Do wealthier households save more? The impact of the demographic factor

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Abstract. This paper investigates the relationship between wealth, ageing and saving behaviour of private households by using pooled cross sections of German consumption survey data. At odds with the permanent income hypothesis, we find that households increase savings in the second half of retirement. Besides the direct impact of the age structure, an indirect effect arises through the stock of wealth. We distinguish three components of wealth, for which the impact on the savings rate is not homogeneous, and find that housing assets dominate, on average. In addition, the savings rate strongly responds to demographic trends. Given the ongoing demographic trend, an increase of 1.4 percentage points in the aggregated savings rate should be expected over the next two decades.

Keywords: Savings, wealth, demographic change

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1 Introduction

For many years, the German economic performance has been characterized by strong export growth due to strong competitiveness in foreign markets, coupled with weak expansion of domestic demand, in particular private consumption. This process has been accompanied by an excess of savings over investment, led to massive capital outflows and fostered the persistence of macroeconomic imbalances which are at the heart of the debt crisis in the euro area (Belke and Dreger, 2011). Therefore, the patterns of consumption and savings, i.e. income not spent for consumption, are of high relevance from a policy perspective. This paper examines the impact of wealth on the savings rate, while accounting for the change in the age profile of the population.

According to the life-cycle permanent income hypothesis, private consumption is driven by permanent income, the latter being defined as the present value of expected lifetime resources. It might include physical wealth, such as housing, and financial assets, as well as human wealth, i.e. current labour income plus the discounted value of the expected future labour income stream. A permanent increase in wealth will boost consumption due to its impact on expected lifetime income. If resources become more valuable, households are able to shift consumption plans upwards without violating budget constraints. Thus, an increase in consumption can be predicted in each period over the remaining lifetime when households smooth consumption. The marginal propensity to consume should be equal to one in the long run, if consumers are rational and forward-looking.

An increase in wealth is expected to stimulate savings over the short and medium, but not in the long run. Higher savings are also expected if the shocks are temporary in na-

ture. However, Carroll (2009) has argued that the optimal marginal propensity to consume may be less than one even in the presence of permanent shocks, as buffer stock savers aim to realize a target asset-to-permanent-income ratio. For a given stock of assets, a positive shock to permanent income will move this ratio below its target, thereby raising the savings rate.

Many empirical studies have analysed the effects of wealth on private consumption or savings at a macro- or mesoeconomic level using panels of countries or regions (see, for instance, Case, Quigley and Shiller (2005) and Carroll, Otrok and Slacalek (2008). As a rule, the estimated parameters are not in contrast with the implications of the permanent income hypothesis: consumption, income and wealth are cointegrated, and the coefficients of the long run relationship look reasonable, more or less. Dreger and Reimers (2012) provide a review of the recent evidence. But there are serious limitations. For example, multicollinearity problems are involved if different components of wealth are considered.

The life-cycle framework also predicts that a household's age affects its savings behaviour, as the latter has an impact on wealth. In overlapping generation models, individuals work when they are young and retire when old (Abel, 2003). Hence, savings should decrease in age, although the increase in life expectancy may raise savings even for the elderly. A bequest motive could also lead to a more complicated behaviour, although it might not be distinguished from precautionary savings especially in times of uncertainty (Gourinchas and Parker, 2002, Dynan, Skinner and Zeldes, 2002). To finance their retirement, individuals raise the demand for financial assets during their working life. Large cohorts of workers may drive asset prices upwards. Therefore, they are expected to realize low returns on their investments compared to an average population structure.

Small cohorts in the working age will receive a higher return. This pattern assumes that savings rates do not adjust to the rates of return. However, the savings rate of a large work cohort can decrease in response to lower rates of return, with corresponding effects on asset demand. Investors may also shift their portfolios to short-maturity assets, if the fall in asset prices is anticipated.

