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Trends in German households' portfolio behavior – assessing the importance of age- and cohort effects*

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Abstract

We start out from a comparison of aggregate trends in German households' portfolio shares and participation rates as they derive from micro data and from the National Accounts. We find the broad trends supported by both data sources. By international comparison the portfolio share of safe investments with banks in Germany has always been high. It is continuously and strongly declining though. Life insurance has gained substantial importance since the 1960s. In the 1990s it lost some of its previous dominance with the rise of stocks and mutual funds. We find that the popularity of mutual funds continued through the stock market downturn. The baisse caused rather few investors to finally quit on direct investments in the stock market.

Looking at the underlying developments at the age- and cohort-level, we aim to compare empirical life-cycle trajectories with the implications of theoretical models and assess the importance of age- and cohort-effects in the observed aggregate trends. We find the rising importance of securities as well as the declining share of saving accounts to be prominent at almost all ages. We observe a declining importance of life insurance for the oldest cohorts and – somewhat surprisingly – for the youngest cohorts.

Last, we use a decomposition of the observed trends into age- and cohort-effects and highlight the crucial assumptions that there is a unique age-profile and cohort differences all take the form of shifts to this age-profile. We argue that both assumptions might well be at odds with theoretical considerations and therefore harm the desired interpretation.

Keywords: portfolio choice, age effects, cohort effects

I. Introduction

Macroeconomic data from the Financial Accounts, assembled by the Deutsche Bundesbank, implies quite substantial shifts in private households' portfolio composition. While net per capita financial wealth in Western Germany grew in real terms by roughly 475 percent between 1962 and 1992, some wealth categories have clearly outpaced these already impressive growth rates. Overall, the portfolio shares of the different asset categories have developed quite differently over time. Wealth in fixed interest securities and wealth in life insurance contracts has seen the strongest and steadiest growth. Stock market wealth shows a more cyclical growth. At the same time, deposits with banks – once the most important investment in Germany – show much smaller growth rates and have lost much of their previous dominance.

The purpose of this paper is twofold. We analyze household portfolios in Germany as they evolve over the life-cycle: first, to compare the age-profiles with the implications of theoretical models. And second, to assess the possible importance of demographic changes to the observed trends in the aggregate portfolio of the household sector.

Consider first theoretical life-cycle asset allocation models: The early literature on life-cycle portfolio choice concluded that the optimal portfolio should be the same all through an individual's life-cycle (Merton, 1969; Samuelson, 1969). The underlying assumptions are quite restrictive though: agents have utility functions that a take quite specific form (CRRA) and asset returns are independent and identically distributed over time. Further, individuals must not have labor income or nontradeable assets. Once models include labor income, they usually imply shifts in the allocation of financial wealth. Assume that individuals only receive a riskless income stream and there are neither borrowing constrains nor short sale limitations present: Perceiving the present discounted value of future income streams as an implicit safe investment, agents will adjust their free financial wealth accordingly – i.e. in this model, the optimal asset allocation of total wealth (human capital plus other wealth) is again constant over the life-cycle. At young age this implicit safe investment is large, and accordingly the optimal portfolio share of financial wealth invested in risky assets is high. Throughout the life-cycle the share of financial wealth in risky assets will decline as the present discounted value of future income streams declines. Further models allow for risky income or other risky assets – e.g. private businesses or housing wealth – which the household cannot or can only imperfectly trade. If this background risk shows zero or positive correlation with the returns of risky assets households will reduce their portfolio share of risky assets when background risk is high. If background risks vary over the life-cycle – e.g. trough the declining present discounted value of risky labor income – we will

again see a declining portfolio share of risky assets over the life-cycle. Another class of models relaxes the assumption of i.i.d. returns. Samuelson (1991) showed that just relaxing this assumption may induce horizon effects. Campbell and Viceira (1999, 2002) present models with mean reversion or negative serial correlation of returns. In this case, households will optimally decrease their exposure to risky assets as they age. Next, consider borrowing constraints in a model with income uncertainty (Guiso, Jappelli and Terlizzese, 1996). These assumptions give reason for a precautionary saving motive. Such models therefore imply higher shares of safe assets at young age, when the wealth to income ratio is still small. Wealth as a buffer-stock against income fluctuations is small and will therefore be invested rather safely. More extensions like capital gains taxation (Dammon, Spatt, and Zhang, 2001), risk aversion that changes with age (Halek and Eisenhauer, 2001) or more complex utility functions have been suggested. For an overview of widely used extensions to the original model proposed by Merton (1969) see Campbell and Viceira (2002). Apart from these theoretical considerations also financial intermediaries recommend an asset allocation, which changes over the life-cycle. They often propose a simple rule of thumb: to allocate a percentage of 100 minus the investor's age in risky assets.

Early empirical evidence on life-cycle portfolio choice was based on cross-sectional data from the United States. Most of these studies document a share of equity owners, which rises over age. The share of equities in financial portfolios tends to increase over working life and decrease thereafter (Yoo, 1994). Guiso, Haliassos and Jappelli (2002) compare participation rates and conditional portfolio shares in cross-section from different countries: They find participation rates in risky assets to be hump shaped over age. For conditional portfolio shares they find distinct differences across age-groups, but the pattern varies strongly across countries. Haliassos et al. (2001) use a cross-section of the Cyprus Survey of Consumer Finance and report ownership rates for 8 categories of financial wealth – they all vary strongly over age. The first study to use synthetic cohorts to account for possible confounding cohort effects is Poterba and Samwick (2001). Using the Survey of Consumer Finances (SCF) they assume that there are no time-effects. They conclude that the age-profiles for equity ownership and portfolio shares are increasing over age and flat from age 50 on. Also for other financial assets they find households' asset allocation to vary over the life-cycle and across cohorts. Some further studies using the SCF rule out cohort effects and allow for time-effects. Their results also imply significant age-effects but differ somewhat from the results in Porterba and Samwick (2001). Ameriks and Zeldes (2004) focus entirely on equity ownership and the portfolio share of financial wealth invested in equity. Also using the SCF the find and increasing age-profile of portfolio shares and participation rates using

a specification that allows for cohort effects and rules out time effects. Both age-profiles look hump-shaped if they allow for time effects and rule set cohort effects equal to zero.

