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**HOUSEHOLD PORTFOLIOS IN THE  
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## **Abstract**

We describe and analyse the portfolio structure of Dutch households using micro panel data from the CentER Savings Survey, 1993-1998. The data allows for a distinction between many types of assets. Moreover, we have information on mortgage debt, consumer debt, etc. We analyse the composition of household portfolios and the level of portfolio diversification, and its relation to age, birth cohort, and education level.

We compare the ownership rates and amounts held in our survey data with published statistics derived from National Accounts and administrative data.

Using discrete choice models and selection models, we relate asset ownership and asset shares to background variables such as age, household composition, education, etc. Moreover, we include subjectively measured explanatory variables reflecting attitudes towards risk and the degree of information the respondent has on financial assets. We consider static as well as dynamic panel data models.

**JEL Classification:** D91

**Key Words:** Portfolio Choice, Panel Data

## 1. Introduction

The composition of household portfolios in the Netherlands has changed dramatically in the past two decades. Twenty years ago, a common family would typically put their savings on a risk free savings account. Stocks and bonds were seen as toys for the rich and adventurous. At some stage in life, the wealthier would buy their own house and obtain a mortgage to pay for it. The rest of their life, their savings would typically be spent on paying off the mortgage debt. This stylised picture no longer applies in the nineties. Like in many other Western countries (see the other country studies in this volume<sup>1</sup>), owning stocks, bonds, mutual funds, options, and other risky assets, is no longer just the domain of the rich and adventurous. Many more people invest in the stock market, and banks and other financial institutions offer a variety of products – together with free advice for even the most modest purse. Special constructions allow for borrowing to finance purchasing stocks. The latest type of mortgage automatically invests repayments in a mutual fund instead of risk free, to benefit optimally from high stock market returns and tax exemptions of capital gains. While all this is clearly shown by the aggregate data, a closer look at the micro level shows that there remains a very large group of families to which these developments do not apply. Many households stick to traditional ways of saving, in spite of the apparent excess returns, the enormous tax advantages of “innovative” portfolios, and all the attention given to this in the media. This makes an analysis of the determinants of ownership of certain types of assets and amounts of the assets held at the micro level particularly useful.

There are two reasons why such an analysis is particularly interesting for the Netherlands. The first is the institutional setting. Financial markets are well developed compared to, for example, Germany and Italy (cf. the chapters in this

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<sup>1</sup> Guiso, Haliassos, and Jappelli (2000). In the text, we will simply refer to “chapters” in “this volume”, instead of citing individual papers.

volume on these countries) and the information channels through which the common household can learn about all the existing investment possibilities are quite extensive. Most importantly perhaps, the tax system both implicitly and explicitly incorporates many incentives for various “innovative” types of saving and borrowing, or combinations of both. We will discuss some of these in detail, and, for example, show that investments with very similar risk and return patterns, may have very different tax treatment and thus quite different after tax returns. Although the complex nature of the tax system makes a structural analysis in which the household maximises some expected utility impossible, we will argue that the tax system has had clear effects on some of the observed diversification patterns.

The second reason to study the Netherlands is the availability of rich and detailed panel data: the CentER Savings Survey (CSS). One of the main stylised findings of the empirical work presented in this volume is the vast heterogeneity in portfolio behaviour over time and across households. While (repeated) cross-section data are available for many countries, household panel data with detailed information on wealth and portfolio choice are still scarce. An exception is the SHIW data for Italy (cf. the chapter by Guiso and Jappelli in this volume, or Brandolini and Cannari (1994)). Our panel data allow us to control for household specific effects, and to distinguish state-dependence from unobserved heterogeneity. In addition, our data contain information on preferences of consumers that is otherwise unavailable in standard micro data.

The CSS data set has six annual waves, for 1993 until 1998. It contains information on wealth components, demographics, and attitudes towards risk, time preference, etc. for about 2500 households. Around 70% of these are designed to be a random sample, the remainder is sampled from high-income areas. The data allows for a distinction between various types of assets, such as traditional saving accounts, tax favoured employer provided saving plans,

various types of risky assets such as stocks, bonds and mutual funds, life insurances, pension insurances, housing wealth, etc. Moreover, we have information on mortgage debt, consumer debt, etc. We describe the distribution of the structure of household portfolio ownership and the level of diversification. We look at cohort and age patterns of ownership rates, which are of importance for the consequences of demographic trends such as ageing of the population on portfolio structures (see Poterba and Samwick, 1997, for example). We focus on financial assets, and the distinction between clearly safe, fairly safe, and risky financial assets. Although much of our analysis focuses on ownership of the assets, we also pay some attention to the amounts held and the shares of various types of assets in total wealth or total financial wealth.

For external validation of our survey data, we compare our micro data with those derived from other sources. Since 1998, the Dutch national accounts data contains information on the stock of financial wealth and its composition. Moreover, we compare the data in our panel with statistics on the distribution and composition of household wealth published by Statistics Netherlands.

Using both static and dynamic discrete choice models for panel data, we relate asset ownership to background variables such as age and education of the head of household, household composition, etc. Moreover, the rich set of subjective data on psychological and economic concepts allows us to investigate the relation between portfolio choice and income expectations, attitudes towards risk or the extent to which the household is informed about financial products. We analyse ownership of risky assets and ownership of a recently introduced asset type, which is specific for the Netherlands: employer sponsored savings plans. We also use a (static) panel data selection model to investigate the determinants of the shares of risky assets and employer sponsored savings plans in total financial wealth.

The remainder of the paper is organised as follows. Section 2 describes the available aggregate stock of wealth data for the Netherlands, based partly on statistics from the Dutch national accounts data, and partly on administrative IPO data, published by Statistics Netherlands. In Section 3 we explain the set up of the CSS data set which we will use in the remainder of the paper. We discuss the asset and debt types included in the survey, and discuss the way in which they are treated by the tax system. We compare statistics from our survey data with statistics from the administrative IPO data. We explain how we have aggregated the asset and debt types in the survey to the categories that are common for all country studies in this volume. We focus on this aggregation level in the remainder. In Section 4, we describe ownership rates, asset shares, diversification of portfolios, and composition of household net worth in the format used for all country studies. Section 5 shows age and cohort patterns of ownership rates for fairly safe and risky financial assets, and for employer sponsored savings plans. It also describes how the share of financial assets in total assets varies with age, and year-of-birth cohort. In Sections 6 and 7 we look at some results for binary choice models explaining asset ownership. In section 6, we consider static panel data models. In Section 7, we exploit the panel nature of the data to a larger extent, and consider dynamic models in which lagged ownership dummies are included among the regressors. In Section 8, we consider selection models to analyse the shares. Section 9 concludes.

## **2. Aggregate Data on the Stock of Wealth**

In the publication ‘National Accounts 1998’ Statistics Netherlands presents for the first time the Flow-of-Funds statement of the sector ‘Households’. This document basically reports the size and composition of households’ financial assets and debts at the beginning of the years 1995 until 1998 (see Table 1).

Before discussing the figures, some observations should be made. First, the National Accounts do not provide data on the value of real assets (e.g. real estate). Second, the sector 'Households' includes 'Non-profit institutions serving households' (like churches, consumer associations, labor unions etc.), and the self-employed. Third, a rather broad classification of asset and debt categories has been adopted. For instance, no distinction has been made between whole life insurances on the one hand and pension and other annuity insurances on the other hand.

Table 1 indicates that financial net worth (financial wealth) increased considerably (by 38%) from 1104 billion guilders at the beginning of 1995 to 1520 billion guilders at the beginning of 1998.<sup>2</sup> Disposable household income grew much slower in this period, leading to an increase in the financial wealth to income ratio from 2.37 to 2.88. An interesting feature of the National Accounts data is that the changes in the stocks of assets and debts are decomposed into capital gains (or losses) and (net) transactions. Capital gains explain 77% of the increase in net worth. The remaining 23% are due to financial transactions. In three years time, financial transactions amounted to 96.2 billion guilders in total, i.e. on average about 7% of disposable household income per year. Most of these transactions are carried out by pension funds or life insurance companies. The reason for this is the extensive system of mandatory occupational pensions in the Netherlands (see e.g. Alessie, Kapteyn and Klijn (1997) for more details about the Dutch social security and pension systems). If these mandatory savings are not taken into account, the savings figures show that households do not 'actively' save much. This is illustrated in Figure 1, which contains time series of both the ratio of contractual and free saving over disposable household income for the period 1985-1997. In this figure, household saving is defined as disposable income minus consumption.



The disposable income measure (and therefore the (conventional) saving measure) does not include capital gains. The total saving measure can be split up into two parts: contractual saving (saving through life insurance companies and pension funds) and non-contractual or ‘free’ saving. With the exception of 1989 and especially 1990, the total saving rate was fairly constant over time and equal to about 12%. In the 1990’s the contractual saving rate gradually increased from 10% to 12%.<sup>3</sup> As a result, the free saving rate was rather low, with a decreasing trend towards zero.

The increase in financial wealth was accompanied by substantial changes in portfolio composition. Between 1995 and 1998, the amount of money in transaction and saving accounts increased by 22%. This increase is smaller than that of financial net worth. This is due to the slow growth rate of saving accounts, since transaction accounts grew at an even faster pace (44%) than financial net worth. As a consequence, the asset share of transaction and saving accounts (in total financial assets) fell from about 18% to 16%. Similarly, the ‘risk-free’ asset item ‘certificates of deposits’ grew only modestly. The most obvious explanation for these findings is that in the period 1995 to 1998, the interest rate on saving accounts and certificates of deposits was rather low. The amount of ‘cash’ hardly changed.

Between 1995 and 1998, the asset share of the risky asset category ‘Stocks, bonds and mutual funds’ increased from 21.9% to 25.1%, at the expense of the risk free asset categories discussed above. In particular, the value of stocks has risen considerably.<sup>4</sup> This reflects the increase in the CBS stock exchange index

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<sup>2</sup> The dollar-guilder exchange rate is about 2 (\$1= Dfl 2)

<sup>3</sup> This is much higher than the savings rate derived from Table 1 (about 7% excluding capital gains, see above). The reason is that the latter did not include investment in real assets.

<sup>4</sup> The asset item ‘stocks’ includes the so-called stocks from a substantial holding. A taxpayer is regarded as having a substantial holding in a corporation if he or she, either alone or with his or her spouse, holds directly or indirectly 5% of the issued capital. The aggregated

from 278 to 618 between (the beginning of) 1995 and 1998 (see the bottom panel of Table 1). The effect of the increasing stock prices on share holdings is reinforced by the fact that capital gains are not liable to income tax in the Netherlands, and by the fall of interest rates on traditional forms of risk free savings in the same time period. Compared to other countries, Dutch households do not invest much in bonds (about 3% of total financial assets in 1995, compared to, for example, about 25% in Italy, 8% in the US and 14% in Germany; see the respective country studies in this volume). Between 1995 and 1998 the amount invested in bonds increased by only 12%, so that its share in total financial assets fell from 3.0% to 2.5%.

In the Netherlands, the asset category ‘defined benefit pensions and contribution pensions and other life insurances’ is a very important part of the household portfolio: more than 50% of all financial assets are held in this form. Compared with other European countries, this number is high. In Germany, the share of life and pension insurances in total financial assets is equal to about 22% (see Deutsche Bundesbank (1999)), and in Italy it is only 11% (see the chapter by Guiso and Jappelli in this volume). The high asset share of this category in the Netherlands is largely due to the mandatory occupational pension system of the defined benefit type, which, as explained above, covers most employees and ex-employees. Moreover, the category is rather broadly defined, and also includes (non-mandatory) whole life insurances and annuity insurances. These include assets that are popular because of their tax-preferred nature.<sup>5</sup>

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value of stocks from a substantial holding is rather high: estimates from the Income Panel Survey (IPO) indicate that the aggregated value is equal to 109 billion guilders at the beginning of 1997 (see de Kleijn (1999)). At the same time, only 1.9% of the households owns this type stocks.

<sup>5</sup> An example is the so-called life insurance mortgage. This type of life insurance is effected in combination with a mortgage. The payout of the life insurance is used to redeem the mortgage. Consequently, the amount of the mortgage debt does not decrease during the

Since the National accounts do not provide any information on the value of real assets (primary residence, real estate etc.), we have to rely on other sources. Statistics Netherlands annually publishes statistics on the households' wealth distribution and its composition, which are mainly based on the Income Panel Survey (IPO, "Inkomens Panelonderzoek"). This is a large sample survey (75,000 households), based on administrative records from the income and wealth tax register. The IPO statistics suggest that between (the beginning of) 1995 and 1997, the value of the housing stock grew by 30% from 746 billion guilders to 913 billion guilders (see de Kleijn (1999)). Only the smaller part of this growth is due to an increasing trend in the home ownership rate; the major part is explained by a surge in house prices (see Table 1).

The increased demand for housing was accompanied by a decreasing trend in the mortgage interest rate (see Table 1). All mortgage interest payments are fully deductible for the income tax. It should also be noted that (for instance, due to the lower mortgage interest rate) the mortgage qualification constraints have been relaxed (i.e. the ratio of the maximum mortgage debt, which a household can take out, and households' earnings has increased over the period).<sup>6</sup> As Table 1 shows, the long-term debt of households (which mainly consists of mortgages) grew considerably over the period 1995-1998. Since a few years, new mortgages are not only effected in order to purchase a new house. In the third quarter of 1999, only 40% of new mortgages were effected for this purpose. The others were used by people who exploited the increase in the value of their house, to buy other durable goods or to finance stock market operations (CBS press release PB99-285). As from 2001, the government wants to abolish the tax deductibility of mortgage interest payments, if the mortgage is

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term of the mortgage contract. Therefore, the life insurance mortgage takes full advantage of the fact that interest payments on the mortgage are fully tax deductible. Not surprisingly, this type of mortgage is rather popular.

not used for purchasing a new primary residence or for maintenance (renovation) of the existing dwelling.

Like long-term debt, the amount of short-term debt has increased considerably from 33.3 billion guilders to 46.9 billion guilders, i.e. from 7 to about 9% of disposable household income. The growth is presumably due to the falling trend in the interest rate. The ratio of these debts to total financial assets remained fairly constant at about 2.2%.

We can conclude that the aggregate trend of investing more in risky assets is in line with the trends in other countries. Some specific findings are not in line with the evidence for other countries, however. Some of these are related to the typical institutional features of the Dutch system of mandatory pensions and the Dutch tax system. The most apparent example of an optimal use of the tax rules is the existence of special types of mortgages, combining interest deduction with untaxed capital gains. More examples of specific asset ownership trends induced by the tax rules will be discussed below, where the micro data do not only allow to study different segments of households, but also more detailed types of assets. The macro data are insufficient for this purpose, due to their high aggregation level and the definition of the household.

### **3. Micro Data**

We use six waves of the CentER Savings Survey (CSS), drawn from 1993 until 1998. Nyhus (1996) describes the set up of this data set and its general quality. The panel consists of two samples. The first is designed to be representative of the Dutch population (REP). It contains approximately 2000 households in each wave. Refreshment samples are drawn in each year to correct for panel attrition. The second sample was drawn from high-income areas and should represent the

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<sup>6</sup> Before 1992, banks generally did not consider spouses' earnings in the determination of

upper income decile (HIP). Initially, it consisted of about 900 families. It is available in each wave except the final one.

Due to survey non-response, the realised REP samples are not completely representative of the Dutch population. For our analyses, we combine REP and HIP sample and use sample weights to correct for non-random sampling. The sampling weights are based upon income and home ownership. For observations with missing income, we predict income from background variables such as family size and education level and age of the head of the household. The weights are constructed using information from a much larger data set (WBO, Woning Behoeftte Onderzoek or Housing Needs Survey) collected by Statistics Netherlands, which is close to representative for the Dutch population.