The demographic impact on savings behaviour transmitted through the wealth channel has been confirmed in several studies. An increase in the fraction of retired people in the population will reduce excess returns in financial markets, especially in countries with well-developed social security systems and lesser-developed financial markets (Ang and Maddaloni, 2005). In a panel of OECD countries Davis and Li (2003) reported a significant impact of the fraction of people in the asset culminating age (40-64) on real stock prices and real bond yields. Geanakoplos, Magill and Quinzii (2004) found evidence for a demographic impact on equity prices in France, Japan and the UK, but not for Germany. For the US, a positive correlation between the share of population in the working years and the level of stock prices is detected (Poterba, 2004).

However, the age structure might be relevant per se, not only because of its impact on wealth. According to the evidence provided by Boersch-Supan, Ludwig and Winter (2006) and Krueger and Ludwig (2007), substantial capital flows from fast aging regions to the rest of the world should be expected. Trends will be reversed if households start to decumulate savings. Bloom, Canning, Mansfield and Moore (2007) have emphasized that a higher life expectancy will raise the need of life-cycle savings, because social security programs prevent retirement ages to increase in line with life expectancy. De Nardi, French and Jones (2010) have stressed expensive medical care as a key driver of saving for many higher-income elderly. Following Demery and Duck (2006), chang-

es in the age structure have a sustained, but moderate effect on aggregate personal savings in the UK. The middle aged, and particularly the later middle aged, tend to save a higher share of their income than the young and the elderly. Therefore, shifts between the middle-aged and the young or elderly should affect the aggregate savings rate.

The contribution of the paper is twofold. First, the link between savings and wealth is explored using a huge microeconomic dataset for German households. Different wealth components can be distinguished under this environment. This can overcome the limitations typically embedded in macro- and mesoeconomic studies. In fact, previous results are often insignificant at the individual country level and pestered by multicollinearity between various elements of wealth. A panel based on macroeconomic data does not provide a solution, as country specific evidence cannot be provided. Aggregation across assets and countries can blur the forces actually at work and can give rise to misleading policy conclusions.

The second contribution of the paper is to explore the effect of the age structure on the savings rate, both directly and indirectly through the wealth channel. Given the recent demographic projections, predictable changes for the savings rate are derived: An increase of 1.4 percentage points is expected over the next two decades. This would dampen private consumption expenditures, implying that domestic demand will play an even lesser role for the German economy. The rise in the savings rate will likely affect future current account positions (Higgins, 1998, Ferioli, 2005). As the demographic trend is particularly strong in Germany, its surplus will likely increase, i.e. the euro area imbalances will widen without proper political action.

The remainder of the paper is structured as follows. Section 2 reviews the main demographic trends in the German economy in the years to come. Section 3 discusses the

Income and Consumer survey of German households, which is the dataset used in the study. Empirical results are presented in section 4. Finally, conclusions and policy recommendations are stated in section 5.

2 Demographic trends in the German economy

The German population is expected to age rapidly over the next few decades. According to the projections of the German Statistical Office (2010), the number of people in the working age, i.e. aged between 20 and 65 years decreases by 7.5 million (15 percent) until 2030. In contrast, the proportion of people in the retirement age (65 or older) will increase by 5.5 million or one third of the current level.

These changes are driven by a combination of low fertility and higher old-age longevity. Since many years, the fertility rate is constant at 1.4, far below the reproduction level. At the same time, life expectancy rises by more than 1 year per decade. The old age dependency ratio, i.e. the number of retirees divided by the number of people in the working age will rise from 0.34 in 2010 to 0.53 in 2030, if people retire at the age of 65. To mitigate the financial burden, recent reforms will raise the retirement age. According to the pension reform decided in 2007, the normal retirement age will increase gradually between 2012 and 2029 from 65 to 67 years. Under these conditions, the old age dependency ratio is expected to increase from 0.29 to 0.47. However, Fehr, Kallweit and Kindermann (2010) have stressed that the efficiency gains from the reform are rather modest. Old-age poverty is hardly reduced as rich people are more flexible in adjusting retirement.

The decline of the labour force will reduce long term growth prospects and likely widen regional disparities within the country. Income convergence in Eastern German States may turn out to be more difficult, as the migration of workers towards the West puts additional pressure on the age structure. In general, demographic forecasts tend to be more reliable than other long term forecasts, as the number of individuals in a given age depends on the current number of younger people and mortality rates over the prediction horizon. Nonetheless, uncertainty can arise from birth and mortality rates and immigration.