Given the empirical support for an asset allocation that optimally varies over age, the possible link between demographic change and aggregate portfolios seems obvious: In an aging society the proportions of old and young individuals change. As individuals change their asset allocation over the life-cycle population aging may be a driving force behind trends in aggregate portfolios. Several studies have examined the potential link between demographic variables and aggregate portfolio shares or the risk premium: Poterba (2001) examines the effects of demographics on wealth holdings in the United States, Canada and the UK. Ang and Maddaloni (2003) analyze the effect of various demographic variables on the risk premium in a set of 15 countries. The general evidence is at most ambiguous. A possible reason for the lack of evidence may certainly be the noise caused by relatively strong short-run fluctuations compared to the long-run effects of demographic change. Also, historically demographic changes have been minor compared to what we face with the aging of the baby boom generation. Last but not least there are reasons, which might cause households to deviate from optimal life-cycle asset allocation implied by the models mentioned above. Abel (2002) relates to the idea proposed by Poterba (2001) and suggests a model including bequest motives to argue why demographic factors might not cause much fluctuation in aggregate saving rates at all. In his model, the elderly never expect to fully consume their wealth in retirement while the young anticipate the bequests. Extending the argument to portfolio choice we would similarly expect a flatter life-cycle asset allocation. The elderly will reallocate less of their wealth to safe investments if they do not need their wealth for consumption. The young, expecting an inheritance of risky assets will adjust their portfolios accordingly.

For both objectives – comparing empirical life-cycle asset allocation in Germany with the implications of theoretical models and looking into the details of past trends at the aggregate level, we first aim to elicit the age-trajectory of household's asset allocation. That means dealing with possible confounding cohort- and time-effects. In cross-section we cannot distinguish whether differences in asset allocation across age-groups really derive from their different age. Differences in initial endowments, in risk aversion, or in the social security scheme, to name just a few possible reasons, may cause what we think of as cohort-effects. Yet, comparing two population subgroups of the same age at different points in time we cannot be sure that their differences stem from cohort-effects. What we think of as time-effects may give reason to different portfolio allocations of the two groups of individuals. They may be caused by institutional influences, such as changes in information- and transaction-costs over time. Also

changes in subsidization or taxation of savings in specific products, as well as the introduction of new products may give reason to differences in portfolio allocation[1]. Last but not least, time-effects effects on portfolio shares may be induced by real economic fluctuations or just market sentiment if households do not readjust their portfolios continuously.

For the long-run aggregate trends, the cohort-effects mentioned above may play a quite important role. Hence, we can think of two demographic factors determining the change of the aggregate portfolio of the household sector: First, what we call population aging, i.e. the change in the population age structure. Thinking of the aggregate portfolio as the weighted average of the different portfolio allocations over the life-cycle, the aggregate will change as the population weights change over time. In terms of theoretical models of life-cycle asset allocation population aging implies, that the share of tentatively more risk averse elderly households in the population rises thereby shifting the optimal portfolio for the aggregate. The second factor relates to the cohort-effects. Let's assume that generations differ in their willingness to invest in risky assets and that this difference in investment behavior will prevail throughout a cohort's life cycle. This will cause aggregate trends when the old cohorts shrink while young cohorts with different investment attitudes grow up. Disentangling age- and cohort-effects is therefore crucial to understand demographic influences on past changes in aggregate portfolio allocations.

Lacking long-run panel data on household portfolios in Germany, we rely on synthetic cohorts based on the German income and expenditure survey (EVS). I.e., we link age-groups in independent cross-sections by their year of birth. Section 2 of this paper gives a thorough description of the two data sources we use – the National Accounts and the German Income and Expenditure Survey. Section 3 describes the aggregate trends in household portfolio allocation. Section 4 then looks at the underlying changes broken down by age and birth-cohort. It applies the methodology proposed by Deaton and Paxson (1994) to disentangle age-, cohort- and time-effects. We discuss the results and highlight the limitations of such decomposition. Section 5 concludes.

1 For an overview over important institutional changes in Germany, specifically market deregulation, taxation and subsidization see Börsch-Supan and Eymann (2000).

II. Data and aggregate trends

We make use of two datasets: First, the Financial Accounts statistics published annually by the Deutsche Bundesbank covering aggregate wealth holdings by sector and type of wealth. The data is available back until 1960 and splits into two sub-datasets before and after the German reunification. Second, we employ wealth data from the German Income and Expenditure Survey (EVS). This cross-sectional survey has been carried out by the Federal Statistical Office at five-year intervals since 1962/63. At this point we only have micro data available for the years 1988, 1993, 1998 and 2003. For two earlier waves of the EVS (1978 and 1983) we have averages for age-bands available, but no micro data.

II.1 Financial Accounts

The financial accounts statistics are compiled annually by the Deutsche Bundesbank. They contain information on sectoral wealth holdings and savings. For the household sector, which includes private non-profit organizations, e.g. the churches and trade unions, the data provides the end of year stocks of gross wealth and liabilities. For Western Germany the data has been published from 1960 though 1992, disaggregated into 9 categories of financial wealth. With new asset categories like mutual funds becoming more and more important in the late 1980s the classification scheme was changed. Hence, time series on 13 – not fully comparable – asset categories are available for the reunified Germany since 1991. The latest data stems from 2002.
The data is constructed using the monthly banking statistics, as well as the quarterly reports on wealth in insurance companies. These are augmented by capital markets statistics, depot statistics and balance of payments statistics, all statistics that are originally collected for other purposes than the financial accounts. The household sector figures are largely calculated as the residual from the entire private sector and the corporate sector. Household wealth data is therefore affected by the data quality for the corporate sector, especially valuation practices in corporate balance sheets. The Bundesbank corrects for secret reserves though, which are quite prevalent under German accounting standards. The main concern therefore seems to be the inclusion of private non-profit organizations in the household sector. Given that both, the banking statistics as well as the depot statistics carry more information on wealth allocation within the sector, Lang (1997) makes an effort to separate private non-profit organizations. We extended his work to

include the most recent data. Securities that are not registered with banks turn out to be the main issue. Counting only registered wealth holdings[2], the private non-profit organizations (NPOs) account for roughly 4-5 percent of total financial wealth in the private household sector as defined by the Bundesbank. This share varies across asset categories from essentially zero (life insurance) to as much as 14-16 percent (savings deposits). Directly held stocks (2-3 percent) play a much smaller role for the private NPOs than investment certificates (8-10 percent) within the household sector. This seems quite plausible given that many NPOs have their funds managed in special closed mutual funds. Building society saving contracts – just as life insurance contracts – are held almost exclusively by private households. For a comparison of wealth holdings from survey data with these aggregate statistics, the varying importance of private NPOs across asset categories must be kept in mind.

