and incexp2.

The Euler equation in (13) can be estimated by IV (2SLS). Keane and Runkle (1992) show how the efficiency of the estimator can be improved if there is correlation across time in residuals. First, the model can be estimated by 2SLS. The coefficient estimates are used to estimate the covariance matrix of the residuals, containing the covariances across time of the residuals, while maintaining the assumption of no correlation across individuals. Next, the choleski decomposition of the inverse of this covariance matrix is used to transform the model equation and reestimate the model by IV. The estimator, thus obtained, is efficient, and its standard errors are consistent, for general forms of time correlation in residuals.

The estimation results for the two sets of instruments are presented in the first and second column of table 3 respectively.

The estimate of parameter δ, the parameter of labour market state, is not significant. This holds for both of the regressions. This result implies that the marginal utility of consumption does not depend on labour market state. Note however, that this result does not have any consequences for a reduced form specification of a model of labour market transitions, based on (7), (8) and (10). The value function V_t still depends on labour market state if different labour market states cause different utility levels, if job offer arrival rates are different for different labour market states and if incomes are different. For the same reasons, the level of consumption, determined by (6), may be different, depending on whether one is employed or not.

At the bottom of table 3, Hansen's test statistic for testing overidentifying restrictions is presented. For both specifications, the overidentifying restrictions are not rejected at the 5% level, implying that the validity of the use of d_t as instrument is not rejected.

3.3 A reduced form model for transitions

A reduced form model for the transition probabilities in (10) is specified. Note from (10) that wealth at the beginning of the period should be included as a regressor and note also that the transition probabilities may be different for different states of origin. Recall that assumptions like leisure being a normal good (Blundell, Magnac and Meghir (1994)) or decreasing abolute risk aversion (Danforth (1979)) imply the value of wealth at the beginning of the period to have a negative effect on the probability of staying employed or experiencing a transition from nonparticipation into employment.

As a reduced form for the transition probability θ_t^i, we specify

$$\theta_t^i = \Phi\left(\kappa_i' x_{t-1}\right), i = 0, 1 \tag{14}$$

in which $\Phi(.)$ is the standard normal cumulative density function. θ_t^0 represents the probability of a transition from unemployment to employment. θ_t^1 represents the staying on rate for employed individuals. Apart from using the normal density, we will also present results obtained with logit. In the vector x_{t-1}we include A_t and its square. Note that the parameter vector is different for different states of origin.

The available data contain observations on the period 1987-1991. The total number of observations on employed is 7744. 349 transitions from employment to nonparticipation occur. The total number of observations among nonparticipants is

2573. The observed number of transitions from nonparticipation into employment is 244.

The included explanatory variables are, apart from initial wealth A_t and its square, a dummy variable for marital status, a dummy indicating whether the head of the household is a male, age and age squared, the education dummies educ1, educ2 and educ3, with educ1 the lowest level of education, educ2 the next to the lowest level, etc., the total number of persons in the household, the cross effects of sex of the head of the household with family size and marital status, and the dummy variables finexp1, finexp2, incexp1 and incexp2 that have also been used as instruments in the estimation of the Euler equation. The transition process describes the transition in labour market state from one period to another and therefore we also include some explanatory variables that are related to changes in exogenous variables. We include a dummy variable ΔEDUC which takes the value one if the level of education has increased from one period to another, zero otherwise, and we include the change in family size from one period to another.

The first column of table 4 gives the probit estimates of the parameters of the staying on probability for the employed. Wealth has a significant positive effect on the probability of staying employed. The estimated effect of the square of wealth is negative but insignificant. The results seem to suggest that the higher is the level of wealth, the higher will be the probability that someone will stay on the job. This is at variance with the theoretical prediction. The positive significant effect of wealth on the staying-on probability seems hard to interpret. According to the model in section 2, the effect of wealth enters the probability through preferences, in which case the positive effect is a preference effect. Individuals with a higher preference for working, may have less time to consume and accumulate more assets. Another explanation may be that wealth serves as an indicator for other, unobserved, characteristics: The individuals with the higher wealth may be the individuals with the better positions and therefore the lower risk of being laid off.

The likelihood ratio test statistic, for testing the null hypothesis that both coefficients of wealth and wealth squared are zero, is 16.1, which implies that the null hypothesis is rejected at the 5% level. Stancanelli (1995) specifies a transition equation including a spline for initial wealth. She finds a positive effect for lower values of wealth and a negative effect for wealth of higher values, and interprets this to be a consequence of risk aversion: Only people with high wealth take the risk not to work. The values of the estimated coefficients of wealth and wealth squared in table 4 imply that only for individuals with a value of wealth of over 1.35 million guilders, wealth would have a negative influence on the staying-on probability, which is not a relevant number considering the range of wealth values in the sample.

The effect of marital status is negative and not significant, but the cross effect of marital status and the head of the household being male is positive: Being married induces male heads of households to work. The estimates of family size show something similar: The effect of family size is negative and significant, and the cross effect of family size and male is positive and significant: For a male head of the household having a larger family implies a higher probability of staying on, whereas for a female head of the household the reverse holds. Note that a change in family size from one period to another does not have a significant effect on the probability of staying on. Both the coefficients of age and its square are significant at the 5% level. The estimates imply that the probability of staying on rises with age until the age of 38, after which it falls. The two lower level of education have a negative effect on the probability of staying on. Note that the dummy variable ΔEDUC, indicating an increase in the level of education, has a significant effect on the probability of staying on. There are two possible explanations for this effect. Either individuals have quit their job as they want to spend their time searching for a better job which they expect to be able to find because of their higher level of education, or they have increased their level of education as they already expected to be laid off and wanted to increase their labour market opportunities. The effect of finexp1 is positive and significant at the 10% level and finexp2 is positive and significant at the 5% level. Recall that finexp1 equals 1 if the financial situation of the household is expected to improve in the next twelve months, and finexp2 is 1 if the financial situation is not expected to change. These estimates imply that individuals who expect their financial situation to worsen have a lower probability of staying on. This may indicate that the dummies finexp1 and finexp2 are indicators for the rate of lay off and the associated financial consequences of being laid off. We see something similar for the variables incexp1 and incexp2. Individuals who expect that their income will increase in the next twelve months have the higher probability of staying on, while this probability is lowest for people expecting a decrease[8].

The second column of table 4 shows the results of the logit estimation. The same parameters are significant as in the probit specification, which is an indication of robustness.

Table 5 shows the parameter estimates of the transition probabilities for transitions from nonparticipation into employment. The first column presents the probit estimates. The parameter estimate of net wealth is negative but not significant, whereas the parameter estimate of its square is positive and insignificant. The likelihood ratio test statistic, for testing the null hupothesis that both coefficients of wealth and wealth squared are zero, is 3.7, and therefore the null hypothesis is not rejected at the 5% level. The quadratic effect of wealth dominates for values of wealth over 850 thousand guilders.

Age and the square of age have a significant effect on the transition probabilities. The estimates imply that the probability of a transition from nonparticipation into employment falls with age after the age of 29. The education dummies have significant negative effects on the transition probability. The effect of family size is negative and not significant, whereas the cross effect of family size and male is positive and significant. The dummies finexp2 and incexp2 are not significant, whereas finexp1 and incexp1 are positive and significant at the 10 and 5% level, respectively, indicating that people who expect their financial situation to improve in the next twelve months and people who expect their income to increase in the

[8]Time dummies for the wave of the panel have been included, but they hardly had any effects on the parameters estimates or their standard errors.

next twelve months, have a higher probability of a transition into employment.

The logit results in the second column are rather similar.

Summarizing we can say that we have found plausible effects of demographic variables, like family size, sex of head of the household and age, on the transition processes. However, the effect of wealth, which is the main concern of the present paper, is not fully in accordance with the implications of economic theory. For the staying-on process, we find a positive effect of wealth, instead of a negative effect. On the other hand, the positive effect is in accordance with the estimation results of Euler equation, which show a negative effect of employment on the marginal utility of consumption. Apparantly, people with a strong preference for employment do not have enough time to consume and consequently accumulate relatively more assets. For transitions from nonparticipation into employment, we do find the negative effect of wealth, but the evidence is weak.

Interpreting the results in terms of the structural probability in (10), the significance of net wealth in the staying-on probability implies that the transition from employment into nonparticipation depends on wealth, e.g. the probability of becoming a nonparticipant is not fully determined by the layoff rate. On the other hand, the transition probability from nonparticipation into employment shows a completely different wealth pattern than the staying-on probability, i.e. negative and insignificant effects of wealth and its square, respectively. The both probabilities should be proportional according to (10), with the arrival rates as proportionality factor. The difference in wealth patterns could be interpreted as evidence against the structural model, but the argument is only valid if the subsample of nonparticipants and the subsample of employed were random samples from the same population. In practice, this is not likely to be the case. In our sample, the mean value of net wealth for the subsample of employed is far higher than for the subsample of nonparticipants.

