CPB Discussion Paper

No 63

February 2006

Households' Response to Wealth Changes

Do Gains or Losses make a Difference?

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We would like to thank Egbert Jongen, Jan Kakes, Rocus van Opstal, Job Swank, and seminar participants at the CPB and DNB for comments. The usual disclaimer applies.

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ISBN 90-5833-268-3

Abstract in English

We estimate the excess impact of financial asset capital losses relative to gains on household active savings and durable goods consumption in the Netherlands. The sample period covers both the stock-market boom during the 90's, and the bear period afterwards. The results suggest that households react more to capital losses than to capital gains. Failing to take into account this asymmetry may seriously bias the estimates of the marginal propensity to consume out of wealth.

Abstract in Dutch

Het doel van deze studie is het schatten van hoe veel groter het effect is van koers verliezen ten opzicht van koers winsten over actieve besparingen en consumptie van duurzame goederen in Nederland. Wij kijken naar de 'boom' van de financiële markten in de jaren '90 en de sterke daling in de periode daarna. Onze resultaten laten zien dat huishoudens sterker reageren op capital losses dan op capital gains. Dit is belangrijk voor een zuivere schatting van de relatie tussen vermogen en consumptie.

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Summary

The marginal propensity to consume out of financial wealth serves as input to different models that economists employ. However, calibration based on macro studies that exploit information about remote past may not provide a good tool. The recent rise in stock-market participation of households should be central in new estimations of this parameter. Behavioural economics also shows that individuals responses to gains and losses need to be taken into account when considering any reaction to wealth changes.

In this paper, we look at asymmetric wealth effects at the micro level from different perspectives. First, we use the data of the DNB household panel to analyse the relationship between wealth gains and losses on actual and planned savings. The result is that a positive return in financial assets has a significant negative effect on active household savings. If households experience a capital loss, they compensate this loss with an increase in active savings. This compensation is asymmetric: the impact of a capital loss is about three times as large as the impact of a capital gain. We suggest that the magnitude of this asymmetry increases with age. Our estimates of this excess reaction are in line with those of the loss aversion literature (Knetsch, 1989) and studies on wealth perceptions for the Netherlands (Mastrogiacomo, 2006).

Second, we estimate the impact of wealth on durable goods consumption, which is the only directly reported consumption information present in the data. To our knowledge, we are the first estimating this relationship at the micro level. We find that though these effects are small, they can as well be asymmetric.

Our methodology still contains an important restrictive element. We only distinguish between capital gains and losses. In reality, households may be expecting a certain positive capital gain on average, and behave differently depending on whether the actual capital gain exceeds this level or falls short of it. This is an interesting topic for future research.

1 Introduction

Over the past decade, many major industrial countries have witnessed large swings in stock-market capitalisation. For example, in the US market capitalisation stood at about 50 percent of GDP in 1995 and rose to 150 percent in 2001, while in the Netherlands market capitalisation grew from 60 percent to 180 percent. After the burst of the ICT-bubble in 2001, these upward trends were partially reversed. Between 2001 and 2003, market capitalisation in the US was reduced by 70 percentage points, while in the Netherlands it fell by more than 100 percentage points. A worldwide drop in asset prices of this size was unprecedented in recent history. This raises the question whether asset wealth losses may effect private consumption differently than asset wealth gains.

Poterba (2000), well before the collapse of asset prices in 2001, already put forward the 'intriguing issue' of the potential asymmetry in how wealth changes affect consumer spending. More specific, he raised the possibility that consumers might react more rapidly when wealth contracts than when it expands. Subsequently research for the US using macro data on consumption and asset wealth seems to contradict this view. For example, Apergis and Miller (2005) and Stevans (2004) show that during an 'upswing' in equity prices private consumption responds more strongly than during stock-market downturns[1]. In order to identify sufficient upswings and downturns, these authors use time-series data starting in the 50's. However, in view of the ongoing liberalisation of financial markets worldwide, it is at least questionable whether using data from the 50's-80's is appropriate when one is interested in an accurate estimate of the current impact of changes in wealth on spending.

In this paper, we use a micro-dataset for the Netherlands covering the period 1993-2005 to estimate the spending response to changes in asset wealth. The dataset does not provide information on non durable consumption. We assess therefore the response of active savings and of a limited set of durable goods, respectively, to capital gains on holdings of stocks, bonds and mutual funds. Moreover, following Poterba's suggestion, we differentiate between capital gains and losses. Despite the relatively short time period that is covered by our dataset, we have sufficient observations to identify the different impacts of capital gains and losses, as many households experience financial gains in the first part of the time period, while facing financial losses in the second part. The high quality Dutch micro-dataset allows us to measure capital gains, or 'pure' changes in wealth (therefore isolating portfolio choices). In this we follow Grant and Peltonen (2004), Juster et al. (2006) and some of the studies contained in Haliassos et al. (2002).

This study is in part motivated by the results of Mastrogiacomo (2006). Using the data of the

[1] Case et al. (2003) show that increases in housing market wealth have positive and significant effects upon consumption, but declines in housing market wealth have no effect at all upon consumption.

Dutch Social Economic Panel he shows that the perception of financial wealth realisations is asymmetric. Individuals need comparatively larger improvements in financial wealth to feel a bit more wealthy than they need financial losses to experience a small wealth decrease. His study focuses on the psychological perception of financial wealth (individuals are asymmetric per se) and does not link changes of financial wealth to consumption behaviour.

The remaining of this study is organised as follows. Section 2 describes the data and the construction and composition of the financial wealth variables. Section 3 studies the relation between financial wealth and active savings as well as the relation between financial wealth and consumption of durables.