II.2 The German Income and Expenditure Survey (EVS)

We use the German Income and Expenditure Survey as micro level database despite its lack of a longitudinal dimension. The available panel datasets suffer from different defects. The GSOEP includes wealth holdings only for the 2003 wave and very little information on financial wealth for the earlier years. The SAVE panel only covers a rather short time span so far and suffers from its rather small sample size. We therefore use the detailed information on financial wealth in the EVS cross-sections to construct a synthetic panel, which allows us to track birth cohorts over time instead of individuals or households. Generally, information on savings and wealth in the EVS is recorded at the household level. Hence, households are attributed to birth cohorts according to the age of the household head. Schnabel (1999), Börsch-Supan et al. (2002) and Sommer (2002) apply this procedure to account for cohort effects in saving behavior. The six available EVS cross-sections between 1978 and 2003 each contain between 40000 and 60000 households. The large number of observations even in the oldest age-groups allows an analysis of saving and wealth pattern among even among the very old. To achieve comparability of cohorts over time, we restrict the sample to Western Germany. There are several issues to the EVS data though which can broadly be summarized in three categories: concerns of comparability and measurement, concerns of sample selection, and last but not least coverage.

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[2] I.e. assuming that all financial wealth which is not registered by public statistics is held by others than the NPOs –

II.2.1 Comparability of asset categories and measurement issues

The questions concerning wealth exhibit certain differences over the cross-sections of the EVS. Focusing on financial wealth the main issue certainly concerns wealth in life in life insurance contracts. For the years 1993 through 2003 the dataset contains the cash value of insurance contracts. Yet until 1988 only information on the insurance sum is available. There is information neither on the inception date nor on the cash values for the 1978-1988 cross-sections. Hence, there is no reasonable way to directly estimate the cash value of those contracts. For 1993, both, the insurance sum as well as the cash value are contained in the dataset. Schnabel (1999) used age-specific ratios of the cash value to insurance sum from the 1993 cross-section to impute cash values for the previous cross-sections. On average this procedure results in a ratio of cash value to insurance sum of 52 percent. This ratio grows from 14 percent (age-group 21 to 24 years) to 128 percent (age-group 63 to 65 years) in the age-profile. We use the average wealth holdings in life insurance contracts from Schnabel's estimations for our analysis.

There is a second measurement problem regarding life insurances over time. While the EVS 1993 and following cross-sections report exact values, information given in the earlier waves is only given as categorical data. Changing from censored to discrete measurement poses problems of comparability, especially as the mean of open-ended classes is not known. The censoring limit of the upper class was constant for the EVS 1978-1988 in real values. One can impute the mean of the upper classes in the EVS 1978-1988 on the basis of the known distribution of the EVS 1993. This also has been done by Schnabel (1999).

In most EVS cross-sections at least some types of assets are grouped into categories. Unfortunately, some assets were regrouped into different categories over time. We therefore only use the broad asset categories "saving accounts", "life insurance", "building society saving contracts", and "securities" for our analysis, although the individual cross-sections offer more detailed insights into household portfolios.

II.2.2 Sample Selection

While the EVS is a representative sample of 98% of all private households in Germany a couple of notes are required. Households with a monthly income above a certain threshold as well as the

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most likely the private households.

institutionalized population are excluded. Exclusion of the institutionalized is serious among the very old. While only 0.7 percent of the population in need of care is living in nursing homes, this percentage increases strongly over age from 0.6 percent among the age-group 65-70 to 6.4 percent among those aged 80-85. More than 25 percent of the population above age 90 lives in nursing homes (see table 1). The elderly in institutions are likely to be rather poor so that the old will on average look wealthier than they actually are. Börsch-Supan, Schnabel and Reil-Held (1998) find EVS-based poverty rates to be much lower than those reported in administrative sources. Specifically, the number of poor elderly widows in the EVS is lower than indicated by social assistance figures. This sample selection problem adds to the influence of differential mortality on the age-pattern in savings and wealth. The importance of differential mortality unfortunately cannot be estimated within the EVS framework because of the lacking longitudinal dimension.

Table 1: Share of Institutionalized by Age-Group

age	in need of care	institutionalized	institutionalized (in % of age-group)
65 - 70	121'110	26'478	0.6%
70 - 75	181'528	41'483	1.1%
75 - 80	284'699	79'418	2.8%
80 - 85	338'610	109'580	6.4%
85 - 90	391'296	150'878	15.2%
90 - 95	259'390	112'813	26.6%
95 and above	69'318	34'943	27.7%
total	2'039'780	604'365	0.7%

Source: Pflegestatistik 2001

The exclusion of both, the tentatively poor institutionalized and the high-income households, is the main reason why the EVS data cannot be expected to add up to national accounting figures. Although the two effects are countervailing, we expect the highly skewed income distribution and the even more skewed wealth distribution to lead to an underestimation of household wealth. While the participation rates are likely little affected, we expect the average portfolio shares to be somewhat tilted towards the portfolio choice of the rich.

Last but not least it should be mentioned, that the shifts in the sampling threshold might be a concern. That is because the threshold is not indexed but arbitrarily chosen (see table 2). The

sampling variable being monthly household net income, the marginal household will likely be a household with several earners and relatively high earnings. The shape of the life-cycle earnings path of an individual, average household size by age of the household head, and labor force participation over the life-cycle taken together indicate that certain age-groups are more likely affected by a shift in the sampling threshold than others.

Table 2: Sampling Threshold (monthly net HH income) in the EVS

year	thresholds (current EUR)	CPI (West, 2000 = 100)	threshold (EUR, 2000)	"relative threshold" (1993=100)
1968	5'113	36.1	14'152	71.3
1973	7'669	45.3	16'947	85.4
1978	10'226	56.9	17'965	90.5
1983	12'782	72.2	17'713	89.2
1988	12'782	76.5	16'711	84.2
1993	17'895	90.1	19'854	100.0
1998	17'895	97.9	18'271	92.0
2003	18'000	104.5	17'225	86.8

Note: CPI available for West-Germany available only though 1999, 2003 data estimated using inflation rates for Germany (total)

Sources: EVS, Statistisches Bundesamt, own calculations

The age of those households with a net monthly income above 33000 DM in 1998 – the threshold being 35000 DM – ranges from 32 to 52. Household incomes at the 99 percentile in each age-group exceed 20000 DM between ages 48 and 57. Dropping those households in the 1998 cross-section that exceeded the indexed 1988 threshold left average stock market wealth unchanged for 60 out of 66 age-groups. Affected were the averages at the ages 32 and 45-49. The changes in average stock market wealth for a specific age-group ranged from –0.5 percent to –9.9 percent.