In trying to explain the differences in the wealth patterns between the probabilities for employed and nonparticipants, we tried to find out what is the main cause of the difference in the mean values of wealth for the subsamples of employed and nonparticipants. On inspection of the different wealth components, we found large differences in house ownership and mortgages between employed and nonparticipating persons. The total percentage of house ownership in the sample is 48.6. For the subsample of employed individuals the percentage is 56.2 and for the subsample of the nonparticipants 26.0, which is considerably lower than for the employed. The mortgage percentages are 44.6 for the whole sample, 53.4 for the subsample of employed individuals and 18.0 for the subsample of nonparticipating individuals. The differences in net average wealth between the employed and the nonparticipants is very much affected by the value of the house and the amount of the mortgage. We reran the probit and logit regressions for the transition probabilities, including a dummy variable for the presence of the mortgage.[9]

The results of including a mortgage dummy are presented in the third and fourth column of tables 4 and 5. The inclusion of the dummy has quite some impact. Looking at the results for the staying-on probability in table 4, the effect of having a mortgage is positive and highly significant. Moreover, the significance of the assets disappeared and the p-value of the asset parameter estimate has risen to as much as 0.73. The reason for the effect probably is that the ownership of a house with mortgage may be an indicator for long term expectations with respect to the labour market perspectives of the individual. Someone who is employed, but faces a high risk of lay-off, will not be tempted to buy a house and take a mortgage. Another possible explanation is that individuals with a mortgage need to work to pay off the mortgage, in which case the positive effect of the mortgage dummy is a pure wealth effect which is perfectly consistent with the prediction of the economic model. There may also be explanations in terms of preferences, e.g. habit persistence. The insignificance of the wealth parameters estimates, together with the above explanation, is evidence in favour of the exogeneity of the transition probability from employment into nonparticipation, e.g. once one has decided to work, one is determined to stay at work, and if one becomes unemployed, it is due

[9] Including a dummy for house ownership led to similar results.

to lay-off.

In table 5 the results are presented for the nonparticipation to employment transition probabilities. In both the probit and the logit regression the effect of the mortgage dummy is positive but insignificant at conventional significance levels.

As a final exercise, we excluded the value of the house, as well as the value of the mortgage from net total wealth, and included them as separate regressors in the probabilities. The results are given in table 6. The first two columns of table 6 present the parameter estimates of the staying-on probabilities for the probit and logit regressions respectively. In both regressions, the parameter estimate of net wealth, with house and mortgage values excluded, is positive and significant at the 5% level. The parameter estimate of the value of the house is negative, but insignificant. The parameter estimate of the value of the mortgage is positive and significant at the 10% level. Note that in the previous tables the mortgage was a negative component of net wealth. The mortgage dummy is not significant. Net wealth excluding house and mortgage has a positive effect on the staying-on probability, whereas the negative value of the mortgage, has a negative effect on the staying-on probability. Although the prediction of the economic model does not hold for wealth as a whole, it does for mortgages. This results may be explained by relative risk aversion. People with high amounts of debt are less tempted to quit a job, than people with lower amounts of debt.

Looking at the results for the transition probability for non-participants, we see that the value of the mortgage does not have a significant effect on the transition probability, whereas the effect of the remaining assets are not significant either.

In conclusion we can say that splitting up total wealth in housing and remaining wealth did not lead to different conclusions about the effect of wealth on the labour market transition probabilities.

3.4 A transition model with random effects

The estimation results of the transition probabilities in the previous subsections, show a significant positive relation between assets and the probability of staying-on. This positive relation may be due to the presence of individual specific unobserved heterogeneity. In this section, we estimate a random effects probit model to allow for the presence of individual specific random effects. We specify the following transition equations:

$$\begin{array}{rcl} d_{it}^{*} & = & \kappa_e' x_{it} + \alpha_i^e + u_{it}^e \text{ if } d_{i,t-1} = 1 \\ d_{it}^{*} & = & \kappa_u' x_{it} + \alpha_i^u + u_{it}^u \text{ if } d_{i,t-1} = 0 \\ d_{it} & = & \iota(d_{it}^{*} > 0), l = e, u \end{array} \tag{15}$$

The disturbance terms u_{it}^u and u_{it}^e are assumed to be independently normally distributed across time and across individuals with their variances normalized to one.

At first sight, the estimation of model (15) under the assumption of normally distributed random effects seems to be straightforward. However, several complications arise:

- The transition equations are conditional on the labour market state in the period before, $d_{i,t-1}$. Consequently, an initial condition for the first period of observation needs to be specified.
- The vector x_{it} contains the lagged endogenous variable A_{it}, which is likely to be correlated with α_i^e and α_i^u. A common approach in the literature is to impose a correlation structure of the form (Chamberlain (1980, 1984), Mundlak (1961)):

$$\alpha_i^e = \tau_1^e \bar{A}_i + \tau_2^e \bar{A}_i^2 + v_i^e \tag{16}$$

$$\alpha_i^u = \tau_1^u \bar{A}_i + \tau_2^u \bar{A}_i^2 + v_i^u \tag{17}$$

$$\begin{pmatrix} v_i^e \\ v_i^u \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_e^2 & \sigma_{eu} \\ \sigma_{eu} & \sigma_u^2 \end{pmatrix} \right) \tag{18}$$

$$\bar{A}_i = \frac{1}{T} \sum_{t=1}^{T} A_{it} \tag{19}$$

- A problem with the approach above is that $\bar{A}_i$ contains $A_{i,t+1}$ which in turn is likely to be correlated with u_{it}^e and u_{it}^u in (15). The correlation will disappear asymptotically if the number of time periods T tends to infinity. In the present application, the number of time periods clearly is too small to ignore the possible correlation. Nickell (1981) calculates the asymptotic bias that arises for fixed T and $N \to \infty$ in case of the linear random effects model.

- As a consequence of the items above, an appropriate way to deal with the problem is to specify a simultaneous model for assets and labour market transitions, with random effects including initial conditions.

Before implementing a simultaneous model of assets and labour market transitions, it seems wise first to estimate the ad hoc specification in equations (15) through (19).

The identification of the covariance σ_{eu} in (18) depends on the availability of observations on multiple transitions of the same individual. These observations are rare, and therefore the model will be estimated imposing[10]

$$v_i^u = \frac{\tau_3^u}{\sigma_e} v_i^e \tag{20}$$

If the random effects are individual specific, and not labour market specific, this restriction is not unrealistic. The parameter τ_3^u allows for differences in scale effects and direction.

An initial condition, explaining the labour market state in the first period of observation, is added to the model and it is specified as

$$d_{i0}^* = \beta_0' z_{i0} + \delta_i \tag{21}$$

We may impose the following structure on δ_i and v_i^e:

$$\begin{pmatrix} \delta_i \\ v_i^e \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \sigma_{e\delta} \\ \sigma_{e\delta} & \sigma_e^2 \end{pmatrix} \right) \tag{22}$$

[10] The model also has been estimated without this restrictions: The correlation coefficient of the error terms took the value -0.99.

Table 7 presents the ML estimation results. Wealth A_{it} now has a negative effect on the staying-on probability, which is significant at the 5% level. The positive effect that we found in the previous specifications has been picked up by the mean assets $\bar{A}_i$, which has a significant positive effect on the probability of staying-on.

The results in the third and fourth column of table 7 show that the negative effect of assets on the transition from nonparticipation into employment, for which the evidence is rather weak in the previous specifications, is much stronger now, whereas the mean of assets has a significant positive effect on the transition probability.

The lower part of table 7 displays the estimates and standard errors of the initial condition, explaining labour market state in the first period. Individuals with a higher average level of assets have a higher probability of being employed. The dummies for the various levels of education add significantly to the explanation of being in a given labour market state. Individuals with the lower two levels of education have a significantly lower probability of being employed.

Finally, the estimated covariance between the error of the initial condition and the random effect, $\sigma_{\epsilon\delta}$, is positive and significant at the 5% level. The correlation coefficient between the random effect and the initial condition, defined as the ratio between $\sigma_{\epsilon\delta}$ and σ_{ϵ}, is 0.19, with a standard error of 0.08.

Note that the parameter τ_3^u, which measures the impact of the random effect on the transition from nonparticipation into employment, is significantly negative. At first sight, this may appear strange, as the implication is that people with a higher probability of becoming employed also have a higher probability of becoming unemployed. It may reflect that individuals with a strong preference towards employment are willing to accept a job, even if the risk of being laid off is high.