2 Data

For the investigation of wealth effects on active savings and consumption in the Netherlands, we make use of the DNB Household Survey (DHS). The DHS is administered by CentERdata, which is associated with Tilburg University, the Netherlands. The survey is sponsored by De Nederlandsche Bank (DNB), the Dutch central bank. The aim of the DHS is, among others, to furnish information on both economical and psychological determinants of savings. The survey is conducted annually, starting 1993. In this study, we use the waves up to and including 2005. Each year, the survey contains approximately 1500 households (well over 2500 individuals).[2]

The DHS provides very detailed information on households' assets and liabilities, which enables us to calculate an approximation of active household savings. In addition, the survey contains data on households' stocks of cars, caravans, boats, and motorbikes. No further information concerning the consumption of (non-)durable goods is available.

We define households' active saving as the money put in checking and saving accounts (CS) and invested in three financial assets: equities (E), bonds (B), or mutual funds (MF). More precisely, we define active saving as follows:

$$s_{i,t} = (X^{CS}_{i,t} - X^{CS}_{i,t-1}) + x^{E}_{i,t} p^{E}_{i,t} + x^{B}_{i,t} p^{B}_{i,t} + x^{MF}_{i,t} p^{MF}_{i,t}, \tag{2.1}$$

where $X^{j}_{i,t}$ denotes the stock of money hold at the end of year t by household i in asset j, $x^{j}_{i,t}$ describes the flow of asset j, thus, the number of assets sold or purchased during year t, and $p^{j}_{i,t}$ denotes the price of asset j at time t payed by household i. Out of all financial wealth categories, these four are the most popular ones in the Netherlands. Table A.1 gives an overview of the ownership rates of these wealth classes calculated on the basis of the answers collected by the DHS.[3] We see that the ownership of checking and saving accounts is nearly 100%. Around 10% of Dutch households reported in 1993 that they hold money in equities. In 2001, equity ownership peeks at around 18%. After the burst of the ICT bubble in 2001, stock ownership decreased to around 15% in 2005. We observe a similar pattern for the ownership of mutual funds. During the 90's, the relative number of households investing in mutual funds rose from around 14% in 1993 to around 30% in 2001. Between 2001 and 2005, mutual fund ownership showed a decreasing trend and reached a participation of 22% in 2005. Compared to the investment in stocks or mutual funds, bonds seem to be relatively unpopular for Dutch households. Only about 5% of the households report between 1993 and 2005 that they have invested in this investment category.

[2] More information can be found at www.uvt.nl/centerdata/dhs.

[3] In the case that households report to hold a certain type of an asset but do not report the amount held in this asset, we follow Alessie et al. (2002) and replace the missing information by imputed values provided in the DHS data set. Since the relatively rich households are over-sampled in the data set, ownership rates are weighted with the sample weights to make them representative for the Dutch population.

We focus in our study on financial asset capital gains, namely returns on equity, bond, and mutual fund holdings. In contrast to most earlier studies on the relationship between wealth effects and spending, we attempt to calculate 'pure' wealth effects. We differentiate between two components. First wealth changes due to sales and purchases, which we define to be one component of active saving. Second return effects, which we refer to as capital gains (passive savings)[4] and that we define as:

$$w_{i,t} = X^{E}_{i,t-1} r^{E}_{i,t} + X^{B}_{i,t-1} r^{B}_{i,t} + X^{MF}_{i,t-1} r^{MF}_{i,t}, \tag{2.2}$$

where $X^{j}_{i,t-1}$ describes again the stock of money hold in asset j and r^{j}_{t} describes the annual return between $t-1$ and t of asset j.

Unfortunately, the DHS neither provides any direct information about households' sales and purchases of financial assets nor about their price and annual return, which complicates the calculation of household savings and asset capital gains according equation (2.1) and (2.2).[5] We solve this problem by approximating the missing variables. The DHS provides information about the amount of money hold at the end of a year in various asset classes, thus $X^{j}_{i,t}$, of which we can calculate the annual change of money hold in asset j, $X^{j}_{i,t} - X^{j}_{i,t-1}$. By definition, the annual change of asset wealth consists out of two different parts. The first is the change due to sales and purchases and the second is the capital gain between $t-1$ and t:

$$X^{j}_{i,t} - X^{j}_{i,t-1} = x^{j}_{i,t} p^{j}_{i,t} + X^{j}_{i,t-1} r^{j}_{i,t}, \tag{2.3}$$

with $j = E, B, MF$. The first term on the right hand side is the 'active savings' part, which is needed for the calculation of households' active savings according to equation (2.1), and the second term is the capital gain in the particular asset, which is used for the calculation of household financial assets capital gain according to equation (2.2). Thus, after approximating the capital gains, we can use equation (2.3) to finally calculate the amount of active savings of the households.

The first and ideal way to split the annual change of money hold in equities into its active savings and capital gains part is to extract the information directly from survey responses. The DHS contains two relevant questions, namely, a question asking household members about the number of equities they hold and a question, which asks for the value of these equities. If respondents answer these two questions in two consecutive years, we can distinguish between a wealth change due to price effects on the one hand, and between wealth developments due to changes in the stock of the assets. This can be applied to 45 households. In the cases where we do not have this information about equity wealth, we approximate the capital gain on equity holdings by multiplying the total amount of money hold in equities at time $t-1$ by the total

[4] Most studies simply calculate the periodical change of wealth hold in a financial asset category, in which way one cannot differentiate between these two possible reasons for wealth increases.

[5] The only exception is equity wealth, where this information is available.

annual return of the 'Amsterdam Exchange Index' (AEX) at time t[6]. To calculate the capital gain on mutual fund holdings, we proceed as follows. If we know what institutions households invested their mutual funds in, we multiply the amount of wealth hold in this asset category by the return on the largest and the most liquid fund offered by this institution. If this information is not available, we multiply the amount of wealth hold in mutual funds by the annual AEX return. For the calculation of the capital gain in bond holdings, we multiply the reported bond wealth at time $t-1$ with the return on the Dutch 10-year benchmark government bond.