The CSS data were collected via on-line terminal sessions, where each family was provided with a PC and modem. The answers to the survey questions provide general information on the household and its members, work history and labour market status of adult household members, health status, and detailed information on many types of income. The survey also includes many economic-psychological questions on, for example, risk attitudes, time preference, expectations, and interest in financial matters. Important for our purposes are the questions on assets and debts. For most of the 40 asset and debt categories, respondents first indicate whether they own assets or debts of that type. If they do, they are asked a series of questions concerning amounts and the precise nature of each asset in that category. There is virtually no nonresponse in the ownership questions, but there is substantial non-response in some of the questions on the amounts. For example, 25 percent of those who own shares do not know or refuse to give the value of their shares. Similar problems exist for the value of life insurances and defined contribution plans (annuity insurances),

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the mortgage qualification constraint.

shares from a substantial holding, and business equity. For assets like saving accounts, of which the value seems easy to determine, the number of missing amounts is still about 10 percent of the number of owners. Only for the value of the house or mortgages, the non-response rate is low (below 5%).

To deal with these item-nonresponse problems, we have imputed the amounts of assets held for those of whom we know they own the asset but for whom the amount is unknown. The imputed values are based upon amounts held in adjacent years, and on the use of regression models which relate the observed amounts to household characteristics. We take account of prediction errors by drawing errors from the estimated error term distribution in the regression models, where full account is taken of the covariance structure of the error terms over time. This procedure obviously requires the implicit assumption that - conditional on the regressors used to construct the imputed value - whether or not a respondent reports the amount, is not related to the amount itself. Our framework does not allow testing this assumption.

The asset and debt categories in the survey are listed in the right hand panel of Table 2. *Checking accounts* are necessary for many financial transactions, and are the usual channel for receiving income. They are held by a large majority of households. *Deposit books, savings or deposit accounts, savings certificates, and savings arrangements linked to a Postbank account,*<sup>7</sup> are various types of traditional risk free savings, with varying withdrawal conditions (free withdrawal, fixed term, premium in case of withdrawal, etc.). The interest income received from saving and checking account balances is taxed to the extent that it exceeds some threshold (Dfl 2,000 for couples, Dfl 1,000 for singles).

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<sup>7</sup> The Postbank is a market leader in terms of consumers' checking accounts; as a peculiarity, saving accounts are directly linked to (the ownership of) a checking account with this bank.

*Employer sponsored saving schemes* are a fairly new attractive way of saving offered by most employers, introduced in the early nineties, as a result of a political compromise between unions, employers and the government to stimulate labour force participation and wealth accumulation. Such an asset does, as far as we know, not exist in other countries. Interest income from these schemes is treated separately from other interest income, and not liable to income tax up to a substantial threshold (Dfl 2,000 for couples, Dfl 1,000 for singles). Up to a ceiling of Dfl 1,670 per year, contributions to these schemes are tax deductible, and if the money is not withdrawn for four years, the withdrawals are not taxed. This makes these schemes somewhat less liquid but much more tax favoured than ordinary savings accounts. The money in the employer sponsored saving schemes can also be used to purchase (illiquid) single premium annuities (which gives an extra tax relief), or other assets, such as mutual funds. Thus, in terms of tax treatment, these schemes have some similarities to the IRA's in the US, though the latter are still much less liquid. The ownership rate of this asset has risen fast shortly after its introduction, and has remained approximately constant since 1995 (see Table 3 below).

Ownership of *bonds* is not common among private households, as we already saw in the previous section. The CSS does not distinguish between long-term and short-term bonds, or between government bonds and bonds of private companies.

The CSS distinguishes between two types of stocks: *stocks from substantial holding* and *(other) shares of private companies*. The two are very different for tax purposes, since the former is treated as business capital, while the latter is not. Income from a substantial holding in a corporation is subject to income tax and is taxed at a rate of 25% insofar as this income exceeds the first tax bracket

of 37.3%.<sup>8</sup> Dividends from other shares and from *mutual funds or mutual fund accounts* are taxable, to the extent that they exceed an exemption threshold (Dfl 2,000 for couples, Dfl 1,000 for singles). Capital gains on these are not taxed. The thresholds on dividends are completely separated from the thresholds on interest on savings, creating a tax incentive for diversification.

While mutual funds are typically portfolios of shares, *growth funds* are portfolios of close to risk free assets like bonds and deposits. The returns to growth funds (including capital gains) are liable to corporation tax with a flat rate of 35%, and not to income tax. Thus growth funds are an attractive form of close to riskfree saving for households with high income and a high marginal tax rate whose interest income already exceeds the exemption limit. Bovenberg and ter Rele (1998) refer to them as “innovative” saving.

The premiums of *single-premium annuity insurance policies* (the only common form of *defined contribution pension plans*) are tax deductible under certain restrictions and up to an upper limit (normally Dfl 5,950 for singles or Dfl 11,000 for couples; more if mandatory pensions are incomplete), but the remittances are taxed in the same way as other income sources. Thus this asset type is most attractive for those who expect their income (and their marginal tax rate) to fall after retirement. The ownership rate of such pension plans is rather low. The reason is that most workers are covered by a mandatory pension. The amounts of mandatory pension wealth exceed by far all discretionary financial wealth (see Alessie, Lusardi and Kapteyn (1995)). As pension wealth is a large part of total household wealth, it is unfortunate that our data do not provide reliable information on the size of mandatory pension entitlements of the

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<sup>8</sup> Interest derived from debt-claims forming part of a substantial holding is taxed at the normal rate of income tax. Dividends and capital gains derived from the alienation of shares or from the redemption of debt-claims are taxed at a proportional rate of 25% in the income tax, insofar as this income exceeds the first tax bracket of 37.3%. In case of a capital loss, 25% of that loss may be offset against the tax that would otherwise be due.



households in our sample. Non-mandatory defined-benefit pensions, a common type of asset in many other countries, hardly exist in the Netherlands.

The other type of life insurance assets, *savings or endowment insurance policies*, is taxed very differently: premiums paid are not tax deductible, but, under some conditions concerning time span and amount, payments are tax free. This type of life insurance is often combined with a mortgage (*whole life insurance with mortgage on real estate, house or second house*).

Owner occupied housing (*own house*) is by far the largest observed wealth component of Dutch households, in terms of the aggregate amount involved. Other types of real estate ownership (*investment real estate and second house*) are much less common. Real estate ownership is taxed in various ways. Owner occupied housing is mainly taxed through the income tax, by adding an imputed rent to income. The increase of the value of real estate is not taxed.

The survey also contains detailed information on various types of financial debts. By far the most important one in terms of the amounts involved is *mortgages on the house*. Less common are *mortgages on pieces of real estate* and *mortgages on the second house*. Interest paid on mortgages is fully tax deductible. Other types of financial debts referred to in the survey are *private loans, extended lines of credit, outstanding debts on hire-purchase contracts, outstanding debts with mail-order firms, loans from family or friends, study loans, loans not mentioned before*. Since 1997, the deduction of interest on these types of debt is restricted. It is envisaged to phase out the tax deductibility by 2001. Finally, *negative checking account balances* are included as a separate debt category.

Apart from the income tax and other taxes paid on income or imputed asset income, families whose net wealth exceeds some threshold (Dfl 193,000 for single tax payers, Dfl 241,000 for married tax payers in 1998), pay a flat rate wealth tax of 0.7% on the amount of net wealth exceeding the threshold. For

computing total wealth, owner occupied housing is valued at only 60% of its market value, while financial assets are valued at their actual value.<sup>9</sup>

To illustrate the differences between tax treatments of various forms of (risk free) savings, we discuss some results given by Bovenberg and ter Rele (1998). They follow the method of King and Fullerton (1984), and compute the after tax return  $s$  from the before tax return  $r$  as

$$s = [(1-m_w)/(1-m_c)]^{1/dur} (1+r) - 1$$

Here  $dur$  is the duration of the investment,  $m_w$  is the marginal tax rate at which withdrawals are taxed, and  $m_c$  is the rate at which contributions can be deducted. Bovenberg and ter Rele (1998) use an inflation rate of 2%, and use a nominal before tax return of 6% for each of the asset types they consider. For households with average marginal tax rates, they find real after tax returns of 1.2% for traditional saving accounts, 1.5% for ('innovative') risk free invested growth funds, and 20.8% for the tax favoured employer sponsored savings plans. For high income (high marginal tax rate) households, the differences are still somewhat larger. Thus employer sponsored savings plans are extremely tax favoured, though limited by ceilings which may make them not so important for the rich. Moreover, they are only accessible for employees of a participating employer. Although there are also some advantages involved for the employers (they do not pay social premiums on the amounts invested), some small employers do not offer them, due to administration costs. Bovenberg and ter Rele (1998) also compute the real after tax returns of both types of life insurance: 4.0% for the savings or endowment insurance policies (equal to the

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<sup>9</sup> All the tax rules that are described are valid for 1998. The government has proposed plans for very substantial reforms that will very likely be implemented as of 2001.

before tax real rate of return), and 5.3% for pension plans. Thus both types are tax favoured compared to traditional or innovative savings.

The left hand panel of Table 2 shows how the asset types referred to in the survey questions are aggregated to obtain the classification common for all country studies in this volume, which will also be used in the remainder of this paper. Most categories speak for themselves, given the explanations above. We include a separate category for *employer-sponsored savings plans*. To the common debt categories, we have added *study loans* and *negative checking account balances*, which do not seem to fit in the common categories.

The bottom panel of Table 2 presents a classification of assets at a more aggregate level. Growth funds are included in the fairly safe assets, since they invest in bonds and deposits. (Other) mutual funds invest in shares, and are included in the risky assets category.

The means of the amounts held and the ownership rates in the CSS can be compared with external data sources. The first source is the national accounts statistics, presented in Table 1. The second source is published statistics from the IPO data set.<sup>10</sup> Comparison with the national accounts data has the following limitations. First, the CSS has no information on asset and debt holdings of the self-employed which are held for business purposes (land, machinery, checking, deposit accounts, loans from banks etc.); it only has business equity (business assets minus business debts). Thus the aggregate balance on saving and deposit accounts estimated from the CSS, excludes assets held by the self-employed for business purposes. This can be a serious problem because the self-employed are overrepresented in the top decile of the wealth distribution (see e.g. Table 6 below). Second, the wealth of ‘Non-profit institutions serving households’ is

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<sup>10</sup> Many low-income households are not required to provide information for income or wealth tax purposes, so that their wealth is not observed in IPO data. To correct for this, Statistics Netherlands has supplemented IPO with data from the Socio-Economic Panel (a

included in the national accounts but not in the CSS. Third, there are differences in the way asset and liability types are defined. In particular, the national accounts cannot be compared to the CSS data on life insurances or consumer debt.

Due to its partly administrative nature, IPO will not suffer so much from the typical measurement problems with survey data. This does not guarantee that these published data perfectly reflect national ownership rates or aggregate amounts held. Underreporting to avoid paying taxes might be as serious as measurement errors in surveys. For this reason, Statistics Netherlands has adjusted the IPO information on the value of the primary residence by making use of the Socio-Economic Panel. On the other hand, banks and other financial institutions are obliged to provide the tax authorities with details on the clients' saving accounts balances, mortgage debt and mortgage interest payments, and on paid interest. This implies that these asset items should be measured rather accurately in the IPO for at least the households in the income and/or wealth tax register. IPO does not cover all assets. Life insurances are not covered, for example. IPO contains the same type of information on business equity as the CSS. These two data sets thus allow for a similar breakdown of assets and liabilities. This is one of the reasons that we mainly use the IPO data for comparison purposes. The results of this comparison can be summarised as follows:

- In the years 1993-1997 the IPO estimates of average net worth are 12% lower than the CSS estimates. This result can mainly be attributed to the fact that home ownership rates are lower in IPO than in the CSS (about 43% versus about 48%). The CSS home ownership coincides with that of the

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household panel with limited information on assets and debts which is representative for the Dutch population).

Housing Needs Survey (WBO).<sup>11</sup> This is not surprising because the information on home ownership and income from the WBO has been used to construct the sample weights of the CSS. It is unclear why the IPO figure is lower. The CSS average value of the house conditional upon ownership is somewhat higher than its IPO equivalent. A comparison with the data from external sources in Table 1 suggests that the IPO data on the value of the house are rather reliable.

- In comparison with the IPO, the CSS underestimates the average balance on checking and saving accounts IPO by about 20%. According to IPO, virtually every household has a checking account or a saving account, whereas according to the CSS 4% of the households do not have such accounts. This partly explains the lower CSS estimate of the average balance.<sup>12</sup>
- According to the CSS the ownership rate of ‘stocks, bonds and mutual funds’ is considerably higher than according to the IPO (25.2% versus 12.8% in 1996). On the other hand, the unconditional means are similar. This implies that the CSS considerably underestimates the mean conditional upon ownership. We suspect that the IPO estimates of the ownership rates of securities can be too low, for example due to non-reporting to the tax authorities. A comparison with the national accounts shows that IPO underestimates aggregate share holdings considerably (by 45% to 50%).<sup>13</sup> In the CSS the estimate of the average amount invested in shares from a

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<sup>11</sup> Statistics Netherlands uses the WBO to construct the official home ownership statistics.

<sup>12</sup> We have also compared the aggregate (macro-economic) balance on checking, saving and deposit accounts according to the national accounts (NA) and the IPO. It turns out that the IPO estimate is 22% lower than the NA estimate. However, a correction for the differential treatment of the self-employed and the non-profit institutions would presumably diminish this difference considerably.

<sup>13</sup> It is unlikely that the difference between the IPO and national accounts estimates can be completely explained by the differential treatment of the self-employed and the non-profit institutions.

substantial holding is considerably lower than its IPO equivalent. According to both IPO and CSS very few households hold this type of assets, but these households are typically very rich. Thus in spite of its oversampling of households in the highest income decile, it seems that CSS considerably underestimates the wealth holdings of the very rich.

- The difference between IPO and CSS estimates of the home ownership rates and of the average value of the house induces a difference in mortgage ownership rates and in mortgage debt. Both data sources suggest, that conditional upon home ownership about 80% of the households have a mortgage on their home.
- The IPO and CSS statistics on consumer credit are quite similar.

Estimates of levels of wealth in survey data are often reputed to be not really reliable. Our comparison is hampered by the fact that both the aggregate data and the micro data have apparent drawbacks. Still, in comparison with other surveys, the accuracy of the CSS estimates is certainly not worse than other wealth surveys with the exception of the American Survey of Consumer Finances (see, e.g., Brandolini and Cannari (1994) for a useful overview).

#### **4. Ownership and Composition of Household Assets and Debts: Survey Data**

In this section, we describe ownership rates and the composition of asset portfolios of Dutch households according to the CSS survey data, using the common classification for all country studies. All the results are weighted with the sample weights, to make them representative for the Dutch population. The

weighted ownership rates for assets are typically smaller than the unweighted ownership rates, reflecting the fact that the rich are oversampled.<sup>14</sup>

Table 3 presents the ownership rates. *Transaction and saving accounts* are held by more than 95% of the households in the survey. The remaining 5% non-ownership may largely be reporting error, since these accounts include *checking accounts*, which are necessary for many financial transactions, and are the usual channel for receiving income. Most households also hold at least one type of traditional saving account. Ownership of *bonds* is not common. The ownership rate never exceeds about 6 percent, with a decreasing trend. The ownership rate of *stocks* has risen during the nineties, from about 11% to more than 15%. *Mutual funds and managed investment accounts* were on average more often held than stocks, with an even higher growth rate during the sample period. Many financial institutions have been successful in introducing and marketing mutual funds as a low threshold risky asset, available to many individual investors. Still, the majority of the households hold neither stocks nor mutual funds. This lack of participation can be explained by monetary transaction costs and information costs. In their chapter in this volume, Guiso and Jappelli pay more attention to the nature of these costs. Like in Italy, there is evidence that investing in a mutual fund involves substantial transaction costs.<sup>15</sup>

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<sup>14</sup> In 1998, there was no separate high income panel (see Section 3). Although the weights should in principle correct for this, it may explain some of the unexpected changes in ownership rates or shares from 1997 to 1998.