The strong significance of mean assets implies that individual specific effects that are persistent over time seem to play an important role in the explanation of the relation between labour market transtions and wealth. Recalling the ad hoc character of the method employed, the results provide sufficient motivation for the specification of a simultaneous model of labour market transitions and wealth, allowing for the possible correlation between wealth and the random effects.

3.5 A simultaneous reduced form model of wealth and labour market transitions with random effects

In the previous section, we estimated a model of labour market transitions with random effects, using the Chamberlain (1985) specification to correct for possible correlation between lagged wealth and the random effect. This method yields inconsistent estimates if the number of time periods observed is fixed. In this section, we specify a simultaneous model for the choice of assets and labour market restrictions, in order to allow for a more proper treatment of correlation between assets and random effects. Throughout, we maintain the assumption that labour market transitions exhibit random effects, as the estimation results of the previous model support the presence of random effects. In addition to the transition equation, an equation explaining the amount of assets in a given period needs to be specified. Various approaches can be followed. One way to proceed is to explain the level of assets from a set of explanatory variables, like age, level of education, family size, etc. Another possibility is to interpret the asset equation as a reduced form equation for the policy function in (6). Then the choice of assets at the end of period t depends on the level of assets at the beginning of period t, and consequently lagged assets should be included an explanatory variable as well. Morevover, the choice of assets in period t will, in general, be different if the labour market state d_t in period t is different. If utility specification (12) is chosen, it can be shown that the solution for net total assets in period t is

$$A_{t+1}^{d_t} = (1-\kappa_t)\left[(1+r)A_t + y_t^{d_t}\right] - \kappa_t\left[\sum_{s=1}^{T-t}(1+r)^{-s}\left\{E_t[y_{t+s}^{d_{t+s}} - \omega_{t+s}^{d_{t+s}}] + \tilde{\beta}^{-s}\omega_t^{d_t}\right\}\right] \tag{23}$$

with

$$\omega_{t+s}^{d_{t+s}} = \frac{1}{\gamma}[\delta d_{t+s} + \alpha' z_{t+s}] \tag{24}$$

$$y_{t+s}^{d_{t+s}} = d_{t+s}w_{t+s} + (1-d_{t+s})b_{t+s} + \mu_{t+s} \tag{25}$$

and

$$\kappa_t = \left[1 + \sum_{s=1}^{T-t}\{(1+r)\tilde{\beta}\}^{-s}\right]^{-1} \tag{26}$$

with $\tilde{\beta} = \beta(1+r)$. From (23) it can easily be seen how labour market state affects the choice of assets. First of all, the labour market state influences the asset level through current income $y_t^{d_t}$. In general, income is lower for unemployed persons than for employed persons. Secondly, labour market state affects the current period marginal utility level of consumption, which effect enters (23) by $\omega_t^{d_t}$. Thirdly, as today's labour market state determines next period's job offers through the arrival rate, labour market state affects future expectations of income as well as marginal utility of consumption.

In specifying a reduced form model for the choice of assets, the dependence of choice of assets on labour market state needs to be incorporated. A linear equation for assets is specified. We allow for correlation between the disturbance terms of the transition process and the asset equation. Moreover, the slope coefficients of the covariates in the asset equation, are allowed to be different for different choices of the labour market state, or, equivalently, cross effects between the covariates and labour market state are included in the asset equation. The joint model becomes:

$$d_{it}^* = \kappa_e' x_{it} + \alpha_i^e + u_{it}^e \text{ if } d_{i,t-1} = 1 \tag{27}$$

$$d_{it}^* = \kappa_u' x_{it} + \alpha_i^u + u_{it}^u \text{ if } d_{i,t-1} = 0 \tag{28}$$

$$d_{it} = \iota(d_{it}^* > 0) \tag{29}$$

$$A_{i,t+1} = \eta_e' m_{it} + l_i + \nu_{it} \text{ if } d_{it}^* > 0 \tag{30}$$

$$A_{i,t+1} = \eta_u' m_{it} + l_i + \nu_{it} \text{ if } d_{it}^* \leq 0 \tag{31}$$

First of all we will say something about the explanatory variables to be included in the vectors m_{it} and x_{it}. Thereafter we will comment on the error structure of the equations and the specification of initial conditions.

If we assume that equations (30) and (31) correspond with equation (6) in the structural model, then assets one period lagged should be included in the vector of explanatory variables m_{it}: We include both A_{it} and A_{it}^2. Like before, they are also included in the vector of explanatory variables of the transition process. Note that equation (23) suggests that the vector m_{it} should include income in period t. The income process will be correlated with the transition process. This implies that, apart from the asset and transition equations, two income equations for the income processes of the two labour market states should be included. We will assume throughout that the income processes can be represented by linear equations, which have already been substituted in (30) and (31). Consequently, the error terms in (30) and (31) include randomness in the income process, and the random effect may also represent persistence in income.

An initial condition for initial assets and labour market state has to be specified:

$$d_{i0}^{*} = \beta_0' z_{i0} + \delta_i \qquad (32)$$

$$A_{i1} = \eta_0' q_{i0} + r_i \qquad (33)$$

$$d_{i0} = \iota(d_{i0}^{*} > 0) \qquad (34)$$

Finally, the correlation structure between the disturbance terms of the different equations needs to be specified. It is assumed that $(\nu_{it}, u_{it}^{e}, u_{it}^{u})$ is independently and identically distributed across time and across individuals. The vector $(\alpha_i^{e}, \alpha_i^{u}, l_i, \delta_i, r_i)$ is assumed to be independent and identically distributed across individuals. Its elements may be correlated. The two vectors $(\nu_{it}, u_{it}^{e}, u_{it}^{u})$ and $(\alpha_i^{e}, \alpha_i^{u}, l_i, \delta_i, r_i)$ are assumed to be independent.

The specification captures the possible correlation between assets and random effects in two ways: First, the random effect in the asset equation l_i is allowed to be correlated with the random effect in the transition equation, α_i^{e}. Second, initial assets are allowed to be correlated with the random effect of the transition process. If the parameter of lagged assets in the asset equation is equal to one, and the parameter of lagged assets squared is equal to zero, these two types of correlation cannot be identidied separately, as the influence of the initial state will persist. In that particular case it is unlikely that the conditional asset equation (conditional on lagged assets) contains a random effect, as a random effect in the level of assets is differenced out. Then the random effect may be excluded from the equation, which means that the correlation across time runs entirely through initial assets. An alternative to solve this identification problem may be to specify a marginal asset equation with random effects, in which case lagged assets are not included in (30) and (31). In that case, there is no need to specify a separate equation for initial assets. Although the first alternative of maintaining the conditional asset specification and exluding random effects, is nested in the complete specification described above, the second approach of specifying a marginal asset equation is not. Moreover, the marginal assets equation does not have a direct economic interpretation as a policy function. However, this alternative approach may be more suitable for the purpose of correcting for possible correlation between lagged assets in the transition equation with the random effect, as it allows for the correlation of the level of assets with the random effects, whereas in the first approach the emphasis is on the period to period change in the level.

A similar assumption as in (20) is made with respect to the relation between α_i^e and α_i^u:

$$\alpha_i^u = \frac{\tau}{\sigma_e}\alpha_i^e \tag{35}$$

The vectors of disturbances are assumed to follow a normal distribution.

$$\begin{pmatrix} \nu_{it} \\ u_{it}^e \\ u_{it}^u \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_\nu^2 & \sigma_{e\nu} & \sigma_{u\nu} \\ \sigma_{e\nu} & 1 & * \\ \sigma_{u\nu} & * & 1 \end{pmatrix}\right) \tag{36}$$

The variances of u_{it}^u and u_{it}^e have been normalized to one, and the correlation between u_{it}^u and u_{it}^e is not defined, as one cannot be in two mutually exclusive labour market states at the same time.

$$\begin{pmatrix} \alpha_i^e \\ l_i \\ \delta_i \\ r_i \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_e^2 & \sigma_{el} & \sigma_{e\delta} & \sigma_{er} \\ \sigma_{el} & \sigma_l^2 & \sigma_{l\delta} & \sigma_{lr} \\ \sigma_{e\delta} & \sigma_{l\delta} & 1 & \sigma_{r\delta} \\ \sigma_{er} & \sigma_{lr} & \sigma_{r\delta} & \sigma_r^2 \end{pmatrix}\right) \tag{37}$$

The variance of δ_i has been normalized to one. The parameter σ_{el} measures the correlation across time between labour market state and assets. The parameters $\sigma_{e\delta}$ and σ_{er} refer to the covariance between labour market state in any period and the initial labour market state, and the covariance between labour market state in any period and initial assets. The parameters $\sigma_{l\delta}$ and σ_{lr} refer to the covariance across time between assets and the initial labour market state, and assets and initial assets. Finally, $\sigma_{r\delta}$ refers to the correlation between initial assets and the initial labour market state. All these covariances can be linked to observables and are, at least theoretically, identified.