Besides our focus on the financial asset wealth, we add two more wealth variables as controls, namely the annual change of housing wealth and pension wealth. We define housing wealth at time t as the self reported current house value. Table A.1 shows that around 50% of the respondents of the DHS own a house or an apartment. In the observed time period, house prices showed a tremendous appreciation, with growth rates peeking to more than 20% in 2000. Alessie and Kapteyn (2002) find significant effects of housing wealth on the take up of a second mortgage in the Netherlands, which is indeed a way to consume out of housing wealth. Further, many previous studies focussed on the impact of housing wealth on consumption and found a significant effect. The reason for the inclusion of a variable measuring the annual change of pension wealth into our regressions is that during the sample period some major institutional reforms in the Netherlands have exogenously changed the level of pension wealth. This may have had a significant impact on householdst' active savings. Pension wealth is calculated as the discounted sum of future benefits minus premiums. We have taken into account information regarding individual pension plans, such as planned retirement age and pension arrangements. Further details are available from the authors upon request.

We define two more binary variables. The first asks whether households put any money aside the last 12 months and the second whether households plan to put money aside the next 12 months. Thus, the former question focuses on 'saving participation' and the latter one on 'saving intentions'. Figure 2.1 shows that there is no stable relationship between the amount of active saving and saving participation. We do not observe persistent trends for both variables between 1994 and 1999. From 1999 onwards, the amount of active savings increases, taking positive values from 2001 onwards and peeking in year 2004. Between 1997 and 2001, the average number of households reporting that they have saved the last 12 months increases continuously and peeks in year 2001. From 2001 onwards, the average number of households that manage to save during the past year decreases again, while the average amount of active saving stays high until 2004. Only in the last year, we observe a drop of active savings. In 2004, households reported an average increase in money held in checking and saving accounts and invested in equities, bonds, and mutual funds of more than 2,500 euro. In 2005, the average amount saved decreases to less than 1,000 euro.

[6] Although the share of foreign assets in Dutch portfolios is on the rise, the home bias is still substantial (IMF, 2005)

Figure 2.1 Active savings and saving participation

Figure 2.2 Saving participation and saving intentions

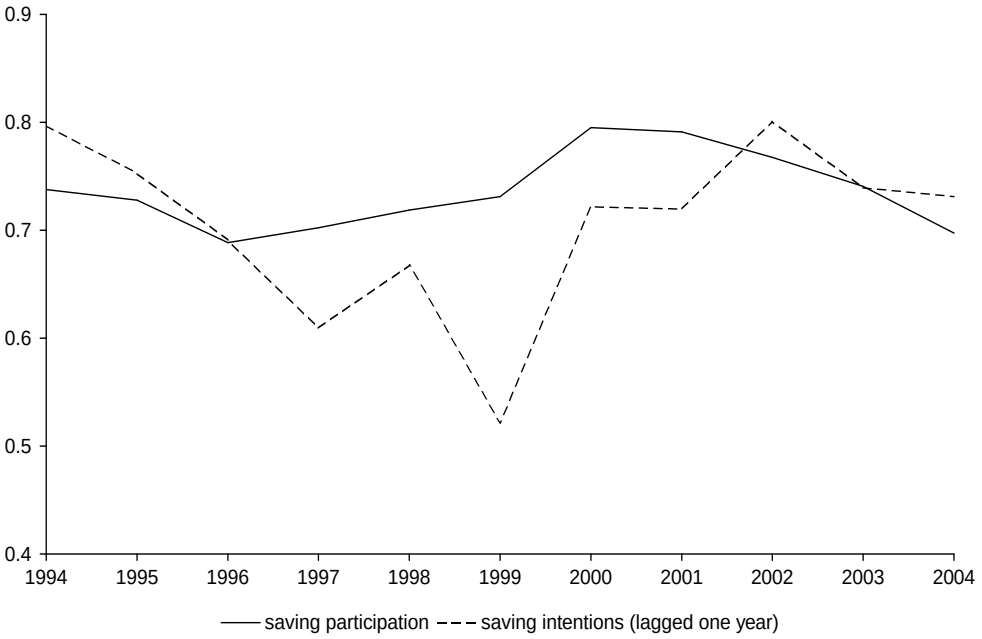
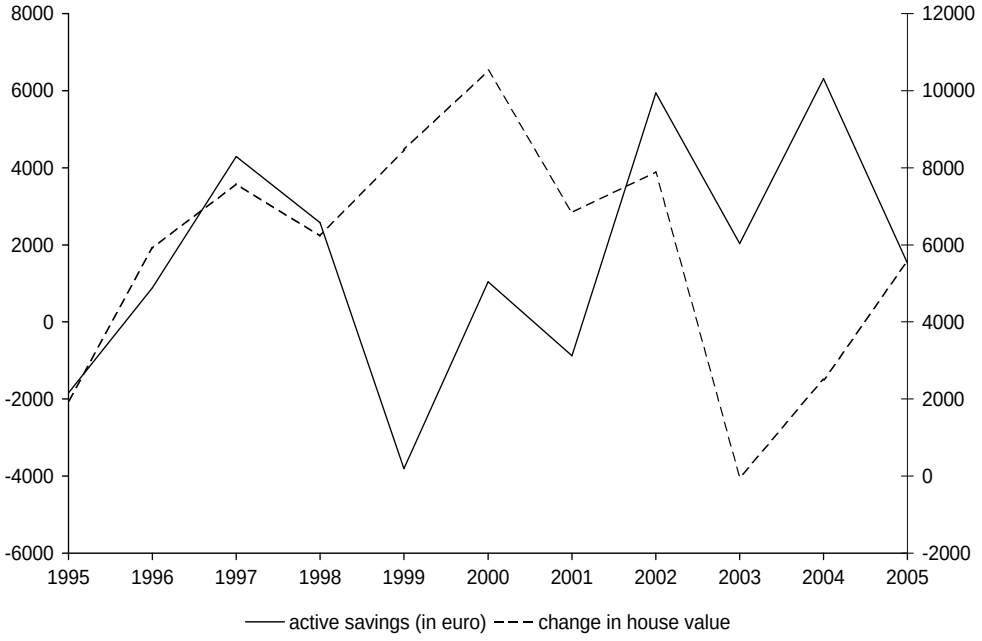