As we do not have micro data available for the old cross-sections of the EVS, a full correction of the described shifts in the sampling threshold will have to be left for future work. On the other hand, there are a number of reasons why our analysis might not be too badly affected: the distribution of stock market wealth certainly is one of the most heavily skewed. We neither look at such narrow asset categories nor do we look at age-groups one year wide but five years. Last but not least, portfolio shares are less affected than absolute values of a single asset category and participation rates are essentially unaffected. Nevertheless any life-cycle analysis based on synthetic panels using the EVS data will have to be aware of this general issue as the shape of the

life-cycle trajectories may be affected. Cross-sectional wealth and income profiles by age will be flattened by a reduction in the sampling threshold. In the language of the later analysis this can be interpreted as a time-effect, which is not common to all age-groups. Generally, the issue of biased age trajectories can be solved within the EVS framework, as the selection can be modeled. The correction will require the availability of micro data for all cross-sections though.

II.2.3 Coverage

Another issue is differential coverage. Lang (1997) reports coverage rates[3] for the EVS 1978-1988 (see table 6 in the Appendix). For 1983 they range from 92.7 percent for building society saving contracts to 27.2 percent for time deposits.

Calculations based on the EVS data will therefore yield biased portfolio shares. Generally, Lang (1997) observes a decline in coverage rates for almost all asset categories over time. Overall, coverage dropped between 1978 and 1988 from 49 percent to 39 percent. Partly, this may have been caused by changes in the questionnaire. A broadening of categories has repeatedly been shown to reduce the amount of assets reported – likely because a detailed enumeration of assets helps the respondent to remember. Other issues may stem from the fact that participation in the survey is voluntary. Specifically, the Federal Statistical Office reports issues attaining the quotas of some population subgroups – especially unemployed and peasants. But also the exclusion of the rich mentioned above may be an issue.

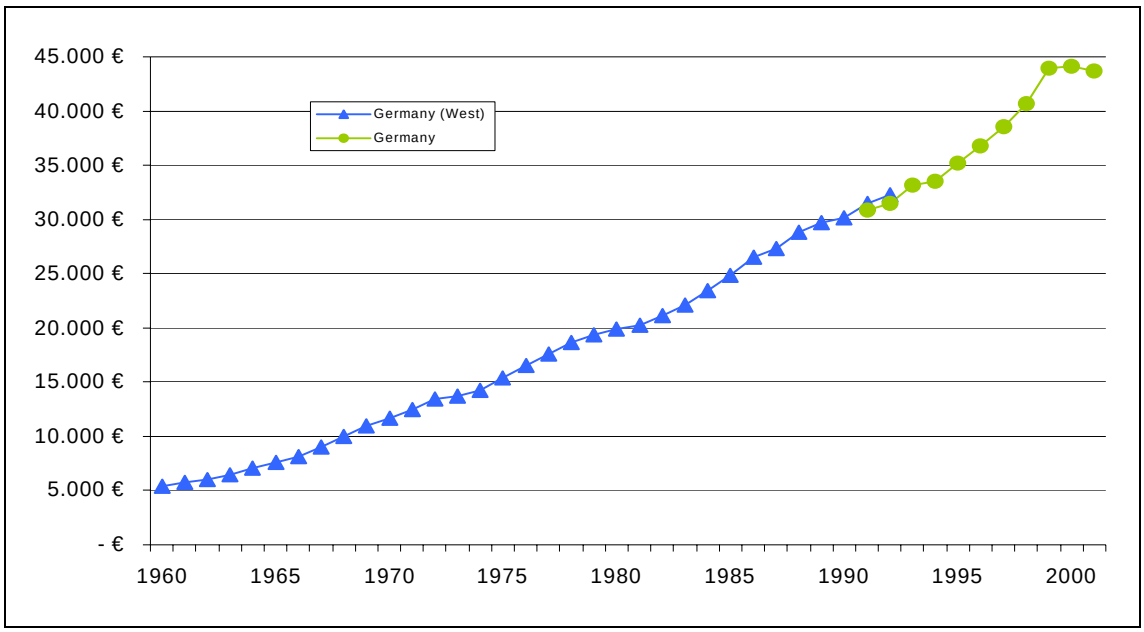
For a life-cycle analysis it will be an issue if coverage of certain asset classes varies with age. There is no way for us to correct for possible differential coverage by age, as the National Accounts data comprises no breakdown by age. Rescaling the portfolio shares to the levels reported in the National Accounts would therefore not change the age-pattern of the portfolio shares. Generally, only variation in coverage rates over time could be corrected for if we assume that all age-groups are affected equally. This is exactly the underlying assumption for the time-effects in the econometric specification suggested by Deaton and Paxson (1994), which we employ in section 4.

For part of the participation rates an equivalent comparison is not possible, as there are no aggregate time-series available. We have reason to believe that the data quality of participation rates is higher compared to portfolio shares. First, we expect people to be more willing and able to correctly declare whether or not they hold a specific asset. Second, shifts in the sampling threshold will only cause minor bias in the participation rates.

III. Macro Trends

Per capita gross financial wealth has risen strongly since 1960, even in real terms. Figure 1 presents the evolution over time in Euros (2000). Financial wealth in the eastern states was about 14 percent below the contemporaneous level in Western Germany. Hence, we observe a slight drop in 1991 comparing the Western German figures to the figures of the reunified Germany.

Figure 1: Per capita Gross Financial Wealth, 1960-2001 (in EUR, 2000)



Source: Financial Accounts, own calculations

Growth rates have been somewhat cyclical over the entire time span covered by the Financial Accounts. Yet it was a first when per capita financial wealth declined in 2001 as a result of the stock market downturn. Stock market wealth already declined by 8.7% in 2000 but savings and appreciation of other wealth components compensated for it. In 2000 and 2001, per capita wealth in stocks declined from 5846 Euros to 4135 Euros, i.e. almost 30 percent. It should be noted though that the strong decline in 2001 was partly due to sales of stocks as well. Generally, these figures highlight the impact of changes in stock market valuation on portfolio shares if markets are as volatile as in the last years of the 1990s and the early 21st century. That is, even though directly held stocks only account for about 10 percent of household wealth.

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[3] Calculated here as the wealth accounted for in the EVS relative to the National Accounts.