An attempt has been made to estimate the full model in (27)-(37), with lagged assets and lagged assets squared included as explanatory variables in the vector m_{it} of the assets equation. It turned out that the coeffient of lagged assets approached 1 and the coefficient of lagged assets squared approached zero. If there is a random effect in the level of assets, the random effect will not appear in the conditional asset equation at these values of coefficients. Apart from that, as mentioned before, the random effect cannot be disentangled from the effect of initial assets. Therefore we have to switch to the two alternatives described above. The first alternative means that the random effect l_i is excluded from the assets equation. The random vector in (37) becomes three dimensional, and the row and column corresponding with l_i disppear from the covariance matrix.

Table 8 presents the estimation results. Table 8A shows the estimation results of the transition equation. Compared with the simple specification for the staying-on probability in table 4, not much has changed. The coefficient of assets in the staying-on equation is significantly positive at the 5% level, while the coefficient of the quadratic term is insignificant. The estimates of the age coefficients are significant. The probability of staying-on rises with age until the age of 37, after which it falls. The education dummy for the second level of education is significant and negative, and this is in accordance with the random effects model in table 7. The dummy indicator for the increase in education level (ΔEDUC) has a significant negative effect on the probability of staying-on. The effects of wealth in the transition from nonparticipation into employment are similar to the results for the simple probit model in table 5. The estimated of the coefficients are not significant. The dummy for the increase in education level is negative and significant. Table 8B shows the results for the assets equation. We considered the inclusion of the dummy variables for income and financial expectations in the next twelve months. Some first regressions showed that these dummy variables do not have significant effects on assets if cross effects between explanatory variables and labour market state are included, like in (30) and (31). Therefore, we do not include them in the estimation of the simultaneous model. For both employed and unemployed individuals, the effect of lagged assets in close to, but significantly larger than one, and the effect of assets squared is close to but significantly smaller than zero. The age coefficients are not significantly different from zero. Equation (23), in which parameter κ_t depends on the time horizon, suggests the inclusion of cross effects of age with all variables. Including these cross effects did not lead to significant coefficient estimates, so the results presented here are without any cross effects. Family size has a positive effect for nonparticipants, but not for employed. The education dummies are significantly negative for both labour market states, which implies that the highest (reference) level of education has a positive effect on assets. A monotonous order of the effect of the education level for the lower three levels of education cannot be detected. Table 8C displays the results for the initial assets equation (33). Cross effects for labour market state have been incorporated, hence the two seperate columns for the various labour market states.

In the equation for initial assets cross effects with age have a significant effect for some variables. A higher level of education leads to a higher stock of assets and the difference in asset levels between various levels of education increase with age. The latter result is consistent with the results of the asset equation in table 8B, which imply that the stock of assets grows more than proportionally. The cross effect of family size and age has a positive and significant effect, both for employed persons and for nonparticipants.

The second part of table 8D shows the estimates of the covariance structure. The covariance parameters σ_{ev} and σ_{uv} (see equation (36)), which are the contemporaneous covariances between the assets equation and the transition equations, are not significantly different from zero. The coefficient σ_c of the random effect in the staying on probability is significantly different from zero. The parameter τ is significantly negative. These results are similar to the random effects model in table 7. The parameters $\sigma_{e\delta}$ and σ_{er}, which denote the covariance between the random effect and the initial conditions of labour market state and assets respectively, are not significantly different from zero. This is at variance with the assumption that wealth contains a random individual effect that is correlated with the random effect if the labour market transition equations. The covariance $\sigma_{r\delta}$, between initial labour maket state and initial assets, is positive and significant. The correlation coefficient, defined as the ratio between $\sigma_{r\delta}$ and σ_r, is equal to 0.77.

Concluding we can say that so far the attempts of a more sophisticated treatment of the ad hoc random effects model of section 3.4 and table 7 failed to generate the same results.

The alternative approach excludes lagged assets A_{it} and lagged assets squared A_{it}^2 from the vector of explanatory variables m_{it} in (30) and (31). Thus we obtain an equation explaining the level of assets, and by including the random effect l_i, we can impose correlation between the random effect in the level of assets and the random effect α_i^e in the labour market transition equations, thereby formalizing the ad hoc correlation structure (16) and (17). If lagged assets are not included in the assets equation, the separate equation for initial assets (33) becomes superfluous, as for assets A_{i1} the specification (30) and (31) can be used. In the equation (37), r_i is replaced with ν_{i0}, which is correlated with the initial labour market state, but uncorrelated with random effects, so $\sigma_{er} = \sigma_{lr} = 0$ and $\sigma_{r\delta} = \sigma_{\nu\delta}, \sigma_r = \sigma_\nu$.

The estimation results are presented in table 9. Table 9A contains the estimates of the transition equation. Lagged assets has a positive significant effect on the probability of staying-on. The coefficient estimate of lagged assets squared is negative. The combination of both estimates implies that the effect of assets becomes negative for asset values of over 719000 or more, which is outside the relevant sample range. Surprisingly, the coefficient estimate of lagged assets in the probability of transition from nonparticipation into employment has become positive and significant as well, and the effect of lagged assets squared is significantly negative. These estimates imply that the effect of assets becomes negative for assets values of over 359000 guilders. So for both the probability of becoming employed and the probability of staying employed the effect of assets is positive.

At this point, it seems worthwhile to look at the influence of the random effects, by looking at the estimates of the covariance structure, displayed in table 9C. The estimate of the covariance parameter σ_{el}, which is the covariance between the random effect in the staying-on equation and the level of assets, is negative and significant, implying that on average, staying employed is negatively correlated with the level of assets. Note that this is exactly the opposite result of the ad hoc random effects model of table 7, in which mean assets had a positive effect and the level of assets itself a negative effect. Note that the estimate of the scale parameter τ, measuring the impact of the random effect on the transition from nonparticipation into employment, is positive now, implying that the random effect in the equation of becoming employed is negatively correlated with the random effect in the level of assets as well. The correlation coefficient, obtained by dividing σ_{el} by the product of σ_e and σ_l, is -0.95. Its standard error is 0.29. Note also that the estimates of the contemporaneous covariances $\sigma_{e\nu}$ and $\sigma_{u\nu}$ are negative and significant. The respective correlation coefficients are -0.38 and -0.80, with standard errors 0.003 and 0.003.

So far we may conclude that assets themselves have a positive effect on the probability of staying or becoming employed, but that there is a strong negative correlation in the unobserved components of assets and these probabilities. The question that remains to be answered is what causes the difference in the results obtained with the ad hoc model of table 7 and the present model. The staying-on equation in table 7 includes the expression $-0.053A_{it} + 0.070\bar{A}_i$. This can be rewritten as $0.017A_{it} - 0.070(A_{it} - \bar{A}_i)$. Now it may very well be that the second term serves as a "residual" of the asset equation. Note that the coefficient of 0.017 is remarkably close to the coefficent of 0.0165 in table 8A. A similar explanation cannot be given for the transition from nonparticipation into employment, as the negative effect of assets is too large there.

Finally, note that the covariances between random effects and the initial condition for labour market state are significant. There is a positive relation between initially being employed and the random effect in the transition equations, whereas there is a negative relation between initial labour market state and the random effect in the asset equation. The covariance between initial labour market state and the initial level of assets, $\sigma_{\nu\delta}$, is negative.

Table 9B shows the results of the asset equation. As opposed to the model in table 8, which contained lagged assets as an explanatory variable in the asset equation, cross effects between age and other explanatory variables play an important role. The effect of marital status on the level of assets is positive and growing with age. A similar effect is found for family size. Individuals with the lower three level of education have lower levels of assets than people with the highest level of education and the gap is growing with age. Until the age of 40, the level of assets is on average higher if the head of the household is a male.

3.6 Simulations

In order to evaluate and compare the various transition models, a Monte Carlo experiment has been run, in which the next period's labour market state has been simulated, conditional on the current labour market state. Random numbers for the transition process have been drawn, conditional on the labour market state and value of assets in the previous period, and the latent variable d_{it}^* has been simulated, which, in turn, establishes a simulated value for d_{it}. In the experiment 1000 replications have been used.