Figure 2.2 illustrates the pattern of the saving participation rate of Dutch households in the last 12 months and the saving intention rate of Dutch households in the next 12 months, where we have lagged the latter by one year. Saving intentions are more volatile than saving participation. Between 1994 and 1999, saving intentions dropped from 0.80 to less then 0.55. Thus, saving became less important for Dutch households during the upswing in equity prices, when many

households experienced huge capital gains. From 2000 onwards, we observe again an increase in the number of households that have saving intentions up to a ratio of 0.80. In general, Figure 2.2 suggests that saving intentions are much more responsive to wealth changes than saving activity in general.

Figure 2.3 plots the average change in housing wealth against the average amount of households' active savings. In general households report an increase in housing wealth. Between 1995 and 2000, the average increase in housing wealth rises steadily and reaches its peak in 2000, when Dutch households indicate an average annual house value increase of more than 10,000 euro. Between 2000 and 2003, the growth rate of house values falls, and turns slightly negative in 2003. Afterwards, the annual house value change picks up again. The figure shows that from 1999 onwards, the change in housing wealth and active savings move in opposite direction, which suggests a negative correlation.

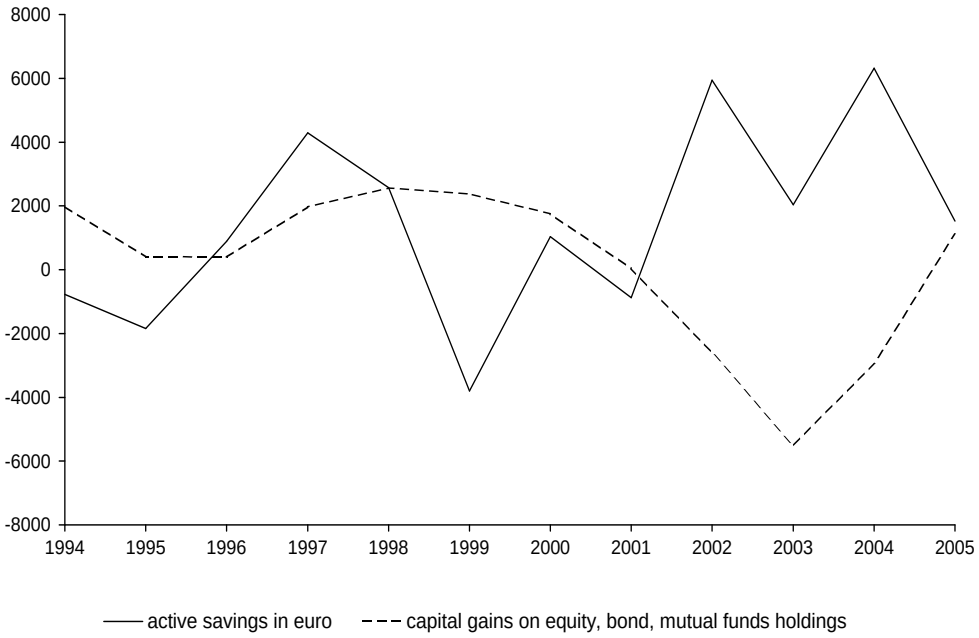
Figure 2.3 Active savings and house value changes



The time profile of the capital gains are presented in Figure 2.4. Capital gains and active savings clearly move in opposite directions, again suggesting a negative correlation. Thus, Figure 2.3 and 2.4 both provide evidence that households tend to increase their active savings when they experience wealth losses, and vice versa.

While the DHS does not report a direct measure for households' consumption expenditures, it does contain a number of questions asking household members about the number of cars (*CA*), caravans (*CV*), motorbikes (*M*) and boats (*B*) they own, and about their estimated second-hand market value. This enables us to approximate durable-good consumption. For example, in year 2004 individuals are asked:

Figure 2.4 Active savings and capital gains



How much was the estimated market value of the [1st to 5th] car you have mentioned, on 31 December 2003?

Similar questions are asked about caravans, boats, and motorbikes. We use this information to calculate a measure of households' purchases (or sales) of a durable goods item as follows:

$$V_{i,t}^{j} = (1-\delta)V_{i,t-1}^{j} + c_{i,t}^{j}, \tag{2.4}$$

with $j = CA, CV, M, B$. $V_{i,t}^{j}$ denotes the (second hand-)market value of household i of item j in year t. δ is the rate of depreciation, and $c_{i,t}^{j}$ is the amount of money the household has spent on the item j in the course of year t. Note that this amount of money can be negative. In that case, the household has sold a durable item. In the remainder of the study, we focus on total consumption of durable goods[7], which is calculated as the sum of $c_{i,t}^{j}$ over the four goods items,