<sup>15</sup> There are explicit and implicit transaction costs. The explicit transaction costs are typically low (about 0.5% of the investment). The implicit transaction costs (entry and exit fees incorporated in the buying and selling price of the mutual fund) are higher. The maximum entry fee is about 2.5% of the investment, and the maximum exit fee is about 1.5% (see Consumentenbond (1999)). It is not clear whether Dutch people are aware of these implicit costs when they invest in mutual funds. Apart from the transactions costs, the mutual funds charge a management fee of about 0.5% per year. Moreover, clients face minimum investment requirements. In comparison to Italy (see the country study on Italy in this volume) transactions costs are sizeable and can explain the fact that a large number of households do not hold any mutual funds.

*Defined contribution-pensions* are less commonly held than in many other countries. The ownership rate varies around 16%. The other type of life insurance assets, *cash value of life insurances*, has consistently larger ownership rates than the defined contribution plans, varying between 23% and 26%. These life insurances also include whole life insurances linked to a mortgage. The ownership rate of the new asset *Employer sponsored saving plans (ESSPs)* has risen fast shortly after its introduction, and has remained approximately constant since 1995.

The rates of the category *primary residence* show that the home ownership rate in the sample has increased during the nineties. Ownership of *other real estate*, on the other hand, has declined somewhat. *Business equity* is held by about 6 percent, and the variation over the years does not reveal a systematic pattern. The stock of *durables* only covers cars, motor bikes, boats and caravans. Between 72 and 77 percent of all families own at least one of these. About 80 percent hold assets in at least one of the non-financial asset categories we consider.

The majority of home owners also have one or more mortgages on their house or other real estate (*mortgage and real estate debt*). Like home ownership, mortgage ownership increased over time. Between 30 and 33 percent of all households have some form of *consumer credit*, while other types of financial debt are held by about 10 to 13 percent.

There is a decreasing trend in ownership of (subsidised) *student loans*. This is due to a political decision to provide incentives to reduce the average time spent for studying. *Negative balances in checking accounts* do not refer to the overall balance, but to all separate checking accounts. 15% of households have at least one checking account with a negative balance (possibly in combination with other checking accounts with positive balances). The percentage of families



with some type of financial debt, including mortgage debt, has increased from about 64% to about 66% during the sample period.

The bottom panel of Table 3 summarises the ownership information at the higher level of aggregation defined in the bottom panel of Table 2. The percentage with *fairly safe financial assets* has risen from about 49 to about 60 percent, which is largely due to the booming of ESSPs. Ownership of risky financial assets has also risen substantially, like in many other countries. In 1998, about 28% held some type of risky financial assets, while 33% held any risky assets, including business equity and investment real estate.

Table 4 describes the composition of household financial and total wealth and the composition of debt. It gives the (estimated) amount of each asset and debt category held by the population as a whole, as a share of total financial wealth, total wealth, or total debts.<sup>16</sup> Missing values are imputed, as explained in Section 3. A drawback of Table 4 is that some large amounts may heavily influence the numbers, due to the skewed distribution of wealth and its components. This is probably the reason why some of the time patterns are not very pronounced. It can also explain why the average amounts of total assets and total financial assets (also presented in the table) do not show the large growth rates we saw in Table 1. The mean amounts are strongly affected by a few very rich people, and there are simply too few of these in the CSS to capture the trend in the means. This problem is not present in the median values, which are insensitive to the outliers. The median amounts show much larger

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<sup>16</sup> This is not the same as the average share, due to different weighting. For example, the average share of stocks is lower than the share of stocks held by the population in total financial wealth of the population, since stocks are often owned by wealthy households. Table 4 gives the relevant numbers for comparing with aggregate data on total amounts, and can be referred to as “macro shares” (see Poterba and Samwick (1997) for similar calculations).

growth rates for the time period 1993-1998, comparable to those in Table 1: about 45% for total financial assets, and about 50% for total assets.

The first panel presents the shares of financial asset categories in total financial wealth. The share of risk free financial assets in total financial assets is between 31 and 36 percent. This share is falling between 1993 and 1997. The share of employer sponsored savings plans has grown, but remains quite limited, due to the low maximum amounts which are tax favoured. The shares of stocks and mutual funds together exceed the share of risk free financial assets, and exhibit an increasing trend over time. The joint share of defined contribution plans and whole life insurances varies between 18% and 25%. The average share of financial assets in total assets has remained fairly stable between 28% and 30%.

The two most important non-financial assets are primary residence and durables (vehicles etc.). The share of primary residence has risen, but not as much as one might expect, given the enormous increase in house prices in the past decade.

The share of mortgage debt in total debt is large and hardly varies over time. Although many people have some form of consumer credit, the total amount of this is only between 5 and 6 percent of total financial debt. The total debt versus total assets ratio has fallen from about 29% to about 24%.

The bottom of the table presents the so-called conditional shares of risky assets. These are computed as the ratio of the average amount of risky assets held by owners of risky assets, and the average amount of total assets of the same group of owners. These shares are larger than the unconditional shares because the zero amounts of non-owners are not included. On the other hand, their size is reduced because total assets of owners of risky assets are larger than total assets of those who do not own risky assets (cf. Table 6 below). The time pattern in the conditional shares is similar to that in the unconditional shares.

In Table 5, the ownership structure of financial asset portfolios is presented. We consider the three categories *clearly safe* (= *risk free*), *fairly safe*, and *risky* (cf. Table 2). This gives eight possible portfolio structures, depending on whether or not any of the three categories are held. The table shows that the number of households reporting no financial assets has fallen in the first few years of the survey, and has been between 4 and 5 percent since then. In 1993, the largest group were people with risk free financial assets only. The size of this category has fallen substantially, however. In the later years of the survey, the largest group is those with risk free as well as fairly safe financial assets. About 5% hold clearly safe as well as risky financial assets, but no fairly safe financial assets. This percentage has remained stable over time. The largest increase is found for the final group: almost 22% of all households hold assets in each of the three risk categories in 1998, versus almost 16% in 1993. Though this increasing trend is similar to the trend in other European countries, the level of diversification is not. Portfolios of the Dutch are more diversified than portfolios in the UK or Italy, and somewhat less diversified than those in Germany (see the other country studies in this volume). An explanation is the presence of several separate tax exemptions up to certain thresholds (interest on traditional accounts, employer sponsored savings plans, dividend payments), which create incentives to invest positive amounts in a number of different types of assets.

Table 6 reports the ownership rates for each quartile of total wealth, and for the top 5% of the wealth distribution. Table 7 does the same for the shares. We only present the numbers for 1997, since this is the most recent wave for which the high income panel was available. The main conclusion is that there are huge differences between portfolio choices of households in the different wealth quartiles, and the differences are largely in line with the findings in the other country studies in this volume. While clearly safe financial assets are held by all

quartiles, ownership of fairly safe and, in particular, risky financial assets is quite uncommon for low wealth households. An exception is the ownership of employer sponsored savings plans, which is common among employees in all wealth categories. This is what we should expect, given this asset's tax-favoured nature and the absence of transaction costs.

The table shows that the wealth gradient of stocks is higher than that of mutual funds. This is due to the concentration of substantial shareholding among the very rich. The positive relation between wealth and home ownership is no surprise. The same holds for other non-financial assets. Somewhat unexpectedly, consumer credit and negative checking account balances are not uncommon among the rich, though the ownership rates are lower than in the lowest wealth quartile.

The portfolio shares in Table 7 basically tell the same story. For the first wealth quartile, clearly safe assets and ESSPs together have an average share of almost 84 percent in total financial assets. For the top 5 percent of the wealth distribution, this is only 14 percent. In particular, the share of stocks is very large for the top 5 percent: 49% in 1997. The share of housing wealth (or other real estate) is quite large for the two higher wealth quartiles, but is smaller for the top 5 percent. Again, this is likely due to the impact of holders of substantial shares among the richest. The wealth gradient of business equity as a share in total assets is steep and positively sloped, while the gradient of durables is strongly negative.

For the lowest wealth quartile, the share of consumer debt and the share of negative balances on checking accounts add up to almost 34% of total debt, on average. For this quartile, total financial debt typically exceeds total (gross) wealth. On the other hand, consumer debt plays a minor role for the higher wealth quartiles, where mortgage debt dominates the distribution of debts. In the top wealth quartile, some form of consumer debt is held by more than 24%,

but the average amount of consumer debt is only 2.4% of total debts and less than 0.5% of average gross wealth.

The conditional shares of financial risky assets are presented in the bottom panel of the table. They still show an increasing pattern with wealth, but less steep than the unconditional shares. The main reason is that ownership of risky assets increases with wealth (see Table 6). Still, these numbers suggest that total wealth does affect the conditional share, something we will check formally in an econometric model in Section 8.

Table 8 presents the same ownership rates as Table 6, again for 1997, but now broken up by age. The asset ownership rates for stocks, mutual funds and bonds are much higher for the older age groups. King and Leape (1987) have found a similar result. Their explanation is that, other things equal, financial knowledge about assets such as stocks and bonds accumulates with age. We shall come back to this in Section 6. Life insurances are typically held by people in their thirties and forties. ESSPs are linked to employment, and are therefore not held by people who retired before ESSPs were introduced. Home ownership rates are highest for people in their forties and fifties, business equity is mostly held by people in their forties and fifties.

The mortgage debt ownership age pattern follows that of home ownership, except for the highest age groups. Many households in this age group apparently own a mortgage free house. Between 1993 and 1998, the fraction of elderly households holding a mortgage increases. A possible explanation is that the decreasing trend in the interest rate induces more and more elderly households to exploit the possibility of tax arbitrage. Consumer debt is most common for people in their thirties, forties and fifties, and is very low for the oldest age group. Negative checking accounts are particularly common for the youngest age group, which might indicate that for the young, access to other types of financial debt is restricted.

Table 9 presents the shares broken up by age groups. The share of risky assets in total financial assets rises with age, from less than 10% to more than 50%. Stocks and bonds are particularly important for the two oldest age groups, this is less the case for mutual funds. The other age patterns for the asset shares are largely in line with the ownership rate patterns. Unlike in Italy (see the country study on Italy in this volume), the conditional shares of risky assets also rise with age, although not as steeply as the unconditional.

## **5. Age, Cohort and Time Patterns of Asset Ownership Rates**

In Figures 2, we present (head of household) age and cohort patterns of the ownership rates of some financial asset types, based upon all six waves of the CSS.<sup>17</sup> We use five year-of-birth cohorts, with birth years 1915-1919 for the oldest cohort, until birth years 1970-1974 for the youngest cohort. Cohort labels indicate the middle year-of-birth. The cohorts born before or after the implied span contain few observations and are not included in the graphs. The three panels in Figure 2 refer to ownership rates of fairly safe and risky financial assets, and of *employer sponsored savings plans* (ESSPs), respectively. (The clearly safe ownership rates are all close to one, making its graph not very interesting.) Note that ESSPs are also included in the fairly safe financial assets category. Each figure presents the raw ownership rates for each cohort in each wave; the six points for each cohort represent the six average age levels at the times of the interviews, and form a "cohort curve." For each cohort, these six points are interconnected. The jumps between the cohort curves show that, apart from age effects, there are cohort or time effects. The fact that cohort curves are not horizontal shows that there are time and/or age effects; the fact that not all cohort curves are the same shows that there is more than just time effects. As

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<sup>17</sup> All graphs are weighted using the sample weights discussed in Section 3.

usual, however, the three effects cannot be disentangled without further assumptions.

The top panel of Figure 2 shows that ownership rates of fairly safe assets have a hump shaped age pattern. For the cohorts of working age, there is a steep increase between 1994 and 1996, reflecting the booming of ESSPs. Thus the jumps between cohort curves seem better interpreted as calendar time effects than as cohort effects.

The pattern for risky financial assets (Figure 2, middle panel) is quite different. Ownership of risky assets continuously rises with age. For the younger cohorts, cohort and calendar time effects do not seem important. For the older cohorts there are clear downward jumps between cohort curves, reflecting either a cohort effect (older cohorts are less likely to own these assets, given age and calendar time) or a calendar time effect (holding risky assets has become more popular in the nineties among the older age groups). The increasing pattern of the risky asset ownership rate is different from the pattern for some other countries. Italy and the US, for example, have a hump shaped pattern. Possible explanations for the increasing pattern are correlation between cohort and wealth, or correlation between cohorts and knowledge about financial products. We will analyse such explanations in the models in the next section.

The ownership rates of ESSPs are presented in the bottom panel of Figure 2. The differences between cohort curves stand out even more clearly than in the top panel, and reflect the calendar time effects shortly after introducing this asset type. This again confirms that ESSPs have become much more popular during the period under consideration, due to their tax-favoured nature.

Figure 3 contains the age patterns broken up by education level. Four education levels are distinguished. Calendar time and cohort effects are ignored; the observations are simply pooled across all waves (implying that each

household is included as between one and six observations). The curves are smoothed as functions of age, using a nonparametric kernel regression technique.<sup>18</sup> This is done to remove of the noise in the raw ownership rates, particularly for the smaller cells. The age pattern of ownership of fairly safe assets (top panel) does not change systematically with education. The small ownership rate for the highly educated young could be due to the fact that they have just recently or not yet entered the labour market. The pattern for risky financial assets (bottom panel) shows that ownership rises sharply with age for the highest education level. For the younger age groups, ownership of risky assets is almost equally likely for all education levels. On the other hand, for a sixty years old head of household with high education, ownership is much more likely than for a sixty years old head with low education. Ownership of ESSPs does not reveal any systematic relationship with education level, and we therefore do not present age patterns by education level for this asset.

Figure 4 shows the cohort curves of the average share of financial assets in total assets. Almost every household in every age and cohort group owns some financial assets, but there is systematic variation in the share. There are no systematic cohort or time effects; it seems that the pattern can largely be interpreted as an age pattern with some noise. The u-shaped pattern is the mirror image of the commonly found hump shaped pattern of home ownership or the share of housing wealth in total wealth. Home ownership is most likely for people in their forties and fifties, and for these age groups, the non-financial wealth share is typically quite large.

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<sup>18</sup> We used the quartic kernel and an adaptive bandwidth with weighting parameter set to 0.5; see, for example, Blundell and Duncan (1998) for an exposition.



## 6. Static Models for Asset Ownership

In this section we explain asset ownership from various background variables. We focus on ownership of risky assets and ownership of employer sponsored savings plans (ESSPs). We have estimated similar models for fairly safe assets, but the main conclusions derived from these estimates coincide with the results for ESSPs.

We have panel data for six waves. As discussed in the chapter by Miniaci and Weber of this volume, there are various ways to model the binary choice of owning versus not owning in a panel data context. In this section, we will look at a static model, dynamics will be added in the next section. We focus on random effects models. The reason is that in fixed effects models, many of the effects that we are interested in are not identified, due to no or little time variation in some of the explanatory variables. The model we will estimate is given by equations (3.3-3.5) in the chapter by Miniaci and Weber. Both the individual effects and the error terms are assumed to follow a normal distribution, and are assumed to be independent of the regressors. The errors are assumed independent over time. The model is estimated by maximum likelihood, using the complete unbalanced panel. Summary statistics for the explanatory variables and the wording of the psychological questions can be found in the appendix.