Table 3 (for the West German states until 1992) and table 4 (for the reunified Germany after 1991) give an overview on the changes in asset allocation since the 1960s. One of the most prominent trends has been the rising importance of life insurance investments. Between 1960 and today the share of wealth held in life insurance policies has doubled from 12.3 percent to 24 percent in 2001. Considering that total financial wealth rose by more than 700 percent throughout that period underlines the importance life insurance has gained. Given that one of the main objectives connected to holding life insurance is old-age provision, the rising portfolio share is in line with what we would expect in an ageing society where more and more people are saving for their retirement. We should note though, that also the tax treatment of these investments used to be quite favorable until recently.

Building society saving contracts increased their importance in private households' portfolios from 5.4 percent in 1960 to 7.8 percent in 1975. Their rise coincides with times when housing construction was a major political concern and savings in building society saving contracts were strongly subsidized. Per capita wealth in building society saving contracts stayed essentially constant between 1975 and 1990. As a consequence their portfolio share dropped back to below 4%. After 1991, building society saving contracts are not picked up separately in the National Accounts. They are accounted as saving deposits until 1998 and as time deposits thereafter.

Table 3: Asset Allocation, Germany (West), 1960-1992

	1960	1965	1970	1975	1980	1985	1990	1992
investment with banks	45.7%	50.5%	52.4%	54.5%	52.4%	46.1%	43.1%	40.6%
thereof:								
cash and checking	14.3%	12.8%	10.6%	9.4%	8.6%	7.0%	7.7%	8.0%
time deposits	1.2%	1.1%	1.8%	2.1%	4.8%	5.0%	6.7%	8.0%
saving certificates	-	-	0.9%	2.9%	5.8%	6.5%	6.1%	5.3%
saving deposits	30.2%	36.6%	39.1%	40.1%	33.2%	27.6%	22.6%	19.4%
building society saving contracts	5.4%	6.9%	7.6%	7.8%	7.3%	5.5%	4.1%	3.7%
investment /w insurance companies	12.3%	13.3%	13.3%	13.1%	14.5%	16.3%	18.6%	18.6%
fixed interest securities	3.3%	6.7%	7.7%	9.1%	11.5%	15.0%	16.7%	20.9%
stocks	24.2%	13.7%	11.3%	7.3%	4.8%	7.0%	6.4%	5.2%
other outstanding money [4]	9.1%	8.9%	7.8%	8.2%	9.5%	10.0%	11.1%	11.1%
total	100%	100%	100%	100%	100%	100%	100%	100%

Source: Financial Accounts, own calculations

[4] Subsumes money market funds and occupational pension claims. Pension claims account for about 80 percent of the category.

Table 4: Asset Allocation, Germany, 1991-2001

	1991	1994	1996	1997	1998	1999	2000	2001
investment with banks	45.8%	43.5%	41.0%	39.4%	38.4%	35.6%	34.1%	34.4%
cash and checking	8.9%	9.4%	9.5%	9.2%	9.5%	9.5%	9.4%	9.5%
time deposits	10.0%	8.7%	5.4%	4.8%	4.6%	6.8%	6.9%	7.3%
saving certificates	4.7%	3.4%	3.1%	3.0%	2.7%	2.2%	2.1%	2.1%
saving deposits	22.2%	22.0%	23.1%	22.4%	21.5%	17.0%	15.6%	15.5%
investment /w insurance companies	18.8%	19.7%	20.7%	21.1%	21.5%	21.5%	22.7%	24.0%
fixed interest securities	13.4%	11.9%	12.7%	11.6%	10.7%	10.2%	10.1%	10.3%
stocks	6.5%	6.8%	7.8%	9.6%	10.7%	13.3%	12.1%	9.5%
other shares	3.9%	4.2%	3.8%	3.9%	3.4%	3.2%	3.6%	3.7%
mutual funds	4.1%	6.9%	7.3%	7.9%	8.9%	10.2%	11.3%	11.7%
other outstanding money	7.4%	7.0%	6.6%	6.4%	6.3%	6.1%	6.2%	6.3%
total	100%	100%	100%	100%	100%	100%	100%	100%

Source: Financial Accounts, own calculations

Saving deposits have lost a lot of their former importance, first in favor of time deposits and saving certificates, later in favor of fixed interest securities and mutual funds. Mutual funds being a quite wide category they may replace many different asset categories associated with quite different saving motives: funds investing in short run government bonds may replace saving deposits or time deposits. Saving certificates may be replaced by other fixed income funds. Last but not least, indirect investment in stocks through mutual funds may replace direct investments at the stock market – an opportunity that started to spread in the mid-1990s.

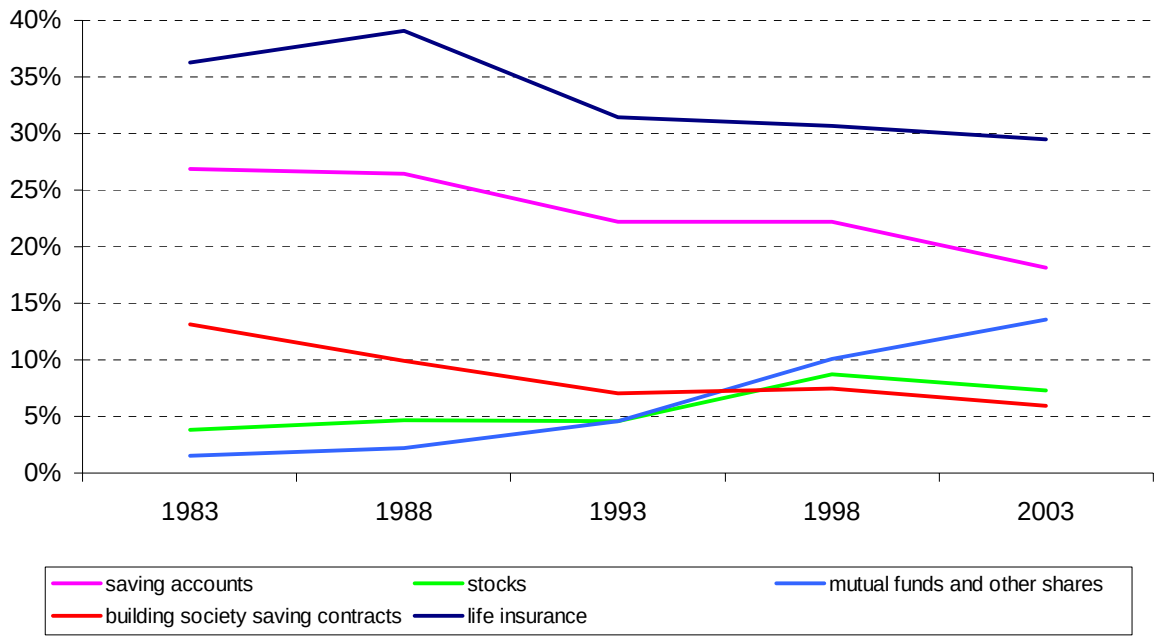
Until the early-1990s per capita stock market wealth had remained flat in real terms for almost 30 years letting its portfolio share plunge. Part of the explanation may have been entry costs like information and transaction costs. Another issue certainly may have been high costs of diversification for small investors. Once these costs decreased with the spreading of the internet and the introduction of mutual funds, both direct and indirect investment in the stock market saw an unpreceded boom. Stocks and mutual funds doubled their combined portfolio share over the last ten years. Valuation effects caused part of the rising portfolio share. Net saving flows into directly held stocks account for a quite small share of total savings in the 1990s. The share of savings going into stocks only rose from 1.3 percent between 1960 and 1992 to 1.8 percent between 1991 and 1999. Only in 1999 and 2000 private households invested roughly 12 percent of their savings in stocks. In 2001 net sales of stocks accounted for 90% of the amount invested in the two previous years. Hence, most of the boom-time investments in directly held stocks were undone in the following year. Mutual fund investment between 1991 and 2001 has been