$$c_{i,t} = c_{i,t}^{CA} + c_{i,t}^{CV} + c_{i,t}^{M} + c_{i,t}^{B}. \tag{2.5}$$

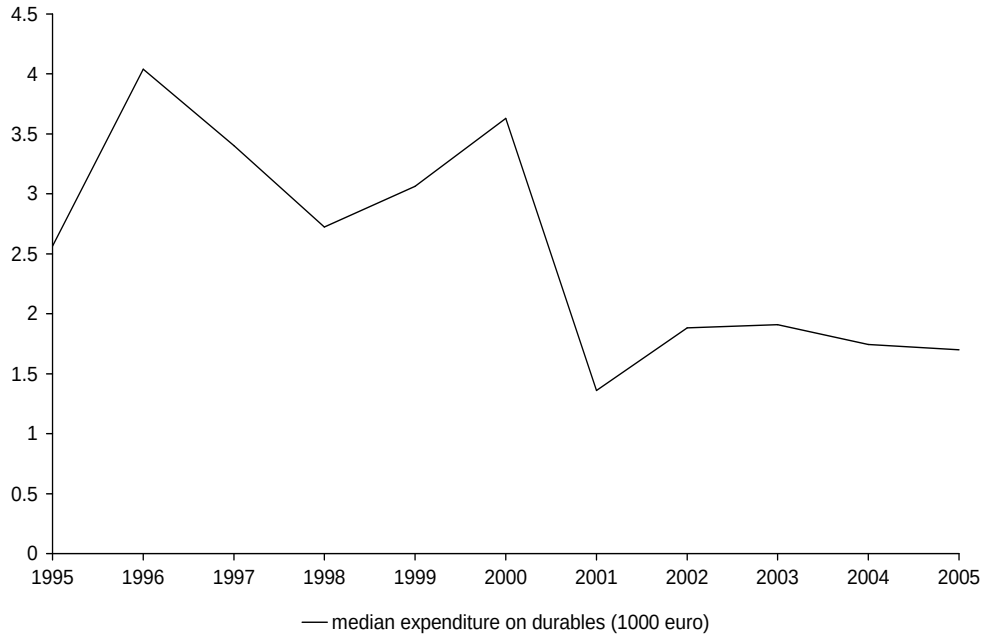
The DHS does not provide information on depreciation rates. We therefore assume that the depreciation rate may take the following values: 0%, 10%, 20%, 30%, cf. Padula (2004). Of course, assuming a uniform rate of depreciation over time, items, and households is arbitrary, and clearly matters for the calculation of $c_{i,t}^{j}$. However, we are not interested in obtaining estimates of durable goods consumption per se, and it is not immediately obvious whether and how idiosyncratic variation in depreciation rates would bias the empirical findings in the

[7] The totality of durable consumption in the DHS does only include vehicles. These account for about 20% of the entire stock of durables registered by National Accounts.

remainder of the study. A final issue is that the DHS does not allow us to differentiate between purchases of new items and of second-hand items. This obfuscates a direct comparison to durable goods (vehicles) consumption in the National Accounts, since the latter excludes purchases of second-hand items.[8]

Figure 2.5 shows the median household expenditure on the four durable goods item, considering only households that actually made a purchase and assuming $\delta = 0.10$[9]. The figure indicates that durable goods consumption slowed down from 2001 onwards.

Figure 2.5 Durables' consumption



[8] Ownership rates for all four items are fairly stable over time. The vast majority of the households owns at least one car. Ownership of caravans, motorbikes and boats is less widespread.

[9] Similar graphs are obtained for the remaining depreciation rates.

3 Impact of Wealth Changes on Savings and Durable Consumption

3.1 Savings

Our estimates of the relationship between household savings and wealth returns are based on the following equation:

$$s_{i,t} = \theta_1 w^P_{i,t} + \theta_2 w^N_{i,t} + \theta_3 x_{i,t} + \alpha_i + \lambda_t + u_{i,t}, i = 1, ..., N,\ t = 1, ..., T, \tag{3.1}$$

where i denotes the household and t the time. $s_{i,t}$ stands for active savings. $w^P_{i,t}$ and $w^N_{i,t}$ describe the vector of wealth gains and wealth losses, respectively. The wealth vector consists of financial asset wealth as defined in equation (2.2), augmented by housing wealth and pension wealth changes. $x_{i,t}$ in equation (3.1) is a vector of household controls, such as income, age, family size and education, λ_t are time effects to account for the business cycle, α_i denotes the individual effect, and $u_{i,t}$ is a white noise error term. We follow Mundlak (1978) and assume that the individual effects are correlated with some explanatory variables. More specifically, the relationship between α_i and $x_{i,t}$ is specified as $\alpha_i = \beta' \overline{x_i}$. This is done by including the 'individual means over time' of some relevant explanatory variables, $\overline{x_i}$ into the estimations.

A number of authors, like e.g. Dynan and Maki (2001), have noted that households' consumption or savings' reactions due to wealth effects may occur with a substantial time lag (owing to uncertainty about the persistence of the change). As attrition is high in the DHS, we must assume that active savings react immediately in response to wealth changes. We control only for contemporaneous wealth effects and restrain from adding lagged asset gains and losses in our regression.

Table A.2 shows the estimation results. Similar to Alessie and Kapteyn (2002) and Engelhardt (1996), we apply a median regression approach, which is robust to outliers. Column A contains the results for the model in which we include all three wealth variables linearly, thus, without differentiating between positive and negative wealth changes (therefore capital gains and losses are kept together). Column B describes the results for the model in which we explicitly distinguish between capital gains and losses, and positive and negative changes in housing and pension wealth.

From the estimation results in column A, we see that financial asset wealth shows the expected negative sign. Thus, a capital gain is associated with a decrease in active savings and vice versa. The estimation results in regression B, where we distinguish further between capital gains and losses, confirm our asymmetry hypothesis. Households react stronger to capital losses than to gains. The coefficient on capital losses is almost three times the size of the coefficient on capital gains. A capital gain of 1,000 euro causes a decrease in active savings of 82 euros. A capital loss of the same magnitude induces households to increase their active savings by 217

euros. In comparison to the results found in the macro-econometric literature (like e.g. Poterba (2000) and Mehra (2001)), our estimated marginal propensity to consume out of equity, bond, and mutual fund returns are somewhat larger [10] . As we focus on the relation between these two effects and not on their level, we do not enquire this further.