Instead of parameter estimates, we present estimated marginal effects, i.e. the changes in the ownership probability if explanatory variables change by one unit, *ceteris paribus*.<sup>19</sup> For most of the variables, these marginal effects are computed at the mean ownership probability. Exceptions are the effects for age, noncapital income, and total net worth. Specification tests show that we need a

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<sup>19</sup> To be precise, for continuous variables (like age or income), the derivative of the estimated probability is evaluated; for dummy variables (like education), the change from 0 to 1 is considered and the corresponding change in probability is reported.

cubic wealth and (non-capital) income pattern and a quadratic age pattern. To interpret the estimated non-linear patterns, we present the marginal effects for these variables at various values of the variable concerned, with the other regressors set to their means. For age, we consider a change by one year at ages 30, 45, and 65. For income and wealth, we consider changes by 1000 Dfl at the 25, 50, and 75 percentile of the income and wealth sample distributions. We also present results of tests for joint significance of all the terms in the polynomials, and for groups of (related) dummy variables. The results are presented in Table 10.

### *Risky assets*

We first discuss the estimates for ownership of risky assets. Income and wealth (net worth) patterns are strongly significant and positively sloped. The income pattern of marginal effects is close to linear; an income rise of Dfl 1,000 leads to a rise of between 0.05 and 0.06 %-points of the probability of owning risky assets. The positive effect of income may be due to the tax incentives: higher income implies a higher marginal tax rate, and a larger incentive to benefit from the untaxed capital gains (see also the chapter by Poterba in this volume).

The net worth pattern is also close to linear, with a wealth increase by Dfl 1,000 leading to a rise of the ownership probability of between 0.071 and 0.083%-points. In his chapter of this volume, Gollier shows in a theoretical model that the effect of wealth on the share of risky assets depends on the relation of wealth with risk aversion. The standard case is one with constant relative risk aversion in which the share is constant. Our finding is consistent with his theory if utility functions exhibit decreasing relative risk aversion.

Labour market status variables for the head of household are also significant. The retired and self-employed are more likely to have risky assets than the

employed. The household composition variables imply that larger families less often own risky financial assets.

The next sets of explanatory variables are based upon subjectively measured variables drawn from the psychological section of the survey. This provides a source of economic psychology questions, which is richer than in the typical household survey.<sup>20</sup> According to Gollier's theoretical model in his chapter, expected utility models of portfolio choice predict that (under plausible assumptions) households with riskier human capital invest less in risky assets (see also Kimball (1993) for the impact of background risk on portfolio choice). We could not confirm this theoretical result: dummies concerning the degree of uncertainty about the expected income change are not significant at the 5% level.<sup>21</sup> These variables are therefore not included in the present specification.

Interest in financial matters of the head of household is summarised in two dummy variables. There is a strong positive relationship between interest in financial matters and probability to own of risky assets, with a difference of 22%-points between the very interested and the non-interested, *ceteris paribus*. The interpretation of this result is probably that the more informed households are better aware of the advantages of risky assets and less hampered by fear of the unknown or initial costs than the less informed. Interest in financial matters serves as a proxy for information. Direct questions on how well the respondents are informed about particular assets (cf. the chapter on Italy in this volume), are not available in the CSS.<sup>22</sup>

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<sup>20</sup> Das and Donkers (1999), Donkers and van Soest (1999), and Donkers *et al.* (1999) use some of these variables for the earlier waves of the panel.

<sup>21</sup> Likewise, Hochguertel (1997) found only weak support for the impact of background risk on portfolio choice, using the first three waves of CentER Savings Survey.

<sup>22</sup> It can be argued that the financial interest variables are endogenous. We cannot test or control for this due to lack of instruments. We did also estimate the models in Sections 6, 7 and 8 without the financial interest variables, and found that this did not substantially affect the estimates of the other parameters in the model. Thus for example, significance levels and shapes of age and education patterns of ownership rates or shares hardly change.

The next set of variables reflect whether the head of household agrees with the statement that it is more important to have safe returns to financial investment than to take some risk to get an excess return. This can be seen as a proxy of risk aversion. As expected, the highly risk averse are the least likely to own risky financial assets.

Since the figures in the previous section suggested that age and time effects would be more important than cohort effects, we have not included any cohort effects.<sup>23</sup> This implies that the age and time patterns are fully identified. The *ceteris paribus* age pattern is not very strong and significant at the 5.3% level only. The pattern is u-shaped, with a negative marginal effect of  $-0.06\%$ -points per year at 30 years of age, and a positive effect of  $0.1\%$ -points per year at age 45. Households headed by persons of retirement age exhibit the strongest propensity to hold risky assets ( $0.44\%$ -points per year). This result is consistent with the steeply rising age pattern in Figure 2. King and Leape (1987) have found a similar result. They stress the role of financial knowledge in making portfolio decisions, in particular when information intensive assets (such as stocks and other risky securities) are involved. In their empirical analysis, they attribute the age effect to the accumulation of information: “Information about investment opportunities is necessary for the construction of the optimal portfolio and arrives over time. Hence age is an important determinant of portfolio composition.” That we find an effect of age even after controlling for interest in financial matters can be seen as evidence that interest in financial matters is an imperfect proxy for financial knowledge. A different interpretation might be that older people have more time to collect information and to monitor their portfolios actively. The finding that risky assets ownership is significantly

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<sup>23</sup> An alternative would be to include cohort effects, age effects and time effects which are restricted to sum to zero (cf. Deaton and Paxson (1994)). This leads to results with a less plausible interpretation.

more likely for heads of household with university education than for others, can again be interpreted as an effect of financial knowledge.

The time effects show that in particular ownership of risky assets has become more popular during the last few years. Controlling for all other variables, the pure time effect between 1993 and 1998 is an increase of more than 10%-points.

Finally, ownership of risky assets increases with degree of urbanisation. This may reflect a supply effect, since the density of banks, and hence the quantity and quality of financial information available will be higher in urbanised areas, or a demand effect, since the information spill-over between households is expected to be larger in densely populated areas. The finding is consistent with evidence for Italy (cf. the chapter by Guiso and Jappelli).

#### *Employer Sponsored Saving Plans*

We have seen in Section 3 that ESSPs are strongly tax favoured up to a limited amount, with a huge after tax real return advantage compared to assets of similarly low risk. Thus basically everybody who saves, has access to ESSPs, and does not face serious liquidity constraints, should invest in ESSPs. Unfortunately, the available data do not provide direct information on who has access to ESSPs and who has not.

Labour market status variables serve as the main proxies for access to ESSPs. They are strongly significant, and indicate that all non-employees have a much smaller chance of owning ESSPs than employees. Since the labour market status dummies only reflect the current status but not the employment history, they are incomplete proxies of access, and other proxies may help as well. This may explain the significant hump shaped age pattern we find, and the significant income and wealth patterns. The latter two are both monotonically increasing, indicating that the higher income households and the wealthy are more likely to have or have had jobs that give access to ESSPs. The number of

adults may be significant because it proxies the likelihood that another family member has access to ESSPs. That the presence of children is not significant is in line with this. So is the insignificance of the education variables, the risk aversion variables, and the degree of urbanisation dummies. On the other hand, if having or having had access were all that matters, we would not expect interest in financial matters to matter. The fact that the more interested more often own ESSPs suggests that there are people who are not interested or not informed about the advantages of ESSPs, and do not buy them, in spite of the fact that they have access.

## **7. Portfolio Mobility and Dynamic Models for Asset Ownership**

As explained in the introduction, our data are unique in the sense that they are genuine panel data, with the majority of the survey households followed during a number of consecutive years. This makes it possible to look at portfolio mobility. In the top panel of Table 11, we present a cross-tabulation of ownership of risky and fairly safe assets in two consecutive years, averaged over all pairs of years in the survey.<sup>24</sup> For example, 28.5% of all households in the sample have both risky and fairly safe financial assets in a given year, and 22.2% have both types of assets in two consecutive years. Thus more than one fifth of all households with both types of assets, no longer own both types in the next year. Similarly, the numbers in the top panel of the table imply that one in every six households of the 34.6% who own risky assets in a given year no longer own risky financial assets in the next year. About one in every nine households who do not own risky financial assets in a given year, have acquired such assets a year later. The bottom panel of Table 11 shows the same cross-

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<sup>24</sup> The table is constructed in the same way as Table 10 in the country study on Italy, and therefore does not use the sample weights. This explains why the ownership rates for one given year are larger than in Table 3.

tabulation for ownership in 1993 and 1998, the first and last year of the CSS. This gives some insight in long term mobility. For example, one of every four households without risky financial assets in 1993 (71.2% of the sample), do have risky financial assets in 1998. One of every seven households with risky financial assets in 1993, no longer have such assets in 1998. The latter is surprisingly large: if knowledge of financial products is important and if such knowledge is acquired by owners, we would not expect so many people to sell their risky assets during a time period in which the stock market returns were quite high. An explanation could be that people saw the high returns as evidence of a speculative bubble and feared a stock market crisis.

The apparent positive correlation in Table 11 between ownership in various years can have two different reasons. The first is that there are time persistent differences in preferences (observed and unobserved heterogeneity). The second is that ownership now makes it easier or more attractive to own in the future (true state dependence). See the chapter by Miniaci and Weber for an extensive discussion. Here we use a dynamic extension of the static model of the previous section to disentangle these two explanations. The model we use is one of the dynamic models analysed by Lee (1997). The specification is as follows.

$$y_{it}^* = \beta' x_{it} + \lambda y_{i,t-1} + \alpha_i + \varepsilon_{it}$$

$$\varepsilon_{it} = \rho \varepsilon_{i,t-1} + u_{it}$$

$$y_{it} = 1 \text{ if } y_{it}^* > 0; y_{it} = 0 \text{ if } y_{it}^* \leq 0$$

The observed dependent variable  $y_{it}$  is the dummy for ownership (of risky assets or ESSPs). The regressors  $x_{it}$  are assumed to be strictly exogenous, i.e. independent of all  $u_{is}$ . The errors  $u_{it}$  are i.i.d.  $N(0,1)$ . The random effects  $\alpha_i$  are

i.i.d.  $N(0, \sigma^2)$ , independent of all  $x_{it}$  and all  $u_{it}$ . For  $\lambda = \rho = 0$ , the model specifies to the static model used in Section 6. In general, the lagged effect  $\lambda y_{it-1}$  reflects true state dependence, while unobserved heterogeneity enters through  $\alpha_i$ .

The model can be estimated by (simulated) maximum likelihood. The initial condition problem (due to the small number of waves) is treated in the same way as in Lee (1997). The results are presented in Table 12.

### *Risky assets*

For risky assets ownership, the true state dependence effect is quite strong and significant. Having owned risky assets in the previous year increases the probability of current ownership by 28%-points, *ceteris paribus*. Explanations are transaction costs, habit formation, and the effect of previous ownership on the knowledge about risky financial products. Allowing for true state dependence reduces the estimated importance of unobserved heterogeneity: the estimate of  $\sigma^2$  is about 57% smaller than in Table 10. There is no evidence of auto-correlation in the error terms. The age pattern is totally insignificant. The urbanisation dummies are now jointly significant at the 5% level – the positive relation between urbanisation and ownership remains. The other marginal effects largely reveal the same pattern and significance level as in the static model.<sup>25</sup> The only exceptions seem to be the time dummies, but this is due to the initial condition problem. This makes the first year – the reference year for the time dummies – different from the other years. The estimated time differentials between the other years are in line with those found in the static model.

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<sup>25</sup> In particular, interest in financial matters is still significant with similar order of magnitude. This is a counter argument against the conjecture that in the static models, interest in financial matters would enter only because owners become more interested (so that it would be endogenous).



### *Employer sponsored savings plans*

For ESSPs, the true state dependence effect is even stronger than for risky assets: owners have a 53%-points higher probability to own next year than non-owners. An explanation is that the tax system creates a strong incentive not to sell this asset during the first four years of ownership (see Section 3). Accordingly, the importance of unobserved heterogeneity is much smaller than according to the static model. The effects of the other variables do not change much compared to the static results.

## **8. Models for Shares**

In this section we analyse the shares of financial assets invested in risky financial assets and in ESSPs by owners of risky financial assets and ESSPs, respectively. Descriptive statistics on these conditional shares were already discussed in Section 4. To correct for the fact that owners are a selected sample, we use the sample selection model for panel data introduced by Wooldridge (1995). This is quite flexible in the sense that it allows for correlation between individual effects and regressors in the share equation, and does not impose normality of the errors in the share equation. This model is discussed in the chapter by Miniaci and Weber (Section 3.2.1) of this volume. The model is static and consists of two equations: one explaining ownership, the other explaining the share invested in the given asset. The selection equation is a static random effects equation identical to the model estimated in Section 6, and the estimation results in Table 10 serve as the first stage estimates. These are used to construct the inverse Mills ratio, which is then included as an additional regressor in the second step. To allow for quasi-fixed effects in the share equation, the means over all available time periods of the regressors in both equations are also added as additional regressors in the second step (this gives

equation (3.25) in the Miniaci and Weber chapter). Eicker-White-Huber standard errors are computed, correcting for heteroskedasticity. We do not correct for the estimation error in the first stage regression, implying that the standard errors we present may slightly underestimate the true standard errors. The results of the second stage regressions are presented in Table 13.

### *Risky assets*

There are some notable differences between the heteroskedasticity robust significance levels and significance levels computed in the standard way, implying that correcting for heteroskedasticity is of major importance here. Education variables are jointly significant, although none of the individual dummies is. Income and labour market state do not play a significant role, whereas they did had a clear impact on ownership. Wealth has a significant and positive impact. Household composition affects the share and the ownership rate in a similar way. The same holds for the interest in financial matters variables. This suggests that knowledge about financial products does not only drive ownership, but also has an effect on the invested amount. The risk aversion variables are jointly significant, but they are not very strong and do not reveal a clear pattern.

Even after correcting for other relevant variables, the age pattern is significant and u-shaped. This result differs from the result of Guiso and Jappelli in this volume, who find that the age profile is flat in Italy.

Finally, the inverse Mills ratio is positive and significant. This is what we could expect if unobserved preference heterogeneity affects the ownership decision and the amount in the same direction.

### *Employer sponsored saving plans*

The tax-favoured nature of ESSPs suggests that those who have access to them should hold the maximum amount, unless they are seriously liquidity constrained. The share should then depend on how many years the household has had access to ESSPs, and will be negatively correlated with total financial wealth.

The results are largely in line with this. Age, education, labour market status, interest in financial matters and risk aversion are insignificant. Total wealth is significant with the expected negative effect. Income has a positive effect, probably reflecting its negative relation to liquidity constraints. The share increases monotonically over calendar time. This is in line with the fact that, since the introduction of the asset, the tax advantages hold for each new investment in each year. The inverse Mills ratio is insignificant, which may mean that unobserved preference heterogeneity does not play a large role here. Again, this is expected if everybody should just invest the maximum amount each year.

## **9. Conclusions**

We have analysed household portfolios in the Netherlands. Many of our findings in the raw data as well as in the econometric models indicate the importance of tax incentives. For example, many employees opened tax-favoured employer-sponsored saving accounts shortly after their introduction, irrespective of their wealth or income.

Both the macro-economic and micro-economic evidence point out that during the nineties investing in risky assets (stocks and mutual funds) has become more popular. *Prima facie* evidence points out that especially elderly households and the rich have a relative high probability of owning risky assets. This result

differs from the hump-shaped age profile found in Italy and the United States (see the contributions in this volume by Guiso and Jappelli and by Bertaut and Starr-McCluer). In the static random effect probit regression, the age variables are significant at the 10% level only. Age becomes insignificant if lagged ownership of risky assets is controlled for. In the selection model for the share of risky assets conditional on ownership, the age pattern is significant and u-shaped.

Both in the raw data and in the econometric models, we find a strong positive relation between total net worth and ownership of risky assets. The share of risky assets conditional on ownership also increases with wealth. These findings are in line with those for other countries.

Thus some of our results are the same as for the other countries analysed in this volume, but some other results are different. Further research is necessary to explain the differences from institutional or cultural differences.