Table 10 provides an overview of the results, split up according to current labour market state and to the model employed. The first models simulated were the simple probit and logit model from tables 4 and 5. If the current labour market state is employment, we see that the simple probit model manages well to predict the event of staying-on. About 96% of the individuals who stay employed is on average predicted correctly. The prediction of individuals with a transition into nonparticipation is rather poor: only 18% is predicted correctly. This difference is due to the relative low number of observations experiencing a transition. Note that there is hardly any difference between the simple probit and the simple logit model. If the ad hoc random effects model (table 7) is used, there is a slight improvement of almost 3% in the prediction of observations experiencing a transition. The simultaneous model, in which lagged assets are included in the asset equation (table 8), yields about the same predictions as simple probit. For the simultaneous model from table 9 the percentage correct predictions of individuals staying employed is comparable to the simplex probit model. However, the percentage of correct predictions of people experiencing a transition is almost 5% higher.

Looking at the results if the current labour market state is nonparticipation, we see some similar patterns. There is hardly any difference in the performance of simple probit and simple logit. The event of staying nonparticipant is predicted correctly for 92.3% of the observations, whereas predictions into employment are predicted correctly in only 26.6% of the cases. For the ad hoc random effects model, these numbers are 93.7% and 22.2% respectively, implying that for this model transitions into employment are predicted slightly worse. Again, the simultaneous model with lagged assets in the asset equation (table 8) does not predict better than simple probit. Looking at the predictions of the simultaneous model from table 9, we see some shifts in the numbers. Compared to the simple probit model the percentage of correct predictions of individuals who remain nonparticipant has decreased with 3.6% to almost 89%. On the other hand, there is an improvement in the prediction of transitions of 10%, such that the correctly predicted percentage of transitions is over 37 now.

The results of the Monte Carlo experiment show that the transition process for the employed is predicted best by the simultaneous model that excludes lagged assets from the asset equation and corrects for correlation between lagged assets and the random effect in the transition equation. For the transition process for nonparticipants, this model does not perform monotonously better. Transitions into employment are predicted better by this model than by the remaining models, but observations on individuals remaining nonparticipant are less well predicted. However, the improvement in percentages in the prediction of movers is higher than the decrease in percentages in the prediction of stayers. Therefore, we may conclude that the simultaneous modelling of assets and labour market transitions leads to an improvement in predictions.

4 Conclusions

A model of wealth and labour market transitions has been formulated. Labour market state affects saving basically in three ways. First, a different labour market state usually implies a different level of income. Income enters the model through the budget constraint. A labour market transition causes a change in income and consequently affects the choice of savings. Second, there may be differences in job offer arrival rates between different labour market states. The arrival rates play a role in the calculation of the dsicounted sum of expected future utility, and therefore, differences in arrival rates imply differences in future uncertainty. Moreover, differences in arrival rates between individuals within the same state play a role. An individual with a low arrival rate in the state of nonparticipation, expects that a spell of unemployment is going to persist for some time, and consequently, his income will be low for some time. Third, labour market state may affect the choice of saving through its effect on the marginal utility of consumption.

The model generates an Euler equation of consumption that can be used to estimate the structural parameters of the utility function. The estimation results show that no significant effect of labour market state on the marginal utility of consumption can be detected.

Under plausible assumptions, economic theory implies the level of assets to have a negative influence on the probability of staying or becoming employed in the next period. Various reduced form models of labour market transitions have been estimated to study the effect of wealth on labour market transitions.

Starting with a binary choice model without correlation across time, wealth is found to have a positive effect on the probability of staying employed, whereas there is weak evidence for a negative effect of wealth on the probability of a transition from nonparticipation into employment.

Splitting up net total wealth into financial wealth, excluding house and mortgage, and the value of the house and the value of the mortgage, does not lead to different conclusions. Net financial wealth still has a significant positive effect on the staying-on probability. The value of the mortgage, however, does have a positive effect on the probability of staying employed, which is in accordance with the economic predictions. Net total wealth, excluding house and mortgage, has a negative but insignificant effect on the transition probability from nonparticipation into employment. The value of the mortgage, however, has an interpretable significant positive effect on the transition probability.

Next, various transition models allowing for random effects have been estimated. The positive effect of wealth on the probability of staying employed may be caused by the role of assets as an indicator for unobserved heterogeneity. People with higher assets may be the people in the better positions with the lower probability of being laid off. Moreover, there may be heterogeneity in preferences.

First, a random effects model has been estimated in which for each individual the mean of assets over time has been included as an explanatory variable, in order to allow for correlation between the level of assets and the random effect. The results show that now assets do have a negative effect on the probability of both staying and remaining employed. The positive effect found before is explained by the mean level of assets. The estimation method of this random effect model is inconsistent for a small number of time periods. Therefore, a model which simultaneously explains assets and labour market transitions is specified to allow for correlation between lagged assets in the asset equation and the random effect in the transition equations.

In the estimation, we are hampered by the high persistence in assets. Including lagged assets in the asset equation yields a coefficient estimate that is close to, although significantly different from, one. Estimating a model with lagged assets in the asset equation makes it impossible to identify random effects from the impact of initial conditions. Consequently, two specifications of a simultaneous model are estimated. The first model contains lagged assets, which is consistent with the economic model in (6). However, random effects are excluded from the equation and the correlation between assets and the random effect in the transition equation completely runs through the effect of initial assets. The second specification excludes lagged assets from the asset equation, and a random effect is included, allowing for the direct imposition of correlation between random effects in the level of assets and in labour market transitons.

The first model completely fails to generate better results than the simple probit specification. The second specification shows that the level of lagged assets now has a positive effect on both the probability of staying and the probability of becoming employed. There is a significant negative correlation in the unobserved components (both random effect and transitory component) of assets and the probabilities of staying and becoming employed. Moreover, the variance in assets that is due to the random effect is far higher than the variance that is due to the transitory component. This is more or less the opposite result of the random effects model with the mean of assets as explanatory variable. Monte Carlo results show that the simultaneous model predicts better than the remaining models.

In conclusion we may say that the evidence of a positive effect of assets on the probability of staying on is fairly robust over the various specifications considered. For the probability of a transition from nonparticpation into employment the results are mixed. In the simpler specifications, there is weak evidence in favour of a negative effect of the amount of assets on the probability of becoming employed. In the joint models of assets and transitions that allows for individual effects, the effect is positive.

TABLE 1A: DATA EULER EQUATION: SAMPLE STATISTICS

number of observations: 6373		
variable	mean (guilders and guilders/year)	standard deviation
c_t	28014.07	34973.87
c_{t+1}	30081.60	32653.81
A_t	55670.21	94085.22
A_{t+1}	61745.28	101760.53
A_{t+2}	68020.44	106259.01
S_t	6075.08	33594.87
S_{t+1}	6275.15	29909.42
SAMPLE STATISTICS BY LABOUR MARKET STATE		
$d_t = 0$, number of observations: 1523		
variable	mean (guilders and guilders/year)	standard deviation
c_t	21801.54	39119.46
c_{t+1}	22061.51	24768.15
A_t	48914.83	104383.24
A_{t+1}	50844.81	104276.14
A_{t+2}	52948.23	105389.25
S_t	1929.98	37484.11
S_{t+1}	2103.42	22649.06
$d_t = 1$, number of observations: 4850		
variable	mean (guilders and guilders/year)	standard deviation
c_t	29964.93	33283.27
c_{t+1}	32600.14	34381.26
A_t	57791.53	90517.97
A_{t+1}	65168.26	100725.45
A_{t+2}	72753.42	106100.56
S_t	7376.72	32171.22
S_{t+1}	7585.16	31738.77

TABLE 1B: DATA EULER EQUATION: SAMPLE STATISTICS

SAMPLE STATISTICS BY LABOUR MARKET TRANSITIONS

$d_t = 0, d_{t+1} = 0$, number of observations:1390

variable	mean (guilders and guilders/year)	standard deviation
c_t	22088.45	40745.78
c_{t+1}	22351.19	25218.42
A_t	52255.29	107759.29
A_{t+1}	54222.19	107505.87
A_{t+2}	55940.79	108494.23
S_t	1966.90	39071.30
S_{t+1}	1718.60	22871.71

$d_t = 0, d_{t+1} = 1$, number of observations: 133

variable	mean (guilders and guilders/year)	standard deviation
c_t	18803.07	12854.47
c_{t+1}	19031.75	19265.01
A_t	14003.22	45786.74
A_{t+1}	15547.38	48815.01
A_{t+2}	21672.55	55883.69
S_t	1544.16	11702.50
S_{t+1}	6125.17	19808.12

$d_t = 1, d_{t+1} = 0$, number of observations:219

variable	mean (guilders and guilders/year)	standard deviation
c_t	24064.45	24561.63
c_{t+1}	27402.81	30197.34
A_t	49572.19	76216.55
A_{t+1}	56395.40	86450.32
A_{t+2}	60288.27	86276.90
S_t	6823.21	24506.39
S_{t+1}	3892.87	25052.99