3 Income and Consumer Survey

The data in this study has been taken from the Income and Consumer Survey for German households (EVS). The survey is conducted by the German Statistical Office (http://www.stabu.de). Households are recruited voluntarily for reports every five years, according to stratified quota samples from Germany's current population census. The data is collected in repeated cross sections. There is no panel element, i.e. households cannot be linked over time.

In the EVS, German households report detailed information on income, consumption, savings, and asset holdings at the household level, among others. It can be observed, for example, which fraction of composite savings is saved in stocks, which in bonds, or in owner-occupied housing. Moreover, income and consumption are available very detailed by their single components. This structure is exploited in the analysis when the relationship between the stock of wealth, measured by different assets, and the household savings rate is investigated.

Importantly, there is a difference in timing for reporting the stock of wealth and savings. While the stock of wealth is reported at the beginning of the reporting year by each household, savings are reported thereafter, over a window of three months during the reporting year. Thereby, we do not have an endogeneity problem in the sense that savings would be endogenous to wealth. In other words, the stock of wealth we observe at the end of period 1 excludes the amount of savings we measure during period 2.

The entire population covered by the EVS survey is restricted, as some groups are not covered: institutionalized people (i. e. military people in barracks, students in dormitories, elderly and disabled people in nursery homes or hospitals, nurses or migrant workers in residences, people in jails), homeless people, and households with monthly net household income greater than 35T Deutschmark for 1998 (18T euros for 2003 and 2008). Due to the voluntary participation, the survey is not a random sample from the population. Households of self-employed, farmers, workers, foreigners, single-person households, and households at the bottom and the top of the income distribution are generally underrepresented. Although there are quota restrictions to be fulfilled and population weights are applied, a slight selection bias towards the middle income groups will nevertheless remain.

Despite these limitations, the Income and Consumer survey constitutes the most appropriate information for this study. It is the only micro data set that comprises information on income, consumption expenditures, savings, and asset holdings in a relatively detailed structure.[2] This allows for an analysis of the age profiles of household savings, while controlling for the stocks of asset holdings, and for an investigation of the effects

[2] Alternatively, we could have used data from the German Socio-Economic Panel (SOEP), in which households can be linked over a longer period. The SOEP data are, however, not appropriate for our analysis because (1) wealth is not reported for a longer period and (2) dissaving in old age is not observed.

of the portfolio structure on household savings for a fixed age group. The total number of households in the survey is 49,720 in 1998, 42,420 in 2003, and 44,088 in 2008, the last year available. The analysis is based on pooled cross sections. However, the cross sections do not constitute a panel.

Some observations have been dropped from the analysis to remove outliers. In particular, households are excluded if they have non-positive disposable income, if they dissave more than their current income or if durable consumption exceeds disposable income by more than 200 percent. Furthermore, the analysis of the savings behaviour is restricted to households with a head aged between 20 and 80 years. By imposing these restrictions, 2.8 percent of the entire sample is lost.

-Figure 1 about here-

Figure 1 reveals the age profile for the savings rate. It depicts age-specific mean cross-sectional savings rates at the household level. It is potentially a composition of age, time, and cohort effects. The profile largely mirrors the typical age profile from the life-cycle permanent income hypothesis: Assets are built up in younger years when the savings rate increases, up to the mid-thirties. Thereafter, assets are built down until agents reach their retirement age; the savings rate decreases until a minimum of around -5.0 percent, right after people enter retirement.

During the retirement period, consumption is reduced as people become increasingly immobile, or bequest motives become increasingly relevant. This might explain the increase of the savings rate starting around the age of 75. When people approach the end

of their lives, around 80 years, the savings rate is at around 2 percent, which is the same level people have in their early twenties and around the age of 60.

One of the determinants of the savings decision will be the stock of wealth, in terms of net asset holdings. Assets are considered net of outstanding debts. For example, housing values are reduced by outstanding mortgages and deposits by outstanding consumer credits. Assets are further categorized into three groups. The first group contains housing assets, owner-occupied as well as rented out. The second group includes equities, such as stocks, bonds, and mutual funds. The third group comprises other financial assets, such as savings deposits at banks and building societies, as well as private old-age pension and wholesale life insurances.