about 12 times as large as flows into directly held stocks. Although only a minority of mutual funds are pure stock market funds the relation indicates that entry costs and especially diversification costs may still be an important issue for small investors.

Trends in participation rates and portfolio shares in the EVS

Looking at aggregate portfolio shares in the survey data (see figure 2) we find most trends from the National Accounts confirmed.

Figure 2: Portfolio shares in selected asset categories (West Germany)

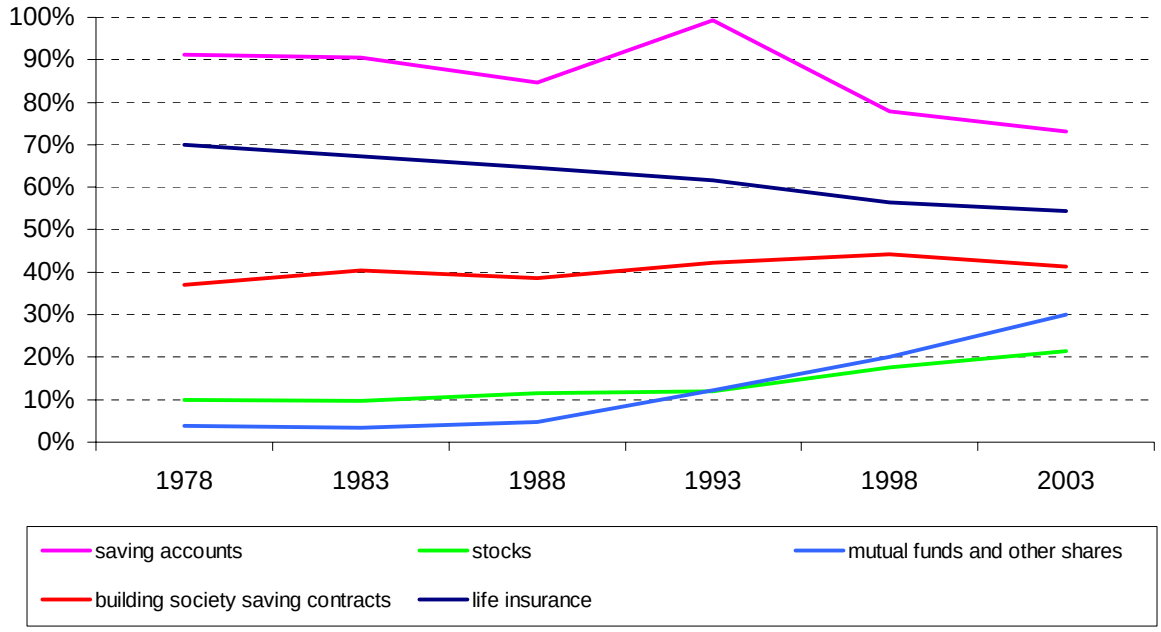


Source: Eymann and Börsch-Supan (2000), EVS, own calculations

There is a steady decline in the probability to hold wealth in saving accounts (see figure 3), accompanied by a decline in the portfolio share of this category. Note that the 1993 data includes checking accounts for this category, which is responsible for the jump in participation rates.
Also the declining portfolio share of building society saving contracts is supported by the survey data. Like in the National accounts data, the portfolio share was almost halved over the last 20 years. Notably, this is not matched by a decline in participation rates. In the late seventies, about 37 percent of the population had savings at a building society. This share rose to about 44

percent in 1998 and somewhat dropped back in 2003. The stagnation in average wealth holdings in this asset category is likely related to the capped subsidization of the contracts.

Figure 3: Participation rates in selected asset categories[5] (West Germany)



Source: Eymann and Börsch-Supan (2000), EVS, own calculations

The rise of stocks and mutual funds, especially in the 1990s, is clearly reflected in the EVS data. Participation in both asset categories rose continually from 1988 through 2003. For part of stocks, the market turndown of the years 2001-2003 already shows in the portfolio shares. Participation rates in 2003 where still higher than five years before though. Between 1978 and 1998, we observe a rising participation in stocks but a much smaller rise in conditional portfolio shares (the average portfolio share invested stocks by those who actually hold stocks). Between 1998 and 2003, the conditional portfolio share dropped from 22 percent to roughly 16 percent, which is lower than in any other year. Aggregate statistics imply that not only the drop in valuation but also actual sales contributed to this decline. Comparing the evolution of conditional and unconditional portfolio shares, we conclude, that the new investors entering the market in the 1990s were rather small investors compared to those who already held stocks before. While some investors sold part of their stocks during the downturn, only few of them quit the market. After all, the popularity of direct investments in stocks has clearly suffered in the last years.

[5] For 1993 the category saving accounts includes checking accounts.