$d_t = 1, d_{t+1} = 1$, number of observations:4631

variable	mean (guilders and guilders/year)	standard deviation
c_t	30243.96	33616.14
c_{t+1}	32845.92	34550.11
A_t	58180.23	91127.38
A_{t+1}	65583.13	101340.05
A_{t+2}	73342.90	106918.78
S_t	7402.90	32490.77
S_{t+1}	7759.77	32012.03

TABLE 2 OBSERVED NUMBERS OF TRANSITIONS

	observations with $d_t = 0$	observations with $d_t = 1$	total
observations with $d_{t-1} = 0$	2329	244	2573
observations with $d_{t-1} = 1$	349	7395	7744

TABLE 3 THE EULER EQUATION

	instrument set: all instruments	instrument set: Δz_{t+1}, incexp1, incexp2
parameter	estimate (st. err.)	estimate (st. err.)
INTERCEPT	0.259 (0.112)	0.097 (0.214)
δ LABOUR MARKET STATE	-0.450 (0.640)	4.050 (4.839)
MARITAL STATUS	0.638 (0.314)	0.756 (0.344)
AGE SQUARED	-0.0010 (0.0011)	0.0013 (0.0028)
FAMILY SIZE	-0.193 (0.115)	-0.208 (0.119)
test for overidentifying restrictions		
χ^2 test statistic	14.7	2.26
degrees of freedom	9	2
critical value, 5%	16.9	5.99

TABLE 4 THE STAYING-ON PROBABILITY
(standard errors in parentheses)

variable	Probit	Logit	Probit	Logit
INTERCEPT	-3.02	-6.45	-2.88	-6.13
	(0.42)	(0.83)	(0.42)	(0.83)
$A_t/10^4$	0.013	0.029	0.0010	0.0040
	(0.0048)	(0.0098)	(0.0049)	(0.0099)
$(A_t/10^4)^2$	-0.000048	-0.00012	0.00083	0.0014
	(0.000065)	(0.00012)	(0.00057)	(0.0011)
AGE	0.23	0.46	0.21	0.43
	(0.02)	(0.04)	(0.02)	(0.04)
SQUARE OF AGE	-0.0030	-0.0061	-0.0029	-0.0058
	(0.0003)	(0.0005)	(0.0003)	(0.0005)
FAMILY SIZE	-0.22	-0.43	-0.22	-0.42
	(0.08)	(0.15)	(0.08)	(0.15)
FAM. SIZE * MALE	0.19	0.40	0.18	0.39
	(0.08)	(0.16)	(0.08)	(0.16)
EDUC1	-0.24	-0.39	-0.19	-0.29
	(0.10)	(0.20)	(0.10)	(0.21)
EDUC2	-0.21	-0.36	-0.18	-0.27
	(0.09)	(0.18)	(0.09)	(0.19)
EDUC3	-0.026	0.011	0.017	0.04
	(0.078)	(0.16)	(0.079)	(0.16)
MALE	-0.033	-0.15	-0.05	-0.16
	(0.16)	(0.31)	(0.16)	(0.31)
MARITAL STATUS	-0.58	-1.14	-0.57	-1.14
	(0.38)	(0.70)	(0.38)	(0.70)
MAR. STAT. *MALE	0.95	1.81	0.93	1.78
	(0.39)	(0.73)	(0.39)	(0.73)
ΔEDUC	-0.30	-0.60	-0.28	-0.56
	(0.10)	(0.20)	(0.10)	(0.20)
ΔFAM.SIZE	0.012	0.04	0.01	0.03
	(0.13)	(0.23)	(0.13)	(0.23)
ΔFAM.SIZE*MALE	-0.035	-0.09	-0.04	-0.09
	(0.14)	(0.26)	(0.14)	(0.26)
FINEXP1	0.22	0.46	0.21	0.42
	(0.12)	(0.24)	(0.12)	(0.24)
FINEXP2	0.29	0.59	0.29	0.59
	(0.10)	(0.20)	(0.10)	(0.20)
INCEXP1	0.85	1.70	0.86	1.73
	(0.12)	(0.25)	(0.12)	(0.25)
INCEXP2	0.63	1.23	0.64	1.23
	(0.10)	(0.20)	(0.10)	(0.20)
MORTGAGE	—	—	0.25	0.57
			(0.07)	(0.15)

TABLE 5 THE TRANSITION PROBABILITY FROM NONPARTICIPATION INTO EMPLOYMENT
(standard errors in parentheses)

variable	Probit	Logit	Probit	Logit
INTERCEPT	-1.78	-3.66	-1.73	-3.55
	(0.47)	(0.90)	(0.48)	(0.91)
$A_t/10^4$	-0.017	-0.033	-0.0083	-0.018
	(0.011)	(0.026)	(0.011)	(0.024)
$(A_t/10^4)^2$	0.00010	0.00012	-0.0044	-0.0080
	(0.00022)	(0.00073)	(0.0038)	(0.0075)
AGE	0.082	0.18	0.079	0.18
	(0.024)	(0.05)	(0.025)	(0.05)
SQUARE OF AGE	-0.0014	-0.0032	-0.0014	-0.0031
	(0.0003)	(0.0006)	(0.0003)	(0.0006)
FAMILY SIZE	-0.060	-0.12	-0.058	-0.12
	(0.067)	(0.13)	(0.067)	(0.13)
FAM. SIZE * MALE	0.20	0.39	0.20	0.39
	(0.08)	(0.16)	(0.08)	(0.16)
EDUC1	-0.40	-0.67	-0.40	-0.68
	(0.14)	(0.26)	(0.14)	(0.26)
EDUC2	-0.45	-0.82	-0.45	-0.84
	(0.14)	(0.26)	(0.14)	(0.27)
EDUC3	-0.38	-0.65	-0.39	-0.68
	(0.13)	(0.24)	(0.13)	(0.24)
MALE	-0.17	-0.36	-0.16	-0.31
	(0.17)	(0.31)	(0.17)	(0.32)
MARITAL STATUS	-0.18	-0.36	-0.18	-0.37
	(0.39)	(0.77)	(0.39)	(0.77)
MAR. STAT. *MALE	-0.05	0.13	-0.06	-0.13
	(0.42)	(0.82)	(0.42)	(0.83)
ΔEDUC	-0.13	-0.22	-0.12	-0.22
	(0.17)	(0.32)	(0.17)	(0.32)
ΔFAM.SIZE	-0.14	-0.28	-0.14	-0.28
	(0.10)	(0.17)	(0.10)	(0.17)
ΔFAM.SIZE*MALE	0.06	0.16	0.07	0.17
	(0.14)	(0.25)	(0.14)	(0.25)
FINEXP1	0.29	0.45	0.29	0.45
	(0.17)	(0.31)	(0.17)	(0.31)
FINEXP2	-0.06	-0.18	-0.06	-0.18
	(0.13)	(0.25)	(0.13)	(0.25)
INCEXP1	0.57	1.11	0.58	1.11
	(0.18)	(0.33)	(0.18)	(0.33)
INCEXP2	0.05	0.16	0.05	0.16
	(0.14)	(0.26)	(0.16)	(0.26)
MORTGAGE	—	—	0.08	0.12
			(0.14)	(0.26)

TABLE 6 NET WEALTH WITHOUT HOUSING[11]
(standard errors in parentheses)

	STAYING-ON PROBABILITY		TRANSITION NONPARTICIPATION EMPLOYMENT	
variable	Probit	Logit	Probit	Logit
INTERCEPT	-2.90	-6.13	-1.74	-3.64
	(0.42)	(0.83)	(0.49)	(0.92)
A_t	0.035	0.071	-0.013	0.077
(house and mortgage excl.)	(0.015)	(0.030)	(0.040)	(0.076)
A_t^2	0.00018	0.00040	-0.0056	-0.012
(house and mortgage excl.)	(0.00051)	(0.0010)	(0.0056)	(0.011)
AGE	0.21	0.42	0.079	0.18
	(0.02)	(0.04)	(0.025)	(0.05)
SQUARE OF AGE	-0.0028	-0.0060	-0.0014	-0.0031
	(0.0003)	(0.0005)	(0.0003)	(0.0006)
FAMILY SIZE	-0.23	-0.44	-0.058	-0.11
	(0.08)	(0.15)	(0.067)	(0.13)
FAM. SIZE * MALE	0.20	0.41	0.20	0.38
	(0.08)	(0.16)	(0.08)	(0.16)
EDUC1	-0.12	-0.18	-0.39	-0.66
	(0.09)	(0.21)	(0.14)	(0.27)
EDUC2	-0.14	-0.15	-0.44	-0.84
	(0.10)	(0.19)	(0.14)	(0.27)
EDUC3	0.03	0.14	-0.38	-0.68
	(0.08)	(0.17)	(0.13)	(0.24)
MALE	-0.09	-0.25	-0.16	-0.30
	(0.16)	(0.31)	(0.17)	(0.32)
MARITAL STATUS	-0.61	-1.19	-0.18	-0.39
	(0.38)	(0.71)	(0.39)	(0.77)
MAR. STAT. *MALE	0.94	1.79	-0.069	-0.15
	(0.40)	(0.74)	(0.42)	(0.83)
ΔEDUC	-0.26	-0.51	-0.11	-0.21
	(0.10)	(0.20)	(0.17)	(0.33)
ΔFAM.SIZE	0.007	0.04	-0.13	-0.28
	(0.13)	(0.23)	(0.10)	(0.17)
ΔFAM.SIZE*MALE	-0.04	-0.11	0.07	0.17
	(0.14)	(0.26)	(0.14)	(0.25)