4 Econometric analysis

In modeling the intertemporal consumption decision, it is assumed that the household's budget is allocated between two periods, where the second period can be seen as an approximation for all future periods. Another interpretation of this set up is that a given budget is allocated discretely to immediate and future consumption in each period. By using a similar approach, Beznoska and Ochmann (2012) have investigated the effects of changes in the interest rate and consumer prices on households' consumption-savings decision.

Current disposable income is allocated between consumption and savings, where the former is durable and non-durable consumption. For a consistent treatment of durable consumption, a correction is applied. In particular, user costs or service flows are constructed to explore effective consumption, as opposed to actual expenditures (Garner

and Short, 2009). Expenditures for durable consumption are reallocated among households: those reporting a purchase have lower effective consumption than actual expenditures, those not purchasing get a positive value imputed for effective consumption. For example, if a household buys a car, only a fraction of the expenditure is considered as consumption in the current period. As a measure for depreciation, leasing rates have been estimated. Households that do not buy, but own a car, receive higher consumption due to the existence of user costs.

For our purposes, savings are defined as the difference between income and effective consumption. Only voluntary savings are considered, such as accumulations of financial assets, expenditures for a house purchase, premiums to private insurances, and repayments of loans. Mandatory or contractual savings, such as contributions to the statutory pension insurance system and employer-based savings plans, are subtracted from gross income and are not part of the disposable budget of private households. Furthermore, a net savings concept is applied, where expenditures for asset purchases are netted out against income from asset sales. Hence, the net savings ratio defined by savings at the household level over current income falls in the open interval [-∞, 100] (measured in percent). The savings equation is based on three pooled cross-sections from the Income and Consumer survey as follows:

$$(1) \qquad s_i = \alpha_0 + x_i^{'}\beta + \gamma_1 \ln(y_i) + \sum_{k=1}^{3} \gamma_{2k} A_{ik} + g(age_i) + \varepsilon_i$$

where *i* refers to the respective household and *k* to the class of assets. Specific characteristics of the household are embedded in the vector *x*, for example, household composition, education, gender, and social status of the head of the household. *x* furthermore contains year and quarter dummies. Current disposable income is denoted by *y*, and *A* is

the level of net assets, where three classes are distinguished: housing, equities, and deposits. Income is measured in logs, while assets are original values (in million euros). To account for the fact that many households do not have a stock of wealth the log-transformation has not been applied for the latter.[3] The age of the household head is included in the function $g(age)$. According to the statistical significance, $g(.)$ is a cubic polynomial for the pooled estimation over all age groups, and a quadratic function for the separate estimations by age groups. The error term ε is assumed to be independent and identically distributed.

The savings function is estimated via OLS on the pooled cross sections of household-level micro data. As the savings rate is not censored in the application, a Tobit estimation is not appropriate.[4] Five regressions are considered: first, the savings function in a pooled model, where a joint regression is estimated for all age groups. In a second variant, the savings function is estimated separately for four age groups, namely age 20-34, age 35-49, age 50-64, and age 65-80. This approach allows for differing patterns of savings across the life-cycle, and for varying effects of income and all demographic factors, depending on whether agents are at the beginning of the life-cycle or in later years. One could think, for example, of the event of becoming unemployed to have a different effect on the savings behavior in case it occurs at the beginning of the working life rather than in case of an old worker. Regressions separated by age have the advantage of allowing the wealth effects on savings to depend on the life-cycle track. Results from the

[3] Alternatively, the function for assets could be specified as ln(A+1). This would not change the results much. Only the estimated effects of the three asset classes on the savings rate would become slightly more pronounced.

[4] There are a significant number of dissavers in our sample (34 percent of the households have a negative savings rate, i.e. they consume more than their current income). They have been included in the regressions. Theoretically, the savings rate is bounded at +100%. This could result in inconsistent predictions at the linear OLS estimations if for some households the savings rate is predicted above +100%. This is however not the case in our sample.

first estimation on the pooled age groups will be utilized to infer life-cycle patterns of savings that are exclusively attributed to the effect of ageing. Results from the four regressions that are performed separately will be used to point out the relevance of wealth effects, in particular portfolio shifts, among the determinants of life-cycle saving patterns.