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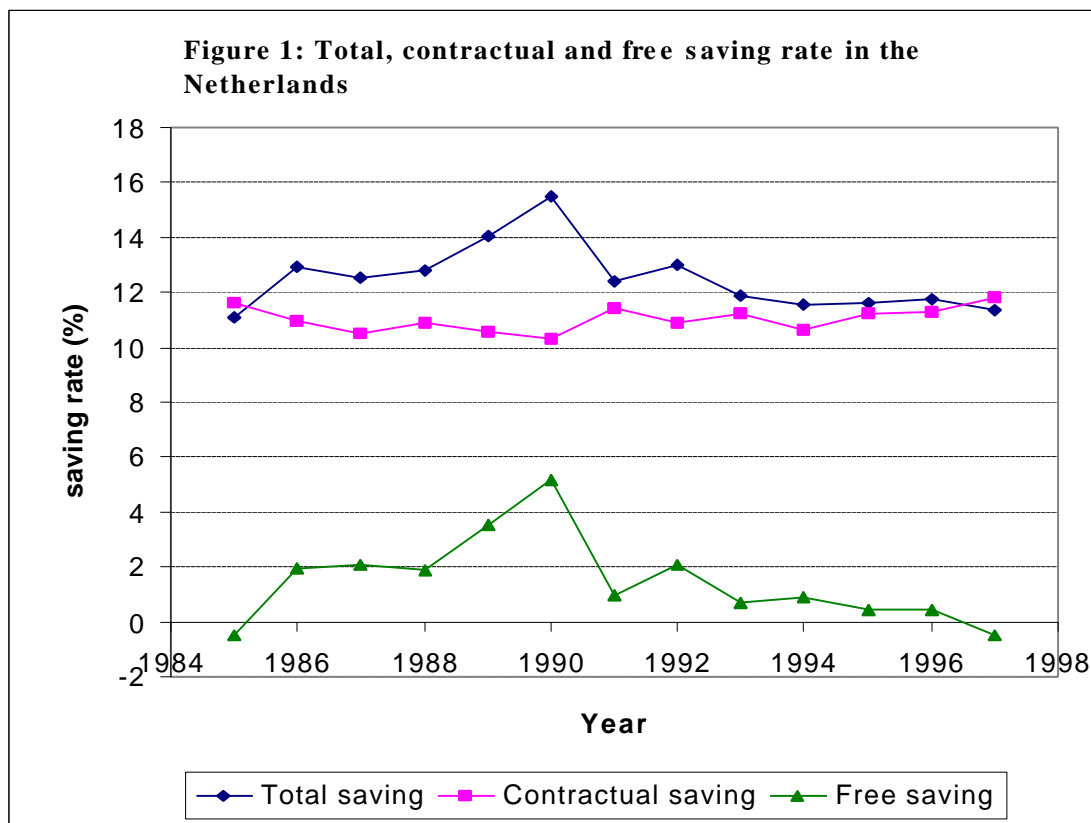
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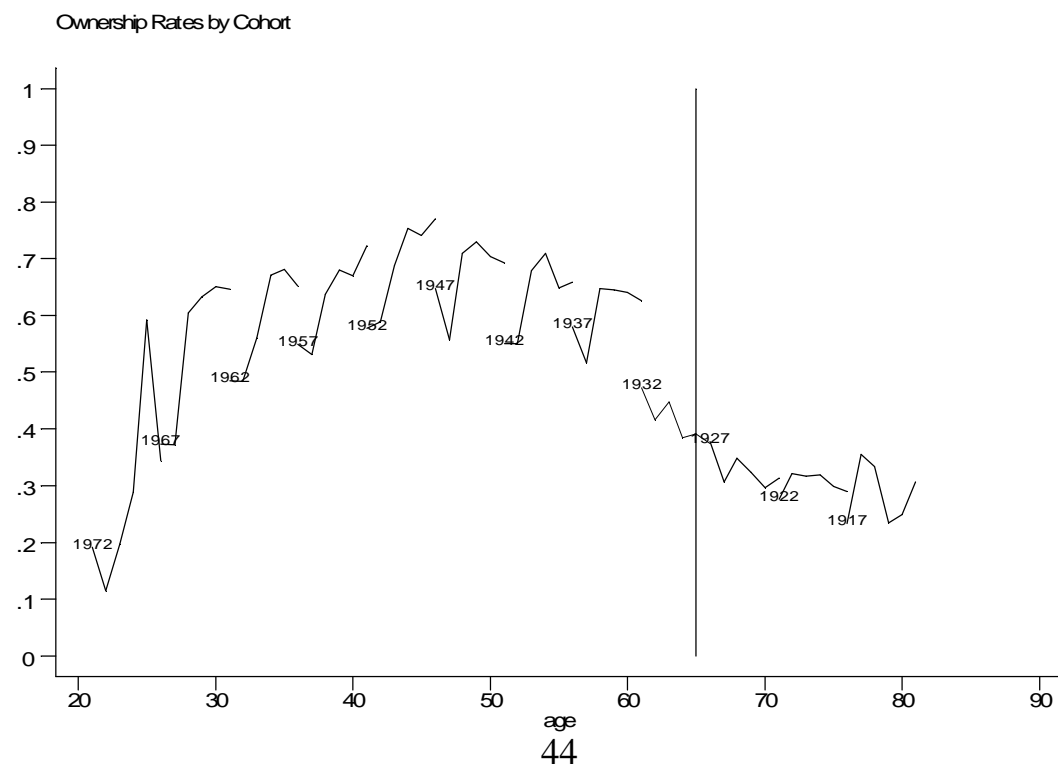
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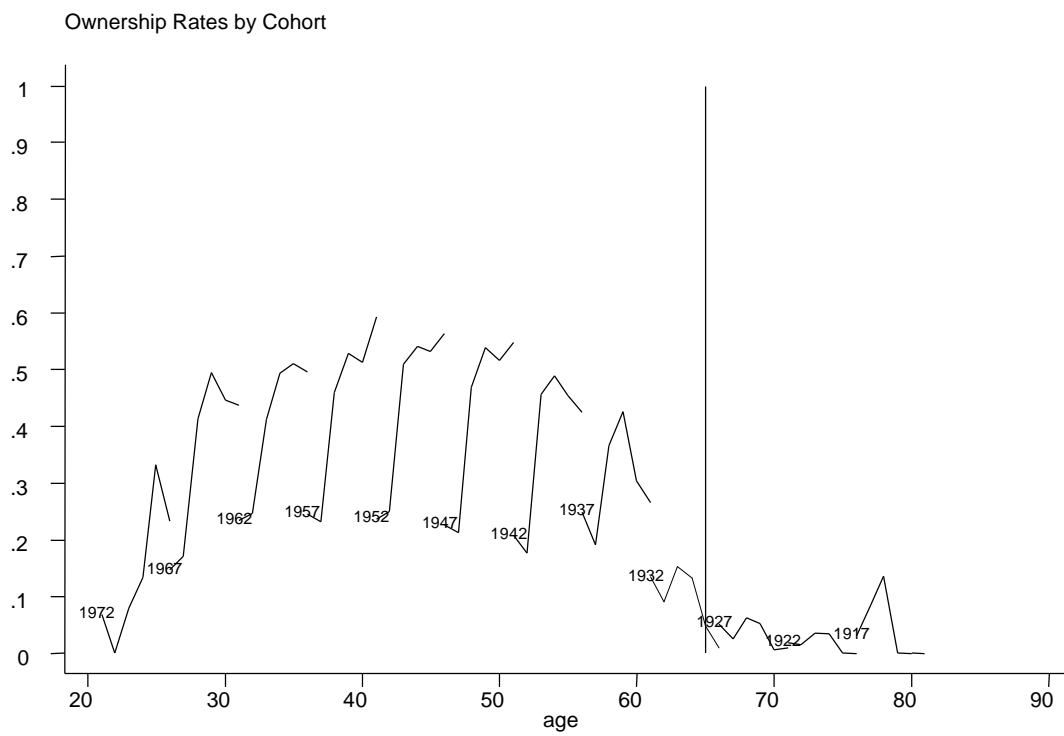
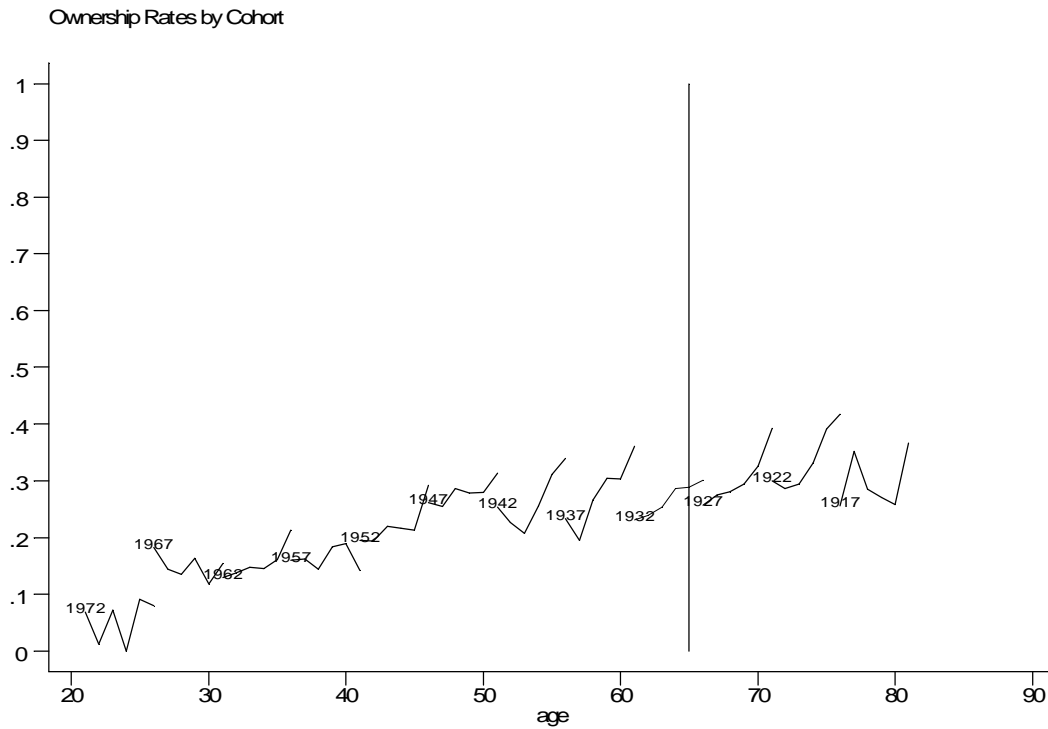
## Figures and Tables



**Figure 2: Ownership by Birth Cohort: Fairly Safe Financial Assets (top panel), [continued overleaf: Risky (middle panel) Financial Assets, and Employer Sponsored Savings Plans (bottom panel)]**

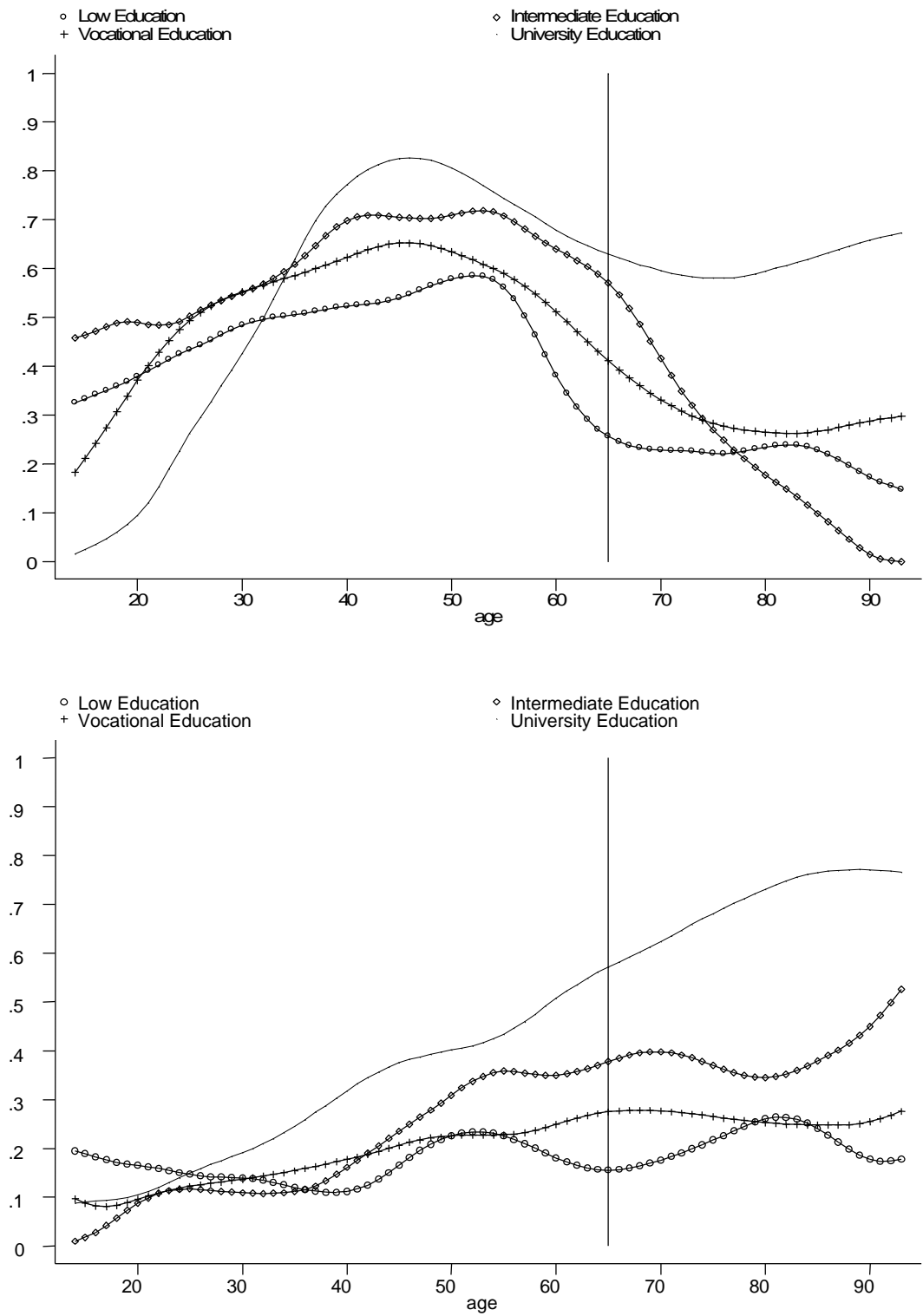


**Figure 2 (continued):** Ownership by Birth Cohort: [Fairly Safe (top panel)], Risky (middle panel) Financial Assets, and Employer Sponsored Savings Plans (bottom panel)