It is however possible that households even manage to put money aside if they experience negative wealth returns. In that case interpreting the coefficients ceteris paribus may be misleading. Thus, we are also interested in comparing the effect of capital gains and losses on savings by looking at the predictions of our models for three different subgroups in the populations: those with no assets, those with capital gains and those with losses. Using the estimates of model B in table A.2, we compute the expected savings for these groups separately. In addition summary statistics show that gains and losses in these returns are of almost identical magnitude (approximately 1,000 euro on average). We take the expected active savings of those with no assets as a benchmark. If all consumers were symmetrically reacting to wealth changes, we would expect those with capital losses to have extra active savings (relative to the benchmark) of the same magnitude of the lower expected active savings of those with capital gains.

More formally, we subtract the expected value of active savings of those with no assets from the expected savings of those with capital gains or losses. Thus, let y denote the predicted active savings, then the ratio:

$$ER = -\frac{E(y|(return < 0)) - E(y|(return = 0))}{E(y|(return > 0)) - E(y|(return = 0))}, \tag{3.2}$$

measures the excess reaction. The calculated ratio for different age-related subgroups ranges from 3.4 for the youth to 5.2 for the elderly. This means that households reaction to capital losses is between three to five times larger than their reaction to a capital gain of the same size. This result supports our asymmetry hypothesis that households respond much stronger to financial losses than to financial gains, although the asymmetry seems to be even larger than the estimated coefficients would suggest. These estimates are however in line with the results of Mastrogiacomo (2006) that measures an asymmetric perception of financial wealth changes ranging from 1.5 to 4.8, also depending on age.

Housing wealth also shows an asymmetric effect, although in both regressions it is not statistically significant. Thus, our results contradict the results of Engelhardt (1996), Blake (2004), Disney et al. (2003), and Grant and Peltonen (2004), who find significant effects of housing wealth on consumption. We propose three explanations for the non-significance of house values changes. The first one is given by Poterba (2000), who argues that the extent to which an unanticipated increase in house prices raises a household's real wealth depends on the

[10] Notice that our estimates refer to active savings, these are the complement to income of the sum of durable and non durable consumption. It is therefore not possible to compare the coefficients estimated here, with those of studies that either focus on durable or non-durable consumption. As the complement is the sum of these two variables it is perfectly plausible, and indeed expected, that the coefficients are larger than standard MPC's.

time horizon over which the household plans to live in its current home. When the house prices rise, the implicit 'user cost' of living in a house also rise. Thus, when households expect to live in their homes for many years, the positive wealth effect associated with a house price increase can be largely offset by the increase in the effective cost of buying housing services. The second explanation we find is related to the first one. If households expect to stay for many years or even until death in their houses, they have no plans to monetize their wealth increase due to a rise in their house price, and therefore, the house value has no significant impact on savings. The third explanation is specific to the Netherlands. Alessie and Kapteyn (2002) show the already quoted relation between housing wealth and the take up of a second mortgage. In the Netherlands also second mortgages are tax deductible if invested in the renovation of the house itself. This regulation creates a subsidy to durable consumption re-invested in house improvements (and therefore endogenous to the value of the house) that is as high as the payroll tax. The strong incentive to get a second mortgage and to re-invest it on the house suggests that no significant relation should be found between non-durable consumption (and therefore also active savings), other durable consumption (vehicles for instance) and housing wealth changes.

Pension wealth developments have no significant impact on active savings. In Models A and B, the coefficient of changes in pension wealth turns out to be negative but non-significant. A possible explanation for this result is that individuals are on average not well informed about their pension wealth (Lusardi, 2006) and therefore do not adapt their savings to changes in their retirement wealth. This explanation finds also support in a study of Rooij et al. (2004), who also use the DHS to show that the average respondent considers himself financially unsophisticated, and is not very eager to take control of retirement savings investment when offered the possibility to increase his expertise.

Some of the taste shifters included are significant. Active savings increases non-linearly with income, which is very intuitive. Family size has a negative effect on active savings. Savings seem to be unaffected by the age of the head, but the relation between income and age may well be responsible for this. We also included time effects to control for business-cycle-related factors, but for reasons of exposition, we do not report them explicitly in our table.

We use this set of regressors for the estimation of four more models. Tables A.3 and A.4 show the estimation results taking the binary variables measuring saving activity and planned saving activity as dependent variables. The table shows the marginal effects and not the probit coefficients. We include a lagged dependent variable in these regressions to address the possible state dependence present in these two variables. The large and significant coefficients shows that the saving participation and intentions are state dependent.

The estimation results in columns A and B show that none of our three wealth-related variables has a significant impact on saving participation of Dutch households. This means that the decision to save is not significantly affected by wealth returns. Households that did not save the previous year will not start to save next year, in the presence of positive wealth returns, and

vice versa. We find, as expected, a significant positive effect of household income on saving participation. The higher (lower) the household income, the more (less) likely that household put some money aside.

When we focus on the determinants of household saving intentions, we do not find a significant wealth effect, when the three wealth variables enter linearly into the regressions (column C). But when we differentiate explicitly between positive and negative wealth returns, we find that households significantly decrease their saving intentions over the next year, if they experience a house value appreciation or an increase in their pension wealth. Contrarily, the impact of house value decreases and pension wealth losses have no significant impact on planned saving activity. This result suggests again that our asymmetry hypothesis holds. Regarding the estimated coefficients of our taste shifters, we find that a high education and a working partner increases saving intentions. In line with the life-cycle theory (with no uncertainty and bequest motives), the probability that a household reports saving intentions decreases with age.

Thus, combining these results with the previous findings, we can conclude that asset wealth returns seem to have not only an impact on the amount that households save, but also on planned saving activities. Contrarily, saving participation is unaffected by financial asset wealth returns.