With data for three points in time over a period of 15 years at hand, our means for estimating potential birth cohort effects in household savings are limited. Moreover, cohort effects cannot be identified together with age and time effects, unless limiting assumptions on one of the effects are made (Deaton, Paxson, 1994). In our approach we assume that cohort effects are absent. This allows us to identify age profiles, while controlling for time effects. Börsch-Supan (1995) has estimated cohort effects and age profiles on older cross sections of the same data set, assuming absence of time effects. He finds that for cohorts born between 1918 and 1930, which are the oldest cohorts we observe, cohort effects on the savings rate are relatively small. For cohorts born between 1930 and 1964 cohort effects are found to be almost zero. We conclude that, while it certainly limits the precision of our projection, the assumption of absent cohort effects is probably not too severe, for large parts of the cohorts we observe.

Table 1 comprises the results for all five models. Given the large sample of more than 130,000 observations in the pooled model, it is not surprising that all coefficient estimates turn out to be highly statistically significant. As the focus is on the wealth and ageing, the household-specific variables are omitted. The full array of results can be obtained from the authors upon request.

-Table 1 about here-

The income coefficient implies that a 1% increase in income raises the average savings rate at the household level by almost 0.3 percentage points. This strong positive relationship between income and the savings rate is a standard result in the empirical literature. In addition, the pooled model indicates negative impacts for housing assets and equities, and positive effects for deposits. The coefficient estimates imply that an increase of 1 million euro in net housing assets lowers the household savings rate by 3.8 percentage points (3.6 percentage points for equities). The rationale is that an increase in asset holdings, ceteris paribus, lowers the need for further assets to be accumulated and thus the household savings rate. In contrast, an increase of 1 million euros in deposits increases the savings rate by 2.5 percentage points. Higher stocks of deposits do not necessarily reduce the savings rate, probably due to the existence of fixed savings contracts, such as savings agreements.

When the savings function is estimated separately for age groups, wealth effects can be further differentiated over the life cycle. Most of the estimated coefficients remain significant. It becomes apparent that there is a lot of heterogeneity in the effects of the assets on the savings rate, depending on whether households are at the beginning of the life cycle or at the end.

The effect of housing assets is negative for each of the four age groups. It does not matter much whether they are young or old; all agents reduce their savings rate when the stock of net housing assets appreciates. The effect of equities differs largely across age groups. It is strongly positive at the early stages of the working life (20-34, 11.6 per-

centage points) and in the group aged between 35 and 49 (6.3). It is not different from 0 in the 50-64 groups. It then turns negative (-4.9) as soon as agents enter retirement. The effect of deposits also varies across the life cycle. It is highly positive at young ages, both between 20 and 34 (39.2) and between 35 and 49 (12.6). It then turns significantly negative when approaching retirement (-7.4), only to become positive again during retirement (5.1).

The coefficient estimates indicate that there is huge heterogeneity in the age effects across the life cycle. While the estimated coefficients are similar and significant for the younger age groups of 20-34 and 35-49, age effects seem to be less prominent within the older age groups of 50-64 and 65-80, where the coefficients are not significantly different from zero.

These age effects can be best interpreted when the implied marginal effects of the age variable is plotted over the age distribution. This will be shown for the pooled model. Figure 2 reveals the marginal effects of the age of the household head on the household savings rate. These impacts result from the coefficient estimates of the (cubic) polynomial age function and can be interpreted as the impact of an additional year of age, ceteris paribus, i.e. given the current age as well as all other variables, such as current income and wealth holdings.

-Figure 2 about here-

The marginal effects of age on the savings rate are *U*-shaped over the life-cycle, a pattern which is inherently determined by the specification of a cubic polynomial for the

age variable. The effect of an additional year of age on the savings rate is lowest around the age of 40 to 42 (-0.3). This is when agents start to significantly decrease savings. The effect of living one additional year is largest at the highest age (+0.7). This is when agents start again building up some assets that they ran down when entering retirement and that shall now be built up again for the purpose of bequest, or that can simply not be consumed because people become increasingly immobile.