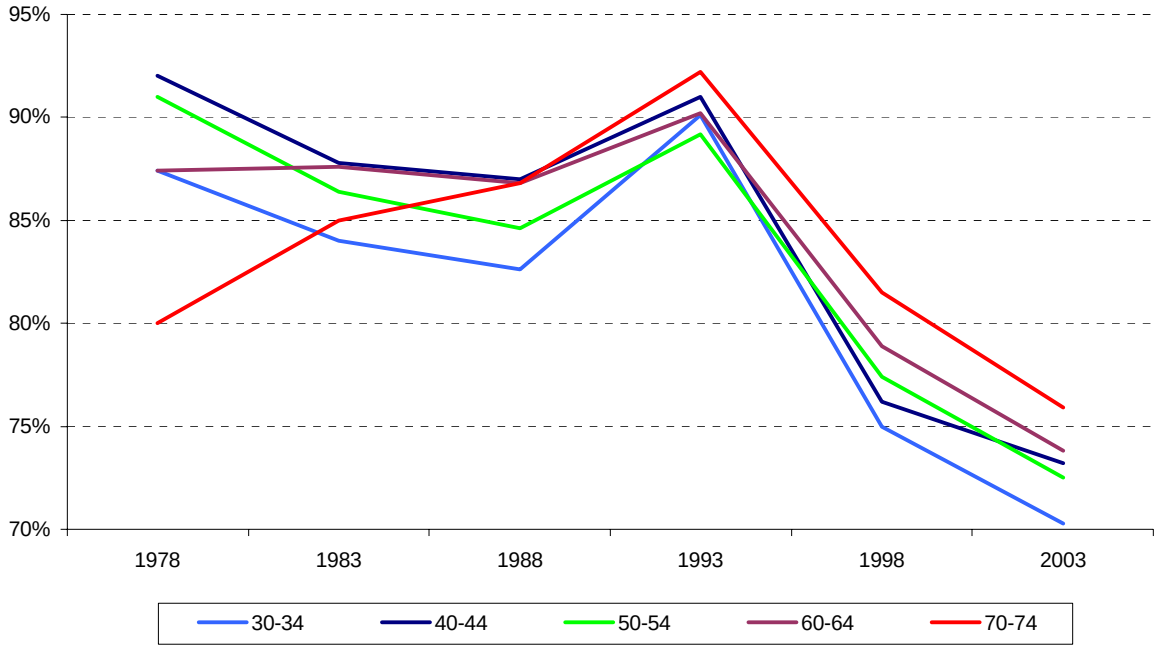
At the same time we observe an ongoing rise in the popularity of mutual funds – again in line with the figures from aggregate statistics. In contrast to (direct) investments in stocks, mutual funds have only recently started to play a role in household portfolios. This short history is just the more impressive. Participation rates rose from 4.7 percent in 1988 to about 20 percent in 1998 and 30 percent in 2003. Conditional portfolio shares also rose substantially over this time span and leveled off at roughly 25 percent in 1998 and 2003. The likely drops in valuation of mutual funds in stocks have obviously been compensated. First, mutual funds investing in fixed interest securities performed quite well over the last years. But second, aggregate flow statistics indicate that net inflows into mutual funds remained positive throughout the market downturn.
Participation in life insurance dropped back from 70 percent to 55 percent between 1978 and 2003. The portfolio share remained more stable. It dropped from a high of 35-40 percent in the 1980s to roughly 30 percent throughout the 1990s. Still – wealth in life insurance remains the dominant asset in private household portfolios.

IV. Trends at the age- and cohort-level

IV.1 Trends and differences in age-groups

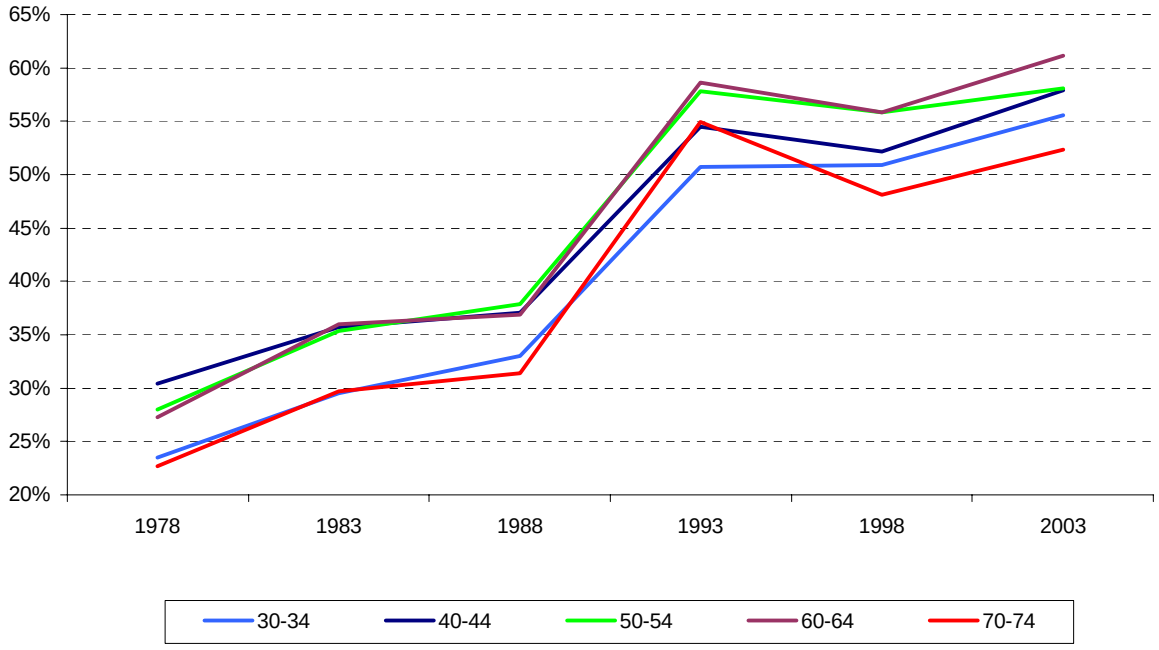
Figures 4 and 5 give an insight, how participation in certain asset categories developed over time in certain age-groups. We find that both, the rise of investments in securities as well as the reduced popularity of savings accounts, are similarly prominent in all age-groups. The peak in participation in savings in 1993 is again to be explained by the inclusion of checking accounts. Comparing 2003 to 1978, roughly 15 percent less in all age groups held assets in saving accounts. In 1978, most households (95 percent) held assets in saving passbooks, life insurance or building society saving contracts. This share dropped below 90 percent in 1998 but remained quite high. At the same time, more and more people held assets in other asset categories. In 1978 only 25 percent of all households held financial wealth in other categories than those mentioned above. Already in 1993 this share exceeded 50 percent. The low diversity in participation rates across age-groups in these two asset classes also indicates that most changes in participation rates over time cannot be the result of population ageing. The fact that these trends are parallel for almost all age-groups is likely caused by the introduction of new investment possibilities and the reduction in transaction and diversification costs.