TABLE 6 NET WEALTH WITHOUT HOUSING (continued)
(standard errors in parentheses)

	STAYING-ON PROBABILITY		TRANSITION NONPARTICIPATION EMPLOYMENT	
variable	Probit	Logit	Probit	Logit
MORTGAGE DUMMY	-0.07	-0.13	-0.10	-0.41
	(0.16)	(0.33)	(0.30)	(0.62)
VALUE OWN HOUSE	0.00043	0.0062	-0.018	-0.032
	(0.012)	(0.024)	(0.025)	(0.050)
VALUE MORTGAGE	0.045	0.10	0.082	0.17
	(0.027)	(0.059)	(0.056)	(0.11)
VALUE HOUSE SQUARED	0.000024	0.00016	0.0010	0.0018
	(0.00034)	(0.00070)	(0.0009)	(0.0017)
VALUE MORT. SQUARED	-0.0019	-0.0025	0.0029	0.0040
	(0.0015)	(0.0036)	(0.0040)	(0.0080)
VAL. MORT.*VAL. HOUSE	0.0011	0.00067	-0.0059	-0.010
	(0.0013)	(0.0029)	(0.0039)	(0.0078)
A_t*VAL. HOUSE	-0.0011	-0.0025	0.0015	0.0020
	(0.0009)	(0.0020)	(0.0041)	(0.0085)
A_t*VAL. MORTGAGE	0.00033	0.0014	-0.0041	-0.0056
	(0.0016)	(0.0034)	(0.0095)	(0.019)
FINEXP1	0.22	0.42	0.29	0.45
	(0.12)	(0.24)	(0.18)	(0.32)
FINEXP2	0.29	0.58	-0.05	-0.16
	(0.10)	(0.20)	(0.13)	(0.25)
INCEXP1	0.87	1.74	0.57	1.13
	(0.11)	(0.25)	(0.18)	(0.33)
INCEXP2	0.65	1.25	0.04	0.16
	(0.10)	(0.20)	(0.14)	(0.26)

[11] All asset and debt components have been normalized by dividing by 10^4

TABLE 7 THE RANDOM EFFECTS MODEL

variable	estimate	standard error	estimate	standard error
STAYING-ON PROBABILITY			**NONPART. → EMPL.**	
INTERCEPT	-3.66	0.58	-1.81	0.68
$A_{it}/10^4$	-0.053	0.026	-0.111	0.032
$(A_{it}/10^4)^2$	0.00030	0.00050	0.0007	0.0012
AGE	0.27	0.03	0.072	0.036
AGE^2	-0.0037	0.0004	-0.0014	0.0005
FAMILY SIZE	-0.24	0.09	-0.049	0.092
FAMILY SIZE * MALE	0.20	0.10	0.19	0.11
EDUC1	-0.23	0.12	-0.33	0.18
EDUC2	-0.23	0.11	-0.46	0.19
EDUC3	-0.010	0.10	-0.42	0.16
MALE	-0.006	0.19	-0.14	0.24
MARITAL STATUS	-0.57	0.50	-0.39	0.68
MAR. STAT. * MALE	0.99	0.52	0.10	0.69
ΔEDUC	-0.43	0.11	-0.23	0.17
ΔFAM.SIZE	0.08	0.17	-0.13	0.14
ΔFAM.SIZE*MALE	-0.14	0.18	0.11	0.19
$\bar{A}_i/10^4$	0.070	0.027	0.089	0.037
$(\bar{A}_i/10^4)^2$	-0.00034	0.00058	-0.00062	0.0016
FINEXP1	0.26	0.14	0.28	0.23
FINEXP2	0.34	0.12	-0.05	0.18
INCEXP1	0.90	0.15	0.64	0.24
INCEXP2	0.71	0.13	-0.001	0.18

TABLE 7 (continued)

variable	estimate	standard error
INITIAL CONDITIONS		
INTERCEPT	-2.49	0.30
AGE	0.22	0.02
AGE^2	-0.0032	0.0002
FAMILY SIZE	-0.30	0.05
FAM. SIZE * MALE	0.39	0.06
EDUC1	-0.64	0.09
EDUC2	-0.18	0.09
EDUC3	-0.037	0.081
MALE	-0.30	0.12
MARITAL STATUS	-0.14	0.22
MAR. STAT. *MALE	0.70	0.24
$\bar{A}_i/10^4$	0.033	0.005
$(\bar{A}_i/10^4)^2$	-0.00021	0.00006
VARIANCES		
σ_e	0.58	0.10
τ_3^u	-0.72	0.15
$\sigma_{e\delta}$	0.11	0.05

TABLE 8A THE JOINT MODEL: PROBABILITIES

	STAYING-ON PROBABILITY		TRANSITION NONPARTICIPATION EMPLOYMENT	
variable	estimate	standard error	estimate	standard error
INTERCEPT	-3.040	0.492	-2.025	0.651
$A_t/10^4$	0.0165	0.0083	-0.028	0.022
$(A_t/10^4)^2$	-0.000158	0.000217	0.00034	0.00069
AGE	0.237	0.026	0.100	0.036
AGE^2	-0.0032	0.0003	-0.0018	0.00046
FAMILY SIZE	-0.198	0.086	-0.064	0.091
FAM. SIZE * MALE	0.161	0.091	0.213	0.107
EDUC1	-0.219	0.114	-0.462	0.174
EDUC2	-0.223	0.101	-0.549	0.185
EDUC3	-0.027	0.093	-0.466	0.161
MALE	0.021	0.176	-0.125	0.232
MARITAL STATUS	-0.496	0.446	-0.222	0.698
MAR. STAT. *MALE	0.877	0.460	-0.030	0.722
ΔEDUC	-0.392	0.098	-0.304	0.167
Δ FAM. SIZE	0.036	0.157	-0.144	0.134
Δ FAM.SIZE*MALE	-0.066	0.170	0.075	0.185
FINEXP1	0.196	0.133	0.263	0.747
FINEXP2	0.294	0.118	-0.038	0.173
INCEXP1	0.864	0.144	0.630	0.234
INCEXP2	0.662	0.122	0.007	0.175

TABLE 8B THE JOINT MODEL: THE ASSET EQUATION

	EMPLOYED parametervector η_e		NONPARTICIPANTS parametervector η_u	
variable	estimate	st. err.	estimate	st. err.
INTERCEPT	0.213	0.747	0.848	1.681
$A_t/10^4$	1.030	0.006	1.048	0.016
$(A_t/10^4)^2$	-0.00058	0.00011	-0.0015	0.0003
AGE	0.023	0.037	-0.042	0.073
AGE^2	-0.00014	0.00044	0.00060	0.00076
FAMILY SIZE	0.031	0.032	0.188	0.060
EDUC1	-0.498	0.124	-0.693	0.241
EDUC2	-0.501	0.113	-0.461	0.237
EDUC3	-0.373	0.073	-0.574	0.219
MALE	0.039	0.171	0.029	0.287
MARITAL STATUS	-0.040	0.120	-0.146	0.281

TABLE 8C INITIAL ASSETS

	EMPLOYED parametervector η_{e0}		NONPARTICIPANTS parametervector η_{n0}	
variable	estimate	st. err.	estimate	st. err.
INTERCEPT	-18.279	3.963	-3.407	6.195
AGE	0.938	0.175	0.486	0.234
AGE^2	-0.010	0.002	-0.0032	0.0024
FAMILY SIZE	-1.529	0.802	-1.627	1.189
EDUC1	3.082	2.941	3.099	4.584
EDUC2	4.742	2.355	3.487	4.468
EDUC3	4.710	1.820	2.338	3.419
MALE	2.663	2.718	4.705	3.583
MARITAL STATUS	0.903	2.493	5.973	4.181
FAMILY SIZE * AGE	0.032	0.018	0.055	0.022
EDUC1 * AGE	-0.234	0.062	-0.261	0.082
EDUC2 * AGE	-0.226	0.052	-0.190	0.078
EDUC3 * AGE	-0.188	0.040	-0.120	0.060
MALE * AGE	-0.014	0.065	-0.075	0.069
MARITAL STATUS * AGE	0.089	0.060	-0.068	0.079