The age coefficients from the savings function imply an average marginal age effect (weighted by population weights) for the age group below 65 of -0.23 and for the age group above 65 of +0.35. If these marginal age effects are assumed to be constant over the next two decades, the demographic shift in the population structure would imply an increase in the aggregate savings rate of 1.4 percentage points until 2030, assuming absence of cohort effects. This addresses an isolate demographic effect. Interactions with wages and interest rates have not been considered. The estimated effects would probably be stronger if rising real wages induce households to increase savings rates. Evidence on the interest rate elasticity of savings is mixed. Recent evidence from similar micro data for Germany suggests that the savings response to interest rate changes is probably very small (Beznoska, Ochmann, 2012).

Thus, a rise in the savings rate can be expected, but it does not appear to be very pronounced. Nonetheless, it will dampen the evolution of private consumption expenditures. Furthermore, the demographic trend is especially strong in Germany. Thus, the surplus in this country's current account will likely widen further, i.e. the problem of the euro area imbalances will become even more severe.

5 Conclusion

This paper investigates the relationship between wealth, ageing and saving behaviour of private households by using three pooled cross sections of German consumption survey data. Different components of wealth are distinguished, as their impact on the savings rate is not homogeneous. On average, the effect attributed to real estate dominates the other components of wealth. In addition, the savings rate strongly responds to demographic trends. Besides the direct impact of the age structure, an indirect effect arises through the accumulation of wealth. The savings rate does not decrease with age in a monotonic way, as the permanent income hypothesis suggests. Most prominently, older households tend to increase their savings over their retirement period. Given the ongoing demographic trend, an increase of 1.4 percentage points in the aggregated savings rate should be expected over the next two decades.

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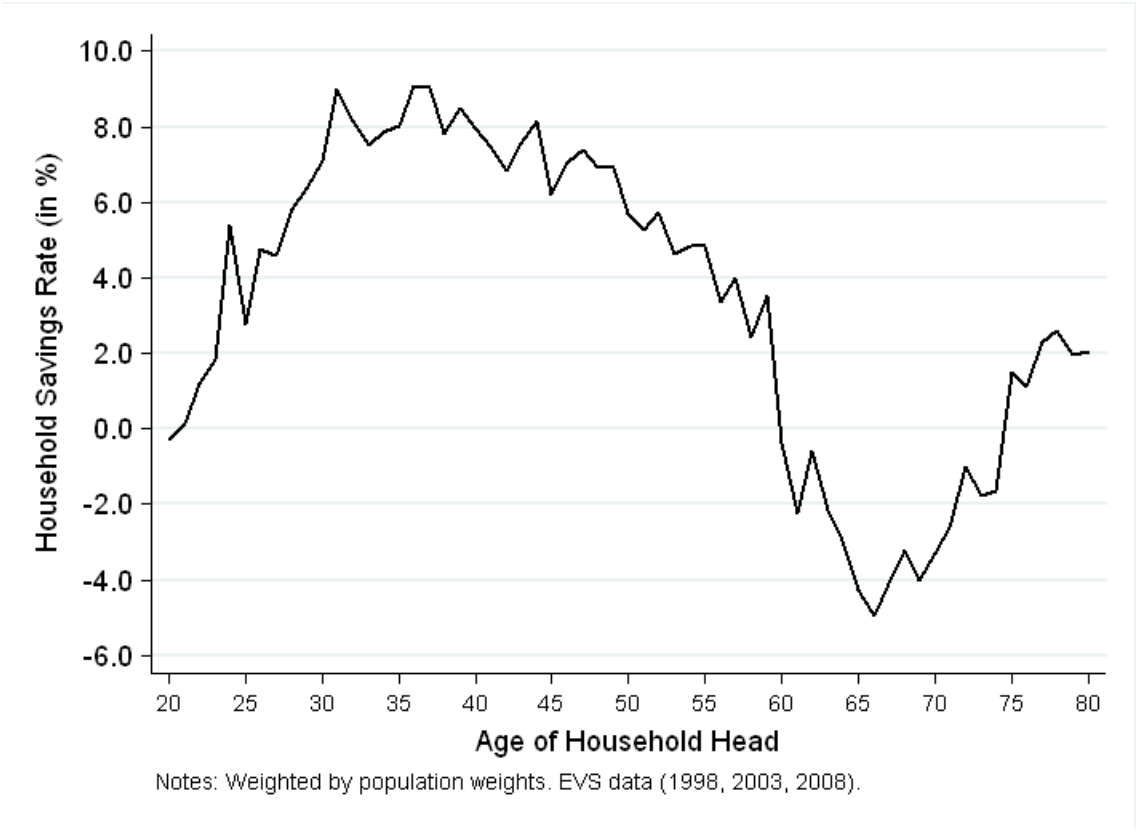
Figure 1: Age profiles of the household savings rate