Figure 4: participation rate in savings passbooks by age-group



Source: EVS, own calculations

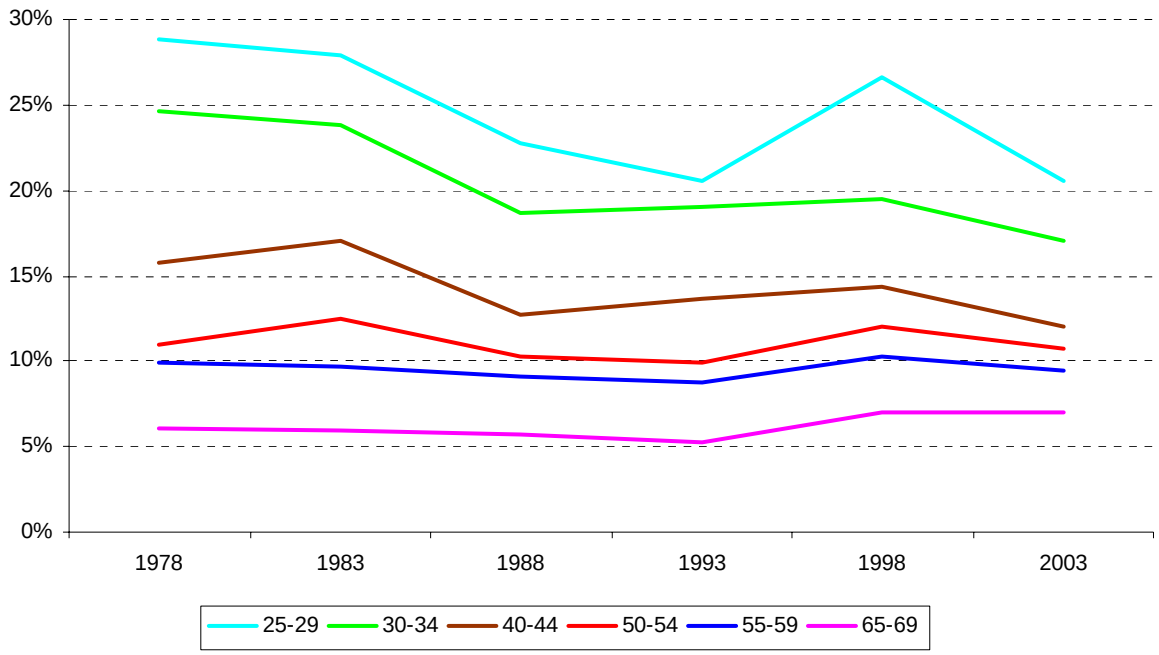
Figure 5: participation rate in (all) securities by age-group



Source: EVS, own calculations

The story looks quite different for part of the portfolio shares. We find quite strong and stable differences across age-groups indicating that population aging is likely to affect portfolio shares in the future. Figure 6 shows, that building society saving contracts constitute a considerable share in gross financial wealth among the young. Their share then continuously declines for the older age-groups. The trends look similar for all age-groups though.

Figure 6: portfolio share invested in building society saving by age-group



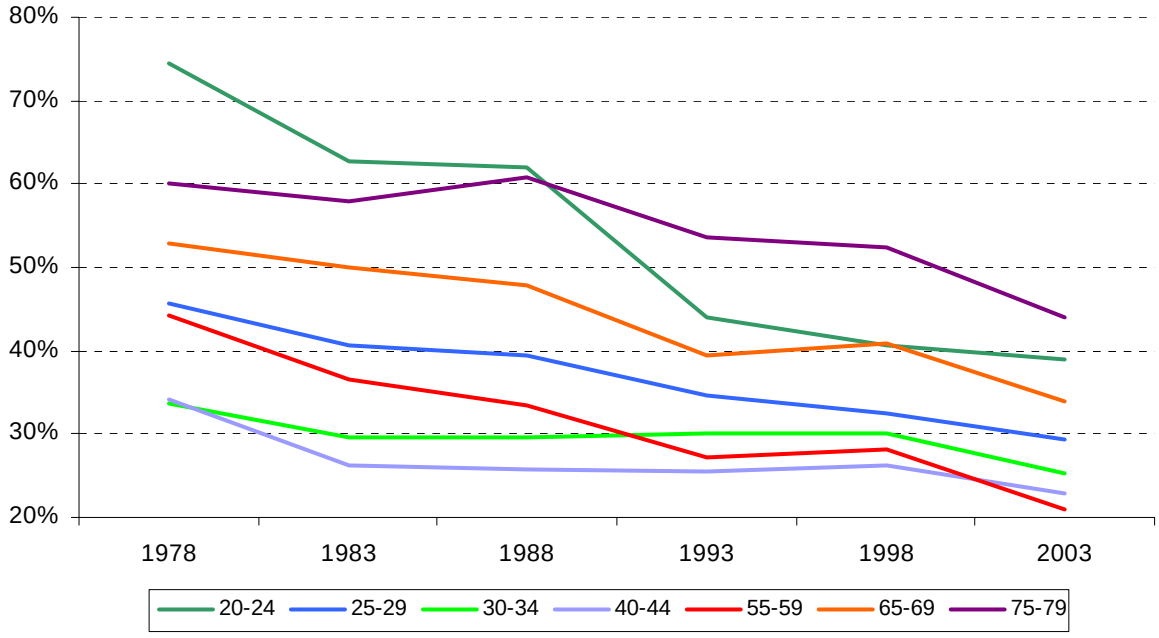
Source: EVS, own calculations

Saving passbooks display a similarly clear picture of differences across age-groups (see figure 7). At young age a lot of money is allocated to these safe and fungible assets. This share then declines strongly for the middle-aged households, increases for those approaching retirement and peaks for the high age households. Overall the portfolio shares declined for all age-groups, but especially so among the youngest households.

The picture is exactly reversed for life insurance wealth (see figure 8). The portfolio share held in life insurance policies starts at about 20 percent for those aged 25-29. Portfolio shares have been highest for the age-groups 45-60. Around age 60 a substantial share of contracts becomes due, reducing the average wealth holdings and portfolio shares of those age-groups. The time pattern across age-groups is quite different though. We should be careful interpreting the trends over time as time-effects in any case as we cannot distinguish cohort-effects and age-specific time-