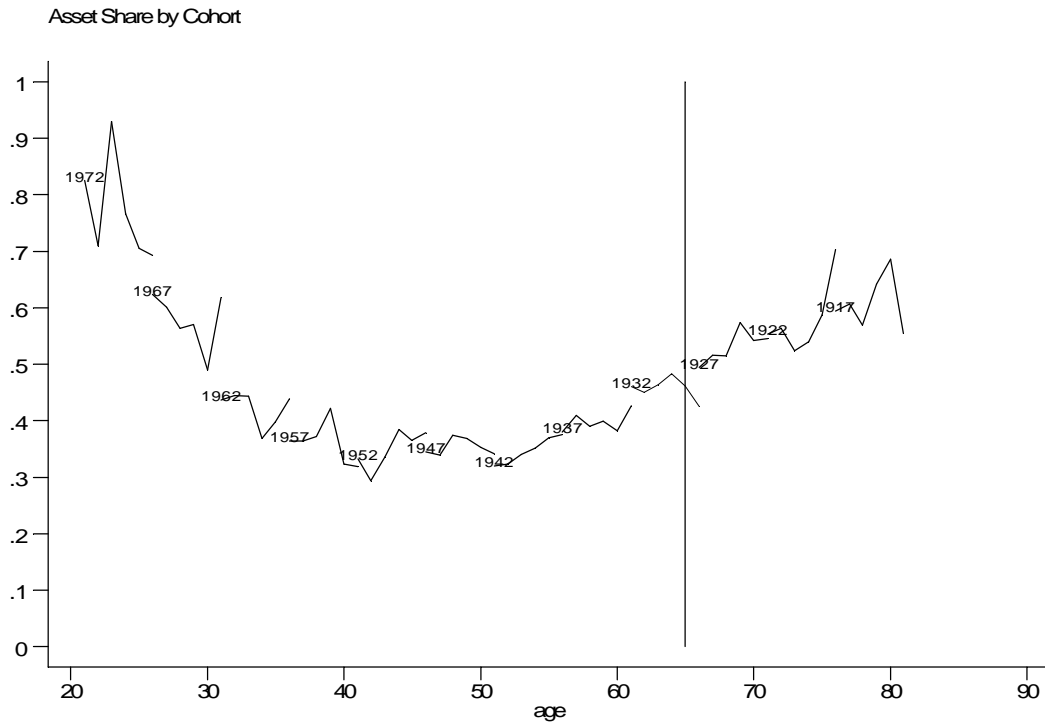




**Figure 3: Ownership of Fairly Safe (top panel) and Risky (bottom panel) Financial Assets: by Education**



**Figure 4:** Share of Financial Assets in Total Assets, by Birth Cohort



**Table 1: Financial Balances of the Sector 'Households' and 'Non-profit Institutions Serving Households'**

	1995		Changes between 1995 and 1998		1998	
	Balance primo year	Asset share	Financial trans- actions	capital gains (revaluation)	Balance primo year	Asset share
<b>ASSETS</b>						
Cash	36.8	2.5	-0.1	0.1	36.7	1.8
Transaction and saving accounts	269.2	18.1	58.7	-0.1	327.8	15.9
Transaction accounts	53.5	3.6	22.3	-0.1	75.8	3.7
Saving accounts	215.7	14.5	36.3	0.0	252.0	12.2
Certificates of deposits	43.8	2.9	2.4	0.0	46.1	2.2
Stocks, bonds, and mutual funds	325.1	21.9	34.1	157.8	517.0	25.1
Bonds	45.1	3.0	3.9	1.7	50.7	2.5
Stocks, mutual funds	280.0	18.8	30.2	156.1	466.3	22.6
Defined benefit and contribution pensions and other life insurances	772.0	52.0	155.2	155.9	1083.1	52.6
Other financial assets	5.1	0.3	-0.1	-0.5	4.6	0.2
Trade credits and residual	33.8	2.3	7.3	4.3	45.4	2.2
Total financial assets	1485.8	100.0	257.5	317.5	2060.7	100.0
<b>LIABILITIES</b>						
Short term debt	33.3	2.2	13.2	0.4	46.9	2.3
Long term debt	347.9	23.4	148.1	-2.5	493.5	23.9
Total debts	381.2	25.7	161.3	-2.1	540.4	26.2
Financial wealth	1104.5	74.3	96.2	319.6	1520.3	73.8
Financial wealth to income ratio	2.37				2.88	
CBS stock price index (1983=100)	278.0				618.0	
Mortgage interest rate	7.26				5.82	
House prices	228.0				293.0	

The table reports balances and asset shares of the sector "households and non-profit organisations serving households" as published in the Dutch National Accounts 1998 (Table R.4.B). Balances are reported in billion Dutch guilders. The item 'Stocks, mutual funds' includes 'stocks from substantial holdings'. The CBS (Statistics Netherlands) stock price index and the mortgage interest rate are from CBS Statline. House prices were provided by the Netherlands Association of Real Estate Agents (Nederlandse Vereniging van Makelaars, NVM).

**Table 2: Definition of Asset and Debt Categories**

Asset and Liability Aggregates	Asset and Liability Items in CentER Savings Survey
Transaction and saving accounts and Certificates of deposit	Checking accounts; savings arrangements linked to a Postbank account; deposit books; savings or deposit accounts; savings certificates
Bonds	Bonds and/or mortgage bonds (all types)
Stocks	Stocks and shares; including shares of substantial holding
Mutual funds and managed investment accounts	Mutual funds and/or mutual fund accounts; growth funds
Defined-contribution plans	Single-premium annuity insurance policies
Cash value of life insurance	Savings or endowment insurance policies; including whole life insurances linked to a life insurance mortgage (on all types of real estate)
Employer-sponsored savings plans	Employer-sponsored savings plans
Other financial assets	Money lent out to family or friends; savings or investments not mentioned before
<b>Total financial assets</b> (sum of the above)	
Primary residence	Primary residence
Other real estate	Second house; other real estate not used for own accommodation
<b>Real estate</b> (sum of the above)	
Business equity	Business equity self-employed; business equity of people working free lance/practicing a free profession
Stock of durable goods	Cars; motorcycles; caravans; boats
<b>Total non-financial assets</b> (sum of the above)	
<b>Total assets</b> (total financial and total non-financial assets)	
Mortgage and real estate debt	Mortgages (on any type of real estate)
Study loans	Study loans
Negative checking account balances	Negative checking account balances
Consumer credit	Private loans; extended lines of credit; outstanding debts on hire-purchase contracts, debts based on payment by installment and/or equity-based loans; outstanding debts with mail-order firms, shops or other sorts of retail business
Other debt	Loans from family or friends; loans not mentioned before
<b>Total debt</b> (sum of the above)	
<b>Total Net Worth</b> (total assets less total debts)	
<b>Asset Categories According to Riskiness</b>	<b>Included Aggregates (and Items)</b>
Clearly safe financial assets	Transaction and saving accounts and certificates of deposit
Fairly safe financial assets	Defined contribution plans; cash value of life insurance; employer-sponsored savings plans; growth funds; other financial assets
Risky financial assets	Stocks; bonds; mutual funds and/or mutual fund accounts
<b>Total financial assets</b>	
Risky total assets	Risky financial assets; business assets; other real estate

**Table 3: Asset and Debt Ownership Rates: Survey Data**

	1993	1994	1995	1996	1997	1998
<b>ASSETS</b>						
Total financial assets	93.3	94.0	95.5	96.0	95.7	95.4
Checking and savings accounts	92.2	92.7	93.6	94.7	93.3	93.2
Bonds	6.0	4.8	4.2	4.6	3.5	3.5
Stocks	11.4	10.0	11.5	13.5	14.4	15.4
Mutual funds	14.0	15.1	15.3	17.8	19.0	21.6
Defined contribution plans	14.2	12.9	15.8	17.7	17.5	17.5
Cash value of life insurance	24.5	24.1	24.8	25.9	25.2	23.0
Employer-sponsored saving plans	18.1	17.2	36.1	39.9	36.6	35.8
Other financial assets	13.3	12.4	13.1	13.0	15.0	14.0
Total non financial assets	78.4	79.4	80.0	81.4	83.2	79.2
Real estate	48.8	48.6	49.3	50.0	51.0	51.6
House	47.6	47.6	48.4	49.2	50.0	50.8
Other real estate	6.2	5.8	5.1	5.6	5.6	4.5
Business equity	4.8	5.9	6.3	6.8	7.1	5.1
Stock of durable goods	71.4	72.8	73.2	75.6	76.7	72.7
Total assets	95.9	96.4	97.2	97.4	97.4	97.1
<b>LIABILITIES</b>						
Total debt	64.5	63.9	63.9	65.3	65.7	65.7
Mortgage and real estate debt	39.7	38.9	40.9	41.8	43.0	42.6
Consumer credit	33.2	31.3	30.2	30.6	32.4	32.0
Other debt	7.4	8.1	7.3	7.0	7.0	5.6
Study loans	6.2	5.3	5.0	4.4	3.8	5.7
Negative balance checking account	14.9	13.7	14.2	15.0	16.3	16.9
Net worth	97.7	98.1	98.8	98.6	98.6	98.9
Total assets	95.9	96.4	97.2	97.4	97.4	97.1
Clearly safe financial assets	92.2	92.7	93.6	94.7	93.3	93.2
Fairly safe financial assets	48.9	46.8	57.8	60.4	59.4	58.2
Safe financial assets	93.2	93.8	95.3	95.9	95.7	95.1
Risky financial assets	21.2	20.6	21.9	23.7	24.8	27.7
Risky total assets	27.7	27.4	28.4	31.1	31.5	32.8

The table reports the fraction of households owning specific asset and debt items, as observed in the CentER Savings Survey for the sampling years 1993-1998. All statistics use sample weights. Stocks include stocks from substantial holdings. Clearly safe financial assets include transaction (checking) and saving accounts, and certificates of deposit. Fairly safe financial assets include defined contribution plans, the cash value of life insurances, employer-sponsored savings plans, growth funds, and other financial assets. Safe financial assets are the sum of clearly safe and fairly safe financial assets. Risky financial assets include stocks, bonds, mutual funds and/or mutual fund accounts. Risky total assets are the sum of risky financial assets and business assets and other real estate.

**Table 4: Asset and Debt Ratios in Per Cent of Total (Financial) Wealth: Survey Data**

	1993	1994	1995	1996	1997	1998
<b>ASSETS</b>						
	As a % of total financial assets					
Checking and savings accounts	35.9	36.4	32.7	30.7	30.5	35.1
Bonds	3.0	2.1	1.9	1.9	1.8	2.2
Stocks	21.3	20.6	22.0	24.0	25.3	23.8
Mutual funds	10.9	12.0	10.6	12.2	11.7	13.3
Defined contribution plans	9.7	11.5	11.4	10.3	8.7	7.9
Cash value of life insurance	12.9	12.0	14.4	13.9	12.1	10.4
Employer-sponsored saving plans	1.1	1.0	1.8	2.3	3.1	2.9
Other financial assets	5.3	4.3	5.2	4.7	6.8	4.5
Total financial assets (average amount)	74893	70416	74969	84803	85060	81563
	As a % of total assets					
Total financial assets	29.6	29.0	28.1	29.7	28.0	27.6
Total non financial assets	70.4	71.0	71.9	70.3	72.0	72.4
Real estate	59.7	59.9	60.4	60.1	61.9	63.8
House	53.8	53.7	54.2	55.1	55.4	58.8
Other real estate	5.9	6.2	6.3	5.0	6.5	4.9
Business equity	5.0	5.8	6.4	4.9	5.0	3.7
Stock of durable goods	5.7	5.4	5.2	5.2	5.1	4.9
Total assets (average amount)	253197	242510	267198	285081	303377	295423
<b>LIABILITIES</b>						
	As a % of total debt					
Total debt (average amount)	74311	66562	73876	77178	78373	71676
Mortgage and real estate debt	87.9	88.5	88.4	89.2	89.0	88.5
Consumer credit	6.0	5.9	5.2	4.9	5.8	5.6
Other debt	4.7	4.3	4.9	4.4	3.7	3.7
Study loans	0.7	0.7	0.8	0.6	0.5	0.8
Negative balance checking account	0.7	0.5	0.8	0.9	1.0	1.4
	As a % of total assets					
Total debt	29.3	27.4	27.6	27.1	25.8	24.3
Net worth	70.7	72.6	72.4	72.9	74.2	75.7
	As a % of total financial assets					
Clearly safe financial assets	35.9	36.4	32.7	30.7	30.5	35.1
Fairly safe financial assets	34.4	34.1	37.1	36.5	35.3	28.9
Safe financial assets	70.3	70.6	69.9	67.2	65.8	64.1
Risky financial assets	29.7	29.4	30.1	32.8	34.2	35.9
Risky total assets						
	As a % of total assets					
Clearly safe financial assets	10.6	10.6	9.2	9.1	8.5	9.7
Fairly safe financial assets	10.2	9.9	10.4	10.9	9.9	8.0
Safe financial assets	20.8	20.5	19.6	20.0	18.5	17.7
Risky financial assets	8.8	8.6	8.5	9.8	9.6	9.9
Risky total assets	19.7	20.5	21.1	19.6	21.0	18.6

The table reports the ratio of households' overall balances in specific asset and debt items to the total of households' assets or debts. Data are from the CentER Savings Survey, sampling years 1993-1998. All statistics use sample weights. Stocks include stocks from substantial holdings. Clearly safe financial assets include transaction (checking) and saving accounts, and certificates of deposit. Fairly safe financial assets include defined contribution plans, the cash value of life insurances, employer-sponsored savings plans, growth funds, and other financial assets. Safe financial assets are the sum of clearly safe and fairly safe financial assets. Risky financial assets include stocks, bonds, mutual funds and/or mutual fund accounts. Risky total assets are the sum of risky financial assets and business assets and other real estate.

**Table 5: Diversification of Households' Financial Portfolios**

Asset combination			1993	1994	1995	1996	1997	1998
Clearly safe	Fairly safe	Risky						
0	0	0	6.7	6.0	4.5	4.0	4.3	4.6
1	0	0	39.2	41.4	33.2	30.7	31.1	31.5
0	1	0	1.0	1.0	1.5	1.0	2.1	1.8
0	0	1	0.1	0.2	0.2	0.1	0.0	0.2
1	1	0	32.0	31.0	38.9	40.5	37.6	34.4
1	0	1	5.2	5.6	4.3	4.7	5.2	5.4
0	1	1	0.1	0.1	0.2	0.1	0.2	0.2
1	1	1	15.8	14.6	17.2	18.7	19.4	21.9

The table reports ownership combinations of asset classes (portfolios) and their observed probabilities (summing to 100 per cent in each year). Explanation of codes: "0" means "not holding", "1" means "holding" of the respective asset category. Data are from the CentER Savings Survey, sampling years 1993-1998. All statistics use sample weights. Clearly safe financial assets include transaction (checking) and saving accounts, and certificates of deposit. Fairly safe financial assets include defined contribution plans, the cash value of life insurances, employer-sponsored savings plans, growth funds, and other financial assets. Risky financial assets include stocks, bonds, mutual funds and/or mutual fund accounts.

**Table 6: Asset and Debt Ownership Rates by Net Worth Quartiles, 1997**

	Below Quartile I	Between Quartiles I and II	Between Quartiles II and III	Above Quartile III	top 5%
<b>ASSETS</b>					
Total financial assets	87.1	98.1	98.9	98.8	99.0
Checking and savings accounts	83.1	95.7	96.8	97.7	96.6
Bonds	0.1	1.8	2.6	9.6	15.9
Stocks	0.8	5.1	13.5	38.1	63.9
Mutual funds	1.3	14.8	19.9	40.0	49.6
Defined contribution plans	6.3	11.7	20.0	32.0	37.3
Cash value of life insurance	5.6	12.8	44.3	38.2	32.0
Employer-sponsored saving plans	18.2	31.1	55.3	41.9	23.6
Other financial assets	9.4	12.9	15.3	22.4	36.2
Total non financial assets	49.3	85.0	98.8	100.0	100.0
Real estate	5.0	18.2	85.9	95.2	100.0
House	5.0	16.9	84.6	93.5	96.1
Other real estate	0.0	2.2	3.2	17.1	35.1
Business	0.6	5.0	5.6	17.2	27.0
Stock of durable goods	48.3	80.8	87.5	90.4	90.6
Total assets	89.7	100.0	100.0	100.0	100.0
<b>LIABILITIES</b>					
Total debt	62.6	37.8	81.7	80.7	74.8
Mortgage and real estate debt	5.0	16.8	76.0	74.4	68.0
Consumer credit	47.7	23.3	34.2	24.3	22.6
Other debt	11.0	3.7	6.2	7.1	12.5
Study loans	7.8	4.7	1.4	1.4	1.1
Negative balance checking account	27.2	9.1	14.7	14.2	15.3
Net worth	94.2	100.0	100.0	100.0	100.0
Total assets					
Clearly safe financial assets	83.1	95.7	96.8	97.7	96.6
Fairly safe financial assets	30.4	50.2	77.6	79.4	84.4
Safe financial assets	87.1	98.1	98.7	98.8	99.0
Risky financial assets	1.2	16.4	24.2	57.4	75.8
Risky total assets	1.8	22.3	30.6	71.4	95.2

The table reports the fraction of households owning specific asset and debt items, conditional on quartiles and percentiles of the net worth distribution. Data are from the CentER Savings Survey, sampling year 1997. All statistics use sample weights. Stocks include stocks from substantial holdings. Clearly safe financial assets include transaction (checking) and saving accounts, and certificates of deposit. Fairly safe financial assets include defined contribution plans, the cash value of life insurances, employer-sponsored savings plans, growth funds, and other financial assets. Safe financial assets are the sum of clearly safe and fairly safe financial assets. Risky financial assets include stocks, bonds, mutual funds and/or mutual fund accounts. Risky total assets are the sum of risky financial assets and business assets and other real estate.