3.2 Durables Consumption

As we explained in some detail in Section 2, the DHS does not provide for questions about households' consumption expenditures. An exception are vehicles, which represent durable goods consumption in the DHS. We measure 'durables consumption' as the net adding to the stock of cars, caravans, motors and boats. The estimation strategy is primarily geared towards gauging the impact of capital gains and losses on durable goods consumption. Our model for consumption is similar to that for active savings:[11]

$$c_{i,t} = \theta_1 w^P_{i,t} + \theta_2 w^N_{i,t} + \theta_3 x_{i,t} + \alpha_i + \lambda_t + u_{i,t}, i = 1,...,N,\ t = 1,...,T, \tag{3.3}$$

where i indexes households, and t indexes time. $c_{i,t}$ is the amount of money that is spent on durable goods estimated according to equation (2.4). The rest of the controls were already introduced in previous estimations, but there are two notable differences. First, we exclude pension wealth. Second, we add the stock of durable goods in the previous period.[12]
Like above, we allow for (random) individual effects, denoted α_i. For example, some households may simply like to buy a new car every year, for reasons that we cannot observe using the survey

[11] More elaborate theoretical models of durable goods consumption can be found in Attanasio (1999) and Caballero (1994).

[12] This variable is motivated by theoretical (S,s) models, see Eberly (1994) and Attanasio (2000). According to these models, the amount spent on durable goods depends on the extent to which the past level of the stock of durable goods differs from an optimal level. In the present paper, we assume that this gap is associated with the level of the stock of durable goods.

data. However, likelihood-ratio tests strongly rejected the presence of such individual effects. Instead, we follow Mundlak (1978) and assume that the individual effects are correlated with some observables.

Table A.5 shows the results for the depreciation rate equal to 10 percent per year. The results for the remaining depreciation rates (0%, 20% and 30%) are qualitatively similar, and are available from the authors upon request. The table reports two models that combine different sets of regressors. The models have been estimated by median regression. The column headed A contains the results for the model in which we use the 'pure' wealth effects introduced in Section 2 and the change in house value, without differentiating between gains and losses. The column headed B contains the results for the model which distinguishes between gains and losses. We assume again that these wealth changes accrue to the households in the course of the year, and can in principle be spent immediately.

Regarding the household control variables, we see that many of them enter with the expected sign. The coefficients on these variables differ little across specifications. Durables consumption is increasing in income. A household that has a net income of 30,000 euro and that earns an additional 1,000 euro, will increase its spending on durables - on average - by about 4 euro. In other words, the marginal propensity to consume (MPC) on durables out of current net income is approximately 0.4 percent. This is a fairly small number, and is related to the fact that many households only occasionally spend a substantial amount of money to buy a new car. Next, the coefficients on age and age squared indicate that consumption expenditures on durable goods are hump-shaped. This can be understood as follows. Households generally begin their economic life with zero stock of durables and may find it difficult to quickly build up this stock, for example due to liquidity constraints. As a consequence, during the first part of their life cycle households tend to progressively accumulate durables, while when they grow older they may gradually reduce this stock, cf. Fernandez-Villaverde and Krueger (2002). Furthermore, for a given level of household net income, larger families spend less on durable goods. One explanation is that these households simply have to spend more on, for instance, food, clothing, housing and children. Finally, durables consumption is (strongly) decreasing in previous year's stock of durable goods. This is consistent with theories that stress the lumpiness of durable goods purchases, cf. Caballero (1994). When a household makes a big purchase, it generally does so by aiming to adjust its stock of durable goods towards an certain optimal level. This implies the household is likely to be near its optimal level next year as well, making further (large) purchases unwarranted.

Looking at the wealth variables, we find that durables consumption is related to both asset wealth and housing wealth. The impact of a change in asset wealth generally exceeds that of housing wealth. This is broadly consistent with anecdotal evidence for the Netherlands. During the housing boom in the late 90's, many households (partly) re-invested their housing wealth in the form of new kitchens, bath-rooms. It was less common to use housing wealth to buy a new

car.

When we differentiate between wealth gains and losses, it turns out that the losses are driving the above result. The impact of asset wealth gains and housing wealth gains on durables consumption is non-significant, while in both cases the impact of losses is significant and about twice as large. So, consistent with our results on active savings, households tend to cut down spending on durables facing a drop in wealth more strongly then they step up spending when they experience a wealth gain. We estimate the MPC out of asset wealth and housing wealth for this specific class of durable goods to be about 0.3 percent and 0.1 percent, respectively. Compared to existing estimates, these are fairly low numbers. For instance Altissimo et al. (2005) put the MPC of asset wealth for total consumption at 1.5 to 7.5 percent for european countries. We think that the size of our estimates reflects the limited set of durables that we dispose of, as households not very often buy a new car. Furthermore, expenditures on durable goods amount to only 20% of total consumption. This means that our results may not easily carry over to total consumption.

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Appendix A Tables

Table A.1 Households' financial asset ownership rate by year

	Checking and saving accounts %	Bonds %	Stocks %	Mutual funds %	House ownership %
1993	91.3	6.1	10.4	14.2	47.7
1994	93.4	4.8	6.2	13.9	45.7
1995	91.3	4.4	10.2	15.5	48.5
1996	92.3	4.9	13.0	17.9	50.3
1997	90.9	3.5	13.6	18.6	50.4
1998	89.5	3.7	15.5	21.5	51.8
1999	88.0	3.5	18.3	25.4	48.8
2000	92.3	3.2	14.4	24.6	52.4
2001	93.8	3.4	17.4	29.5	50.0
2002	94.3	3.5	17.1	28.7	50.8
2003	96.1	4.2	16.7	18.4	50.0
2004	95.4	4.4	15.6	21.5	50.7
2005	95.7	4.9	14.5	21.7	48.3

Explanatory note: All statistics use sample weights. Source: DHS, own computations.