Notes: Weighted by population weights. EVS data (1998, 2003, 2008).

Figure 2: Marginal age effects on the household savings rate

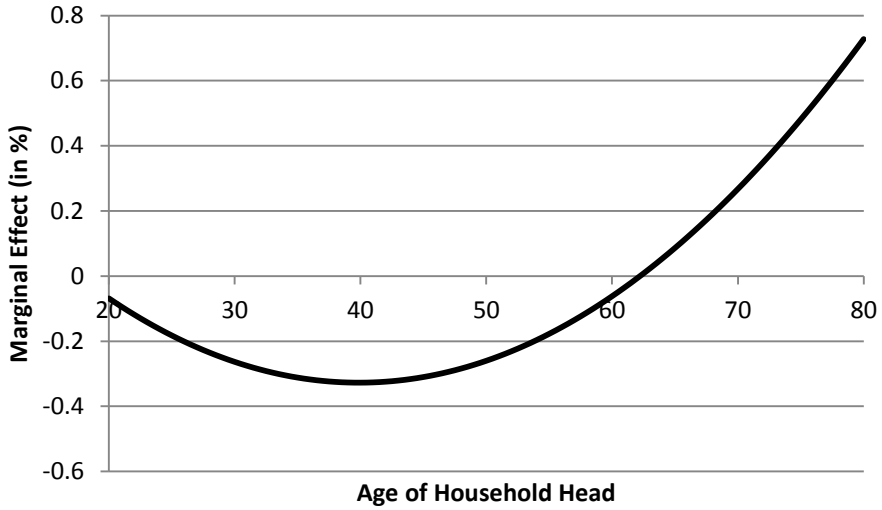


Table 1: OLS estimates for the savings function: Age and wealth effects

	pooled age groups		20-34		35-49		50-64		65-80	
dep. var: s_i in %	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)
Income:										
log of disp. income	28.7	(0.16)***	33.3	(0.41)***	29	(0.25)***	28.8	(0.31)***	26.5	(0.41)***
Assets (in mn):										
Housing	-3.75	(0.31)***	-5.8	(1.41)***	-2.36	(0.50)***	-3.23	(0.53)***	-2.73	(0.70)***
Equities	-3.6	(1.18)***	11.6	(6.80)*	6.34	(2.44)***	1.89	(2.21)	-4.88	(1.96)**
Deposits	2.51	(1.21)**	39.2	(5.61)***	12.6	(2.15)***	-7.44	(1.91)***	5.09	(2.70)*
Age of HH Head:										
age	0.71	(0.15)***	-1.53	(0.59)***	-1.53	(0.44)***	0.33	(0.81)	1.33	(1.24)
age^2	-0.026	(0.0030)***	0.016	(0.01)	0.014	(0.0053)***	-0.0047	(0.0072)	-0.0063	(0.0086)
age^3	0.00022	(0.000019)**								
Observations	132,393		20,256		50,585		36,888		24,664	
R^2	0.268		0.340		0.281		0.260		0.190	

Notes: Standard errors, robust to heteroskedasticity, in parentheses. Omitted variables: demographic controls (gender, marital status, nationalty, location, education, family composition, social status), time effects (year dummies, quarter dummies) , a dummy for cars in the household, and a constant. Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

Source: Own calculations using the EVS data (1998, 2003, 2008).