**Table 7: Composition of Assets by Net Worth Quartiles, 1997**

	Below Quartile I	Between Quartiles I and II	Between Quartiles II and III	Above Quartile III	top 5%
<b>ASSETS</b>					
	As a % of total financial assets				
Checking and savings accounts	65.8	65.4	47.2	21.8	13.5
Bonds	0.0	0.6	0.7	2.2	2.3
Stocks	0.6	3.1	6.0	32.9	49.2
Mutual funds	0.6	8.2	9.2	12.9	10.5
Defined contribution plans	7.7	3.2	7.7	9.6	9.3
Cash value of life insurance	6.0	4.7	18.2	11.7	6.8
Employer-sponsored saving plans	16.2	6.2	6.1	1.8	0.6
Other financial assets	3.1	8.6	5.0	7.0	7.8
Total financial assets (average amount)	4520	29178	57912	248722	666729
	As a % of total assets				
Real estate	58.3	46.8	74.6	58.5	46.8
House	58.3	44.6	72.9	49.5	33.3
Other real estate	0.0	2.2	1.7	9.0	13.4
Business equity	1.9	3.1	1.2	6.7	9.8
Stock of durable goods	17.7	14.6	5.9	3.5	2.3
Total non financial assets (average amount)	15947	53021	258400	546169	954009
Total assets (average amount)	20467	82200	316312	794892	1620738
<b>LIABILITIES</b>					
	As a % of total debt				
Mortgage and real estate debt	51.2	87.7	94.1	91.8	87.8
Consumer credit	30.6	8.3	3.7	2.4	1.9
Other debt	10.7	2.5	1.7	4.5	7.8
Study loans	4.3	0.7	0.1	0.0	0.0
Negative balance checking account	3.1	0.7	0.4	1.3	2.4
Total debt (average amount)	24920	34605	118393	135660	190468
	As a % of total financial assets				
Clearly safe financial assets	65.8	65.4	47.2	21.8	13.5
Fairly safe financial assets	33.6	25.5	39.2	35.6	30.0
Safe financial assets	99.3	90.9	86.5	57.4	43.5
Risky financial assets	0.7	9.1	13.5	42.6	56.5
	As a % of total assets				
Total risky assets	2.0	8.5	5.4	29.1	46.4
Conditional shares (shares for owners only)					
Financial risky assets (as % of fin. assets)	26.9	33.5	34.1	52.1	62.0
Total risky assets (as % of total assets)	23.9	31.1	17.2	35.6	48.0

The table reports the ratio of households' overall balances in specific asset and debt items to the total of households' assets or debts, broken down by quartiles and percentiles of the net worth distribution. Data are from the CentER Savings Survey, sampling year 1997. All statistics use sample weights. Stocks include stocks from substantial holdings. Clearly safe financial assets include transaction (checking) and saving accounts, and certificates of deposit. Fairly safe financial assets include defined contribution plans, the cash value of life insurances, employer-sponsored savings plans, growth funds, and other financial assets. Safe financial assets are the sum of clearly safe and fairly safe financial assets. Risky financial assets include stocks, bonds, mutual funds and/or mutual fund accounts. Risky total assets are the sum of risky financial assets and business assets and other real estate.

**Table 8: Asset and Debt Ownership Rates by Age of the Household Head, 1997**

	Age Class					
	<30	30-39	40-49	50-59	60-69	70+
<b>ASSETS</b>						
Total financial assets	95.3	96.9	94.9	96.9	96.8	91.7
Checking and savings accounts	94.8	92.6	91.8	95.2	95.3	90.5
Bonds	0.0	1.3	2.1	4.4	6.2	6.4
Stocks	4.7	6.8	13.4	18.4	17.8	21.2
Mutual funds	10.0	14.5	14.3	24.3	23.1	25.1
Defined contribution plans	7.2	15.8	22.9	23.6	15.6	4.0
Cash value of life insurance	13.8	33.1	34.3	30.0	14.3	3.8
Employer-sponsored saving plans	33.2	49.2	53.0	46.1	11.0	0.5
Other financial assets	15.2	11.5	15.7	14.7	16.8	17.4
Total non financial assets	62.8	83.0	85.9	90.6	83.5	72.4
Real estate	16.7	48.3	57.6	62.3	51.5	34.3
House	16.7	47.0	57.4	61.3	51.0	30.4
Other real estate	0.7	3.0	4.9	9.5	4.8	7.7
Business	4.3	7.1	10.9	8.5	3.0	3.4
Stock of durable goods	59.9	75.8	78.5	84.3	77.9	65.7
Total assets	96.3	97.7	96.5	99.3	98.9	93.5
<b>LIABILITIES</b>						
Total debt	66.5	72.6	77.0	74.0	54.5	28.3
Mortgage and real estate debt	15.1	42.5	53.3	55.4	38.6	16.4
Consumer credit	26.9	38.8	40.1	37.0	24.2	9.8
Other debt	6.5	9.9	8.5	6.6	4.3	3.8
Study loans	24.8	8.1	1.7	1.4	0.7	0.7
Negative balance checking account	31.8	20.3	18.9	16.2	10.8	4.9
Net worth	100.0	99.7	98.4	99.3	98.9	94.2
Total assets						
Clearly safe financial assets	94.8	92.6	91.8	95.2	95.3	90.5
Fairly safe financial assets	54.4	67.0	71.3	66.4	46.5	27.4
Safe financial assets	95.3	96.8	94.9	96.9	96.8	91.7
Risky financial assets	8.7	15.6	21.0	31.1	31.1	35.1
Risky total assets	12.8	22.9	29.6	41.2	32.8	38.8

The table reports the fraction of households owning specific asset and debt items, broken down by age class of the household head. Data are from the CentER Savings Survey, sampling year 1997. All statistics use sample weights. Stocks include stocks from substantial holdings. Clearly safe financial assets include transaction (checking) and saving accounts, and certificates of deposit. Fairly safe financial assets include defined contribution plans, the cash value of life insurances, employer-sponsored savings plans, growth funds, and other financial assets. Safe financial assets are the sum of clearly safe and fairly safe financial assets. Risky financial assets include stocks, bonds, mutual funds and/or mutual fund accounts. Risky total assets are the sum of risky financial assets and business assets and other real estate.

**Table 9: Composition of Assets by Age of the Household Head, 1997**

	Age Class					
	<30	30-39	40-49	50-59	60-69	70+
<b>ASSETS</b>						
	As a % of financial assets					
Checking and savings accounts	49.8	37.7	34.1	27.0	28.2	29.7
Bonds	0.0	0.3	1.3	0.5	1.8	5.5
Stocks	4.4	13.1	13.7	21.3	36.4	37.7
Mutual funds	5.4	13.8	10.1	11.6	10.9	13.8
Defined contribution plans	0.7	5.6	10.1	13.1	9.5	1.1
Cash value of life insurance	15.5	17.3	19.7	17.5	5.7	0.8
Employer-sponsored saving plans	8.9	6.7	5.7	3.9	0.6	0.0
Other financial assets	15.2	5.4	5.3	4.9	7.0	11.5
Total financial assets (average amount)	18246	42198	67041	107537	121767	131329
	As a % of total assets					
Real estate	59.1	69.1	66.0	64.4	55.2	48.2
House	57.4	66.1	61.9	52.6	52.1	40.0
Other real estate	1.7	3.1	4.1	11.8	3.0	8.3
Business equity	4.1	4.9	7.3	5.5	3.1	1.2
Stock of durable goods	7.8	5.7	5.1	4.4	5.9	4.6
Total non financial assets (average amount)	44887	165814	242595	311354	218464	154205
Total assets (average amount)	63133	208012	309635	418891	340231	285534
<b>LIABILITIES</b>						
	As a % of total debt					
Mortgage and real estate debt	82.6	88.0	89.8	91.0	85.3	84.8
Consumer credit	8.3	7.5	4.9	4.4	8.8	3.6
Other debt	1.8	2.4	4.5	3.5	3.9	6.7
Study loans	6.0	1.3	0.2	0.1	0.0	0.3
Negative balance checking account	1.3	0.8	0.6	0.9	2.0	4.6
Total debt (average amount)	28622	81168	99643	112275	55152	18285
	As a % of financial assets					
Clearly safe financial assets	49.8	37.7	34.1	27.0	28.2	29.7
Fairly safe financial assets	41.1	42.1	44.2	42.5	27.9	20.0
Safe financial assets	90.9	79.8	78.3	69.6	56.1	49.7
Risky financial assets	9.1	20.2	21.7	30.4	43.9	50.3
	As a % of total assets					
Total risky assets	8.5	12.1	16.1	25.1	21.9	32.6
Conditional shares (shares for owners only)						
Financial risky assets (as % of fin. assets)	32.1	40.0	37.0	43.2	56.6	64.0
Total risky assets (as % of total assets)	24.2	27.1	28.0	34.8	32.3	44.7

The table reports the ratio of households' overall balances in specific asset and debt items to the total of households' assets or debts, broken down by age class of the household head. Data are from the Center Savings Survey, sampling year 1997. All statistics use sample weights. Stocks include stocks from substantial holdings. Clearly safe financial assets include transaction (checking) and saving accounts, and certificates of deposit. Fairly safe financial assets include defined contribution plans, the cash value of life insurances, employer-sponsored savings plans, growth funds, and other financial assets. Safe financial assets are the sum of clearly safe and fairly safe financial assets. Risky financial assets include stocks, bonds, mutual funds and/or mutual fund accounts. Risky total assets are the sum of risky financial assets and business assets and other real estate.

**Table 10: Static Random Effects Probit (1)**

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	<b>Risky Financial Assets</b>			<b>Employer Spons. Saving Plans</b>		
Total # of observations	8010			8010		
Total # of households	2979			2979		
Log Likelihood	-3065.731			-3296.647		
Pseudo R2	0.3834			0.4819		
<b>variable (2)</b>	<b>marginal effect (6)</b>	<b>standard error</b>	<b>p-value (7)</b>	<b>marginal effect (6)</b>	<b>standard error</b>	<b>p-value (7)</b>
age: at age 30 (5)	-0.00059	0.0018	0.072	0.01665	0.0035	0.000
age: at age 45	0.00105	0.0009		-0.01033	0.0019	
age: at age 65	0.00441	0.0024		-0.00920	0.0014	
low education	-0.07645	0.0194	0.000	0.08218	0.0660	0.678
intermediate/low education	-0.06115	0.0223		0.05359	0.0498	
intermediate/high education	-0.06363	0.0210		0.07119	0.0485	
vocational education, level 1	-0.10060	0.0156		0.03539	0.0506	
vocational education, level 2	-0.08842	0.0179		0.06292	0.0459	
vocational education, level 3	-0.03402	0.0213		0.04357	0.0330	
<i>reference: university education</i>						
noncapital income: at 25% (3,5)	0.00055	0.0002	0.000	0.00172	0.0002	0.000
noncapital income: at 50%	0.00053	0.0002		0.00138	0.0002	
noncapital income: at 75%	0.00050	0.0002		0.00111	0.0003	
total net worth: at 25% (3,5)	0.00073	0.0001	0.000	0.00071	0.0001	0.000
total net worth: at 50%	0.00083	0.0001		0.00030	0.0001	
total net worth: at 75%	0.00071	0.0001		0.00017	0.0000	
unemployed	-0.07431	0.0282	0.000	-0.17542	0.0145	0.000
retired	0.08767	0.0360		-0.25996	0.0216	
disabled	-0.04510	0.0375		-0.18687	0.0140	
other labor market status	0.04296	0.0446		-0.15784	0.0195	
self-employed	0.14760	0.0506		-0.19139	0.0144	
<i>reference: paid employment</i>						
high-income sub-panel	0.06877	0.0255	0.003	0.04019	0.0304	0.175
# of adults in HH	-0.03461	0.0203	0.023	0.06686	0.0266	0.042
# of children at home	-0.01356	0.0075		-0.00613	0.0101	
financial interest: low (4)	-0.22466	0.0201	0.000	-0.13060	0.0228	0.000
financial interest: medium	-0.13064	0.0189		-0.06628	0.0229	
<i>reference: high</i>						
risk aversion: low (4)	0.02212	0.0252	0.002	-0.01381	0.0271	0.657
risk aversion: medium	0.04334	0.0131		0.00915	0.0164	
<i>reference: high</i>						
year = 1994	0.01420	0.0149	0.003	-0.02988	0.0180	0.000
year = 1995	0.00507	0.0158		0.47986	0.0295	
year = 1996	0.01613	0.0167		0.59663	0.0273	
year = 1997	0.03450	0.0204		0.52649	0.0326	
year = 1998	0.10773	0.0328		0.58197	0.0374	
<i>reference: year = 1993</i>						
urbanization: very high	0.09198	0.0406	0.061	0.02243	0.0412	0.074
urbanization: high	0.03986	0.0296		-0.01510	0.0332	
urbanization: medium	0.00842	0.0259		0.05975	0.0373	
urbanization: low	0.01977	0.0284		0.06562	0.0392	
<i>reference: not urbanized</i>						
<b>coefficient (8)</b>	<b>estimate</b>	<b>stderr</b>	<b>p-value</b>	<b>estimate</b>	<b>stderr</b>	<b>p-value</b>
intercept	-0.21882	0.2710	0.419	-1.74760	0.2564	0.000
random effect: sigma	1.68390	0.0715	0.000	1.57504	0.0688	0.000

**Table 11: Ownership Transitions between Years: Fairly Safe and Risky Financial Assets**

**Short-term Transitions**

		year <i>t+1</i>				
		00	01	10	11	all
<i>t</i>	00	0.1646	0.0073	0.0519	0.0073	0.2311
	01	0.0065	0.0334	0.0063	0.0146	0.0608
	10	0.0407	0.0057	0.3257	0.0511	0.4232
	11	0.0055	0.0156	0.0417	0.2221	0.2848
	all	0.2173	0.0620	0.4256	0.2951	1.0000

**Long-term Transitions**

		year 1998				
		00	01	10	11	all
1993	00	0.1971	0.0144	0.1346	0.0192	0.3654
	01	0.0144	0.0240	0.0096	0.0433	0.0913
	10	0.0481	0.0192	0.1490	0.1298	0.3462
	11	0.0048	0.0240	0.0144	0.1538	0.1971
	all	0.2644	0.0817	0.3077	0.3462	1.0000

The table reports transition rates between two years for portfolio holdings of risky financial assets and fairly safe financial assets. Data are from the CentER Savings Survey. All statistics are unweighted. Fairly safe financial assets include defined contribution plans, the cash value of life insurances, employer-sponsored savings plans, growth funds, and other financial assets. Risky financial assets include stocks, bonds, mutual funds and/or mutual fund accounts. Codes are as follows: 00 - neither risky nor fairly safe holdings, 01 - risky holdings only, 10 - fairly safe holdings only, 11 - both.