Table A.2 Estimation Results for Active Savings

	A		B	
Financial asset (capital) gains and losses	− 211.044***	(9.687)		
Change in house value	− 2.861	(3.938)		
Change in pension wealth	− 0.001	(0.002)		
Capital gains			− 82.158***	(17.288)
Capital losses			− 217.216***	(11.294)
House value increase			− 1.480	(4.998)
House value decrease			− 6.940	(5.110)
Pension wealth increase			− 0.001	(0.002)
Pension wealth decrease			− 0.001	(0.002)
Total income ($*10^{-3}$)	− 11.670	(14.77)	− 15.029	(14.330)
Total income squared ($*10^{-6}$)	0.504***	(0.142)	0.521***	(0.139)
Partner works	284.110	(362.4)	345.869	(355.557)
Education	− 179.014	(330.1)	− 252.670	(322.720)
Family Size	− 480.49*	(293.3)	− 367.102	(287.096)
Age	− 9.143	(64.13)	9.417	(62.661)
Age squared	0.487	(0.362)	0.349	(0.355)
Constant	845.048	(1331.3)	936.013	(1305.94)
Time effects	yes		yes	
Endogenous variable	yes		yes	
N	4055		4055	

Explanatory note: $***$, $**$ and $*$ indicates significance at the 1%, 5% and 10% level, respectively. Standard errors within brackets. Source: DHS, own computations.

Table A.3 Estimation Results for Actual Savings Activity in the last 12 months

	A		B	
Lagged dependent variable	0.53***	(0.019)	0.537***	(0.019)
Capital gains and losses	− 0.0001	(0.0002)		
Change in house value	− 0.0003	(0.0005)		
Change in pension wealth ($*10^{-5}$)	− 0.0160	(0.0218)		
Capital gains			− 0.0002	(0.0015)
Capital losses			− 0.0001	(0.0003)
House value increase			− 0.0002	(0.0006)
House value decrease			− 0.0005	(0.0006)
Pension wealth increase ($*10^{-5}$)			− 0.0218	(0.0283)
Pension wealth decrease ($*10^{-5}$)			− 0.010	(0.0285)
Total income ($*10^{-3}$)	0.0027**	(0.0014)	0.0027**	(0.0014)
Total income squared ($*10^{-8}$)	− 0.0182	(0.009)	− 0.0181	(0.0092)
Partner works	− 0.081*	(0.048)	− 0.080*	(0.048)
Education	0.0148	(0.0434)	0.0156	(0.0435)
Family Size	− 0.0066	(0.0345)	− 0.0055	(0.0346)
Age	− 0.0095	(0.0071)	− 0.0095	(0.0071)
Age squared ($*10^{-3}$)	0.0052	(0.0447)	0.0043	(0.0450)
Time effects	yes		yes	
Endogenous variable	yes		yes	
N	3111		3111	

Explanatory note: $***$, $**$ and $*$ indicate significance at the 1%, 5% and 10% level, respectively. Standard errors within brackets. Source: DHS, own computations.

Table A.4 Estimation Results for Planned Savings Activity in the next 12 months

	C		D	
Lagged dependent variable	0.360***	(0.019)	0.360***	0.0198
Capital gains and losses	− 0.0001	(0.0003)		
Change in house value	− 0.0003	(0.0004)		
Change in pension wealth ($*10^{-5}$)	− 0.0310	(0.0196)		
Capital gains			− 0.0014	(0.0014)
Capital losses			0.0000	(0.0003)
House value increase			− 0.001**	(0.0005)
House value decrease			0.0006	(0.0005)
Pension wealth increase ($*10^{-5}$)			− 0.042*	(0.0227)
Pension wealth decrease ($*10^{-5}$)			− 0.016	(0.0263)
Total income ($*10^{-3}$)	0.0015	(0.0013)	0.0016	(0.0013)
Total income squared ($*10^{-8}$)	− 0.0004	(0.0098)	− 0.0018	(0.009)
Partner works	0.102***	(0.034)	0.099***	(0.0340)
Education	0.079**	(0.0401)	0.077**	(0.0403)
Family Size	0.0200	(0.0322)	0.0184	(0.0317)
Age	− 0.013**	(0.0065)	− 0.02*	(0.0065)
Age squared ($*10^{-3}$)	− 0.0648	(0.0407)	− 0.0642	(0.0409)
Time effects	yes		yes	
Endogenous variable	yes		yes	
N	3659		3659	

Explanatory note: $***$, $**$ and $*$ indicate significance at the 1%, 5% and 10% level, respectively. Standard errors within brackets. Source: DHS, own computations.

Table A.5 Estimation Results for Durables

	A		B	
Financial asset (capital) gains and losses	0.0024***	(0.0009)		
Capital gains			0.0011	(0.0019)
Capital losses			0.0026**	(0.0011)
Change in house value	0.0011***	(0.0003)		
House value increase			0.0007	(0.0005)
House value decrease			0.0013**	(0.0005)
Stock durables prev year	− 0.7681***	(0.0017)	− 0.7672***	(0.0018)
Total income	0.0078***	(0.0015)	0.0079***	(0.0016)
Total income squared ($*10^{-3}$)	− 0.0001***	(0.00001)	− 0.0001***	(0.00001)
Education	− 0.0438	(0.0424)	− 0.0404	(0.0457)
Family size	− 0.1832***	(0.0345)	− 0.1894***	(0.0371)
Age	0.0201**	(0.0081)	0.0216**	(0.0086)
Age squared ($*10^{-2}$)	− 0.0045	(0.0046)	− 0.0047	(0.0049)
Partner works	0.0321	(0.0408)	0.0365	(0.0438)
Female head household	− 0.0152	(0.0225)	− 0.0172	(0.0241)
Pseudo R^2	0.0945		0.0945	
Time effects	yes		yes	
Endogenous variables	yes		yes	
Ftest asym wealth effect assets			0.50	
Prob $>$ F			0.4811	
N	2969		2969	

Explanatory note: $***$, $**$ indicates significance at the 1% and 5% level, respectively. Depreciation rate equals 10% per year. Source: DHS, own computations.