TABLE 8D INITIAL LABOUR MARKET STATE AND VARIANCES

	parametervector β_0		COVARIANCE STRUCTURE		
variable	estimate	st. err.	parameter	estimate	st. err.
INTERCEPT	-2.793	0.300	σ_ν	2.776	0.006
AGE	0.221	0.016	$\sigma_{e\nu}$	-0.071	0.120
AGE^2	-0.0031	0.0002	$\sigma_{w\nu}$	0.154	0.203
FAMILY SIZE	-0.190	0.047	σ_e	0.362	0.102
FAM. SIZE * MALE	0.227	0.052	τ	-0.657	0.141
EDUC1	-0.677	0.084	$\sigma_{e\delta}$	-0.012	0.029
EDUC2	-0.303	0.082	σ_{er}	-0.079	0.269
EDUC3	-0.161	0.075	σ_r	8.743	0.077
MALE	-0.0018	0.118	$\sigma_{r\delta}$	6.701	0.148
MARITAL STATUS	0.273	0.210			
MAR. STAT. * MALE	0.260	0.224			

TABLE 9A THE JOINT MODEL: PROBABILITIES

	STAYING-ON PROBABILITY		TRANSITION NONPARTICIPATION EMPLOYMENT	
variable	estimate	standard error	estimate	standard error
INTERCEPT	-2.708	0.451	-0.990	0.420
$A_t/10^4$	0.105	0.012	0.079	0.019
$(A_t/10^4)^2$	-0.00073	0.00018	-0.0011	0.0003
AGE	0.220	0.024	0.072	0.023
AGE^2	-0.0033	0.0003	-0.0017	0.00029
FAMILY SIZE	-0.213	0.082	-0.089	0.063
FAM. SIZE * MALE	0.153	0.086	0.171	0.074
EDUC1	-0.197	0.111	-0.320	0.113
EDUC2	-0.184	0.097	-0.394	0.115
EDUC3	-0.006	0.087	-0.314	0.097
MALE	-0.013	0.171	-0.222	0.162
MARITAL STATUS	-0.611	0.446	0.188	0.246
MAR. STAT. *MALE	0.922	0.460	-0.261	0.277
ΔEDUC	-0.362	0.093	-0.239	0.128
ΔFAM. SIZE	0.040	0.145	-0.088	0.078
ΔFAM.SIZE*MALE	-0.058	0.156	-0.004	0.123
FINEXP1	0.171	0.128	0.305	0.172
FINEXP2	0.251	0.117	-0.019	0.138
INCEXP1	0.802	0.135	0.245	0.167
INCEXP2	0.590	0.120	-0.048	0.129

TABLE 9B THE JOINT MODEL: THE ASSET EQUATION

	EMPLOYED parametervector η_e		NONPARTICIPANTS parametervector η_u	
variable	estimate	st. err.	estimate	st. err.
INTERCEPT	-8.351	0.865	-3.081	1.173
AGE	0.324	0.037	-0.096	0.045
AGE^2	0.0023	0.0004	0.0060	0.0005
FAMILY SIZE	-0.227	0.158	-0.427	0.253
EDUC1	4.162	0.494	2.763	0.877
EDUC2	4.474	0.490	1.819	0.891
EDUC3	2.832	0.360	2.054	0.757
MALE	2.707	0.636	0.738	0.641
MARITAL STATUS	-1.194	0.536	0.289	0.852
FAMILY SIZE * AGE	0.012	0.004	0.031	0.004
EDUC1 * AGE	-0.127	0.011	-0.103	0.016
EDUC2 * AGE	-0.142	0.011	-0.065	0.016
EDUC3 * AGE	-0.096	0.008	-0.071	0.014
MALE * AGE	-0.067	0.016	0.002	0.013
MARITAL STATUS * AGE	0.062	0.014	0.0063	0.016

TABLE 9C INITIAL LABOUR MARKET STATE AND VARIANCES

	parametervector β_0		COVARIANCE STRUCTURE		
variable	estimate	st. err.	parameter	estimate	st. err.
INTERCEPT	-2.416	0.297	σ_ν	2.776	0.009
AGE	0.214	0.016	$\sigma_{e\nu}$	-1.047	0.073
AGE^2	-0.0031	0.0002	$\sigma_{w\nu}$	-2.219	0.055
FAMILY SIZE	-0.303	0.049	σ_e	0.792	0.119
FAM. SIZE * MALE	0.381	0.056	τ	0.943	0.147
EDUC1	-0.636	0.087	σ_l	11.856	0.028
EDUC2	-0.185	0.087	σ_{el}	-8.965	1.345
EDUC3	-0.042	0.079	$\sigma_{e\delta}$	0.096	0.036
MALE	-0.314	0.123	$\sigma_{l\delta}$	-1.223	0.497
MARITAL STATUS	-0.230	0.214	$\sigma_{\nu\delta}$	-0.819	0.063
MAR. STAT. *MALE	0.787	0.231			

TABLE 10
Period to period transition predictions
Current labour market state: EMPLOYMENT
MODEL: simple probit (table 4)

simulated labour market state next period	observed labour market state next period: nonparticipation	employment	total
nonparticipation	63.9 (18.3%)[12]	285.4 (3.9%)	349.3
employment	285.1 (81.7%)	7109.6 (96.1%)	7394.7
total	349	7395	7744

Current labour market state: EMPLOYMENT
MODEL: simple logit (table 4)

simulated labour market state next period	observed labour market state next period: nonparticipation	employment	total
nonparticipation	66.6 (19.1%)	282.7 (3.8%)	349.3
employment	282.4 (80.9%)	7112.3 (96.2%)	7394.7
total	349	7395	7744

[12]In parentheses are the predicted numbers, expressed in percentages of the observed numbers

Current labour market state: EMPLOYMENT
MODEL: ad hoc random effects model (table 7)

	observed labour market state next period		
simulated labour market state next period	nonparticipation	employment	total
nonparticipation	66.6 (19.5%)	264.6 (3.6%)	332.8
employment	280.8 (80.5%)	7130.4 (96.4%)	7411.2
total	349	7395	7744

Current labour market state: EMPLOYMENT
MODEL: simultaneous model (table 8)

	observed labour market state next period		
simulated labour market state next period	nonparticipation	employment	total
nonparticipation	64.3 (18.4%)	301.5 (4.1%)	365.8
employment	284.7 (81.6%)	7093.5 (95.9%)	7378.2
total	349	7395	7744

Current labour market state: EMPLOYMENT
MODEL: simultaneous model (table 9)

	observed labour market state next period		
simulated labour market state next period	nonparticipation	employment	total
nonparticipation	80.4 (23.0%)	321.7 (4.4%)	402.1
employment	268.6 (77.0%)	7073.3 (95.6%)	7341.9
total	349	7395	7744

Current labour market state: NONPARTICIPATION
MODEL: simple probit (table 5)

	observed labour market state next period		
simulated labour market state next period	nonparticipation	employment	total
nonparticipation	2149.2 (92.3%)	179.2 (73.4%)	2328.4
employment	179.8 (7.7%)	64.8 (26.6%)	244.6
total	2329	244	2573

Current labour market state: NONPARTICIPATION
MODEL: simple logit (table 5)

	observed labour market state next period		
simulated labour market state next period	nonparticipation	employment	total
nonparticipation	2151.6 (92.4%)	177.5 (72.7%)	2329.1
employment	177.4 (7.6%)	66.5 (27.3%)	243.9
total	2329	244	2573

Current labour market state: NONPARTICIPATION
MODEL: ad hoc random effects model (table 7)

	observed labour market state next period		
simulated labour market state next period	nonparticipation	employment	total
nonparticipation	2183.4 (93.7%)	190.0 (77.9%)	2373.4
employment	145.5 (6.2%)	54.0 (22.1%)	199.6
total	2329	244	2573

Current labour market state: NONPARTICIPATION
MODEL: simultaneous model (table 8)

	observed labour market state next period		
simulated labour market state next period	nonparticipation	employment	total
nonparticipation	2134.3 (91.6%)	178.9 (73.3%)	2313.3
employment	194.7 (8.4%)	65.1 (26.7%)	259.7
total	2329	244	2573

Current labour market state: NONPARTICIPATION
MODEL: simultaneous model (table 9)

	observed labour market state next period		
simulated labour market state next period	nonparticipation	employment	total
nonparticipation	2068.3 (88.8%)	153.4 (62.9%)	2221.7
employment	260.7 (11.2%)	90.6 (37.1%)	351.3
total	2329	244	2573

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