The upper panel of the table reports transition rates between adjacent years, *t* (main column) and *t+1* (main row). Table entries are based on transitions for each pair of adjacent years, from 1993 to 1998; from these observed transitions, averages have been calculated over the entire period. Total sample size: 7685 observations, 2309 households.

The lower panel table reports transition rates between the first sampling year, 1993 (main column) and the latest available year, 1998 (main row) for portfolio holdings of risky financial assets and fairly safe financial assets. Codes are as in the upper panel. Total sample size: 1968 observations, 1760 households.

**Table 12: Dynamic Random Effects Probit (1)**

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	<b>Risky Financial Assets</b>			<b>Employer Spons. Saving Plans</b>		
Total # of observations	7197			7197		
Total # of households	2166			2166		
Log Likelihood	-2713.197			-2705.978		
Pseudo R2	0.5232			0.8804		
<b>variable (2)</b>	<b>marginal effect (6)</b>	<b>standard error</b>	<b>p-value (7)</b>	<b>marginal effect (6)</b>	<b>standard error</b>	<b>p-value (7)</b>
lagged endog. (dummy) variable	0.28163	0.0460	0.000	0.53327	0.0338	0.000
age: at age 30 (5)	-0.00134	0.0027	0.520	0.00294	0.0024	0.000
age: at age 45	0.00035	0.0013		-0.00582	0.0011	
age: at age 65	0.00278	0.0025		-0.01367	0.0018	
low education	-0.09804	0.0396	0.002	0.06554	0.0487	0.851
intermediate/low education	-0.05940	0.0357		0.00815	0.0347	
intermediate/high education	-0.08258	0.0314		0.02722	0.0324	
vocational education, level 1	-0.14695	0.0285		0.00649	0.0369	
vocational education, level 2	-0.11282	0.0292		0.02443	0.0320	
vocational education, level 3	-0.04183	0.0280		0.02160	0.0244	
<i>reference: university education</i>						
noncapital income: at 25% (3,5)	0.00070	0.0003	0.001	0.00133	0.0003	0.000
noncapital income: at 50%	0.00063	0.0002		0.00095	0.0002	
noncapital income: at 75%	0.00055	0.0002		0.00067	0.0002	
total net worth: at 25% (3,5)	0.00134	0.0001	0.000	0.00053	0.0001	0.000
total net worth: at 50%	0.00092	0.0001		0.00017	0.0000	
total net worth: at 75%	0.00063	0.0000		0.00008	0.0000	
unemployed	-0.07499	0.0644	0.004	-0.25980	0.0375	0.000
retired	0.12629	0.0424		-0.35543	0.0246	
disabled	-0.02439	0.0635		-0.27930	0.0284	
other labor market status	0.05377	0.0549		-0.23199	0.0308	
self-employed	0.13883	0.0538		-0.28774	0.0214	
<i>reference: paid employment</i>						
high-income sub-panel	0.04573	0.0288	0.109	-0.00090	0.0231	0.969
# of adults in HH	-0.06767	0.0257	0.004	0.04641	0.0218	0.088
# of children at home	-0.01638	0.0101		-0.00862	0.0081	
financial interest: low (4)	-0.30434	0.0198	0.000	-0.11600	0.0231	0.000
financial interest: medium	-0.18032	0.0220		-0.06534	0.0216	
<i>reference: high</i>						
risk aversion: low (4)	0.04862	0.0362	0.002	-0.01400	0.0294	0.595
risk aversion: medium	0.06179	0.0177		0.01228	0.0168	
<i>reference: high</i>						
year = 1994	-0.08403	0.0222	0.000	-0.19495	0.0204	0.000
year = 1995	-0.10836	0.0230		0.21458	0.0271	
year = 1996	-0.08786	0.0227		0.24658	0.0292	
year = 1997	-0.08403	0.0258		0.03157	0.0367	
year = 1998	-0.03410	0.0344		0.07525	0.0459	
<i>reference: year = 1993</i>						
urbanization: very high	0.11693	0.0442	0.044	0.01509	0.0313	0.228
urbanization: high	0.03833	0.0350		-0.00154	0.0273	
urbanization: medium	0.01993	0.0336		0.04823	0.0275	
urbanization: low	0.01330	0.0350		0.03497	0.0282	
<i>reference: not urbanized</i>						
<b>coefficient (8)</b>	<b>estimate</b>	<b>stderr</b>	<b>p-value</b>	<b>estimate</b>	<b>stderr</b>	<b>p-value</b>
intercept	0.20290	0.2155	0.346	-0.74530	0.1489	0.000
autocorrelation: rho	0.00040	0.0736	0.996	0.18550	0.0547	0.001
random effect: sigma	1.09370	0.0811	0.000	0.35940	0.0902	0.000

## Notes to Tables 10 and 12

- 1 The Tables report estimates from random effects probit models, as explained in the text. The dynamic specifications allow for first order serial correlation. The focus of the present Tables is on reporting marginal effects. Full results, including parameter estimates and standard errors of all underlying coefficients are available from the authors upon request.
- 2 All regressors refer to measures of the head of the household, except noncapital income, total net worth, and the number of household members.
- 3 Noncapital income and total net worth were deflated using the Annual Total Consumer Price Index, as published by Statistics Netherlands; 1995=100.
- 4 The definition of variables "financial interest" and "risk aversion" is detailed in Appendix A.
- 5 For the variables age, noncapital income, and total net worth, the model specification is based on orthogonal polynomials. For age, we use a 2nd degree polynomial, for noncapital income and total net worth we use a 3rd degree polynomial of the log-transformed variable. The log transformation is of the form  $y = \ln(x+1)$  if  $x \geq 0$ , and  $y = -\ln(-x+1)$  if  $x < 0$ .
- 6 The marginal effects refer to changes in the predicted probability caused by marginal changes in regressors. All other regressors are held constant at their mean values. Changes in predicted probability are calculated as follows: for continuous variables (# of adults in HH; # of children at home) as the first derivative of the predicted probability at mean values of the regressor; for dummy variables based on a discrete change in the regressor from 1 to 0; for the orthogonal polynomials based on a discrete change in the underlying, untransformed variable as follows, at three points each: for age: due to an increase in age by 1 year, at ages 30, 45, and 65; for noncapital income (total net worth): due to an increase in noncapital income (total net worth) by 1000 DFL, at percentiles 25, 50, and 75.
- 7 The p-values refer to simple or joint tests of underlying estimated regressor coefficient (groups). The null hypothesis in all cases is  $H_0: \text{coefficient (group)} = 0$ .
- 8 For other model parameters, the Tables report estimated coefficients and associated standard errors and p-values.

**Table 13: Selection Model, 2nd Stage (1)**

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	<b>Risky Financial Assets</b>			<b>Employer Spons. Saving Plans</b>		
Total # of observations	2609			3016		
Total # of households	1100			1452		
R2	0.1736			0.2648		
<b>variable (2)</b>	<b>marginal effect (6)</b>	<b>standard error (7)</b>	<b>p-value (8)</b>	<b>marginal effect (6)</b>	<b>standard error (7)</b>	<b>p-value (8)</b>
age: at age 30 (5)	-0.00338	0.0291	0.025	-0.00038	0.0361	0.421
age: at age 45	0.00086	0.0163		0.00044	0.0317	
age: at age 65	0.00652	0.0250		0.00155	0.0574	
low education	-0.02253	0.0520	0.001	-0.03273	0.0267	0.069
intermediate/low education	-0.01737	0.0360		0.04458	0.0183	
intermediate/high education	-0.03795	0.0307		0.01720	0.0150	
vocational education, level 1	-0.13107	0.0482		0.05863	0.0237	
vocational education, level 2	-0.06699	0.0390		0.04266	0.0164	
vocational education, level 3	-0.01955	0.0203		0.00020	0.0097	
<i>reference: university education</i>						
noncapital income: at 25% (3,5)	0.00023	0.0007	0.204	-0.00054	0.0003	0.013
noncapital income: at 50%	0.00008	0.0008		-0.00034	0.0010	
noncapital income: at 75%	0.00003	0.0010		-0.00022	0.0013	
total net worth: at 25% (3,5)	0.00045	0.0006	0.039	-0.00059	0.0006	0.000
total net worth: at 50%	0.00028	0.0003		-0.00028	0.0003	
total net worth: at 75%	0.00018	0.0002		-0.00017	0.0002	
unemployed	-0.02498	0.0808	0.120	0.13339	0.0831	0.176
retired	0.10646	0.0354		0.07276	0.0427	
disabled	0.00652	0.0635		-0.02110	0.0433	
other labor market status	0.10257	0.0487		-0.01793	0.0310	
self-employed	0.22549	0.0401		0.06134	0.0372	
<i>reference: paid employment</i>						
high-income sub-panel	0.02189	0.0242	0.366	-0.00422	0.0112	0.707
# of adults in HH	-0.06879	0.0227	0.008	-0.01540	0.0132	0.619
# of children at home	-0.00503	0.0079		0.00234	0.0040	
financial interest: low (4)	-0.15138	0.0640	0.020	0.07746	0.0163	0.596
financial interest: medium	-0.10057	0.0296		0.03285	0.0117	
<i>reference: high</i>						
risk aversion: low (4)	0.05612	0.0306	0.023	0.02813	0.0191	0.946
risk aversion: medium	0.07865	0.0203		0.00168	0.0102	
<i>reference: high</i>						
year = 1994	-0.02622	0.0401	0.000	0.01108	0.0322	0.002
year = 1995	0.00059	0.0443		-0.08048	0.0355	
year = 1996	0.01301	0.0355		-0.06704	0.0414	
year = 1997	-0.02918	0.0406		-0.01613	0.0393	
year = 1998	0.05132	0.0443		-0.04722	0.0449	
<i>reference: year = 1993</i>						
<b>coefficient (9)</b>	<b>estimate</b>	<b>stderr</b>	<b>p-value</b>	<b>estimate</b>	<b>stderr</b>	<b>p-value</b>
intercept	0.23893	0.0939	0.011	0.21365	0.0789	0.007
Mill's ratio	0.25206	0.1087	0.021	-0.08306	0.0606	0.171
random effect: sigma	0.20630			0.12424		
standard error	0.16120			0.11739		



Notes to Table 13:

- 1 The Table reports estimates from the second stage of the selection model, as described in the text. First stage estimates are those of the static random effects probit model, reported in Table 10. The focus of the present Table is on reporting marginal effects. Full results, including parameter estimates and standard errors of all underlying coefficients are available from the authors upon request.
- 2 All regressors refer to measures of the head of the household, except noncapital income, total net worth, and the number of household members.
- 3 Noncapital income and total net worth were deflated using the Annual Total Consumer Price Index, as published by Statistics Netherlands; 1995=100.
- 4 The definition of variables "financial interest" and "risk aversion" is detailed in Appendix A.
- 5 For the variables age, noncapital income, and total net worth, the model specification is based on orthogonal polynomials. For age, we use a 2nd degree polynomial, for noncapital income and total net worth we use a 3rd degree polynomial of the log-transformed variable. The log transformation is of the form  $y = \ln(x+1)$  if  $x \geq 0$ , and  $y = -\ln(-x+1)$  if  $x < 0$ .
- 6 The marginal effects refer to changes in the endogenous variable caused by marginal changes in regressors. Marginal effects are calculated conditional on selection. This implies that we disregard the effect of regressors on the endogenous variable through the selection-correction term. For the orthogonal polynomials, calculated changes in the endogenous variable are based on a discrete change in the underlying, untransformed variable as follows, at three points each: for age: due to an increase in age by 1 year, at ages 30, 45, and 65; for noncapital income (total net worth): due to an increase in noncapital income (total net worth) by 1000 DFL, at percentiles 25, 50, and 75.
- 7 The standard errors are based on an estimate of the variance-covariance matrix that allows for heteroskedasticity.
- 8 The p-values refer to simple or joint tests of underlying estimated regressor coefficient (groups). The null hypothesis in all cases is  $H_0: \text{coefficient (group)} = 0$ .
- 9 For other model parameters, the Table reports estimated coefficients and associated (heteroskedasticity robust) standard errors and p-values.

## Appendix A

### A.1 Psychological Variables

We employ two variable groups from the section on economic-psychological concepts. These relate to a measure of respondent's personal interest in financial matters, and a measure about the respondent's attitude to risky investments.

#### A.1.1 Interest in Financial Matters

The questionnaire explains:

“The following statements concern saving. Please indicate for each statement to what extent you agree or disagree

EXAMPLE

Totally disagree							totally agree
1	2	3	4	5	6	7	

Imagine you are asked to what extent you agree with the following statement: ‘every Saturday night I go out to meet people’. If you totally agree with this statement, please type 7. If you totally disagree with the statement, please type 1. You can also select a number somewhere in between 1 and 7; 4 is neutral. If you cannot make a choice, type 0.”

The statement analyzed is:

- *I am very interested in financial matters (insurance, investments, etc.)*

This results in eight possible answers (including “don’t know”). They were recoded into three dummy variables, one (‘financial interest: high’) for the levels 6 and 7 of the original variable, one (‘financial interest: medium’) for levels 3 through 5, and one (‘financial interest: low’) for levels 1 and 2. Observations with “don’t know” answers to this question have been discarded.

#### A.1.2. Risk Attitude

For respondents in a household with total net household income of 20,000 Dfl or more, the questionnaire explains:

“The following questions concern money, saving, and investments.

The following statements concern saving and taking risks. Please indicate for each statement to what extent you agree or disagree, on the basis of your personal opinion or experience.

Totally disagree							totally agree”
1	2	3	4	5	6	7	

The statement analyzed is:

- *I think it is more important to have safe investments and guaranteed returns, than to take a risk to have a chance to get the highest possible returns.*

Again, this results in eight possible answers (including “don’t know”). They were recoded into three dummy variables, following the same scheme as for the variable in A.1.1.: one (‘risk aversion: high’) for the levels 6 and 7, one (‘risk aversion: medium’) for levels 3 through 5, and one (‘risk aversion:

low') for levels 1 and 2. Observations with "don't know" answers to this question have been discarded as well.

**Table A2**  
**Summary Statistics, Estimation Sample**

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Year	1995.11	1.58	1993	1998
Age	49.70	13.40	22	92
Low education	0.0456			
Intermediate/low education	0.1036			
Intermediate/high education	0.1152			
Vocational education, level 1	0.0978			
Vocational education, level 2	0.1302			
Vocational education, level 3	0.3114			
Reference: university education	0.1944			
Noncapital income	91408	90504	0	6.32e+6
High income sub-panel	0.3019			
Total net worth	297915	450069	-1.87e+6	1.14e+7
Unemployed	0.0160			
Retired	0.2171			
Disabled	0.0278			
Other labor market status	0.0459			
Self-employed	0.0620			
Reference: paid employment	0.6311			
# of adults	1.8237	0.4344	1	6
# of children living in household	0.7900	1.1214	0	7
Financial interest: low	0.3361			
Financial interest: medium	0.4556			
Reference:: financial interest: high	0.2084			
Risk aversion: low	0.0873			
Risk aversion: medium	0.4162			
Reference:: risk aversion: high	0.4965			
Urbanization: very high	0.1498			
Urbanization: high	0.2378			
Urbanization: medium	0.2482			
Urbanization: low	0.1946			
Reference: not urbanized	0.1695			

Note: This table reports summary statistics for the estimation sample of the static binary choice model with 8010 observations. For the variable "age" we used a quadratic orthogonal polynomial in the regressions; for the variables "noncapital income" and "total net worth" we used cubic orthogonal polynomials of the log-transformed variables. The following log transformation was applied: for the value of a variable,  $x$ , we used  $\ln(x+1)$  if  $x \geq 0$ , and  $-\ln(-x+1)$  for  $x < 0$ . Noncapital income and net worth were measured in currency units (Dutch guilders) and adjusted for inflation (base year 1995) before transformation. These two variable groups, and the number of adults and children, refer to the household, all other variables pertain to characteristics of the head of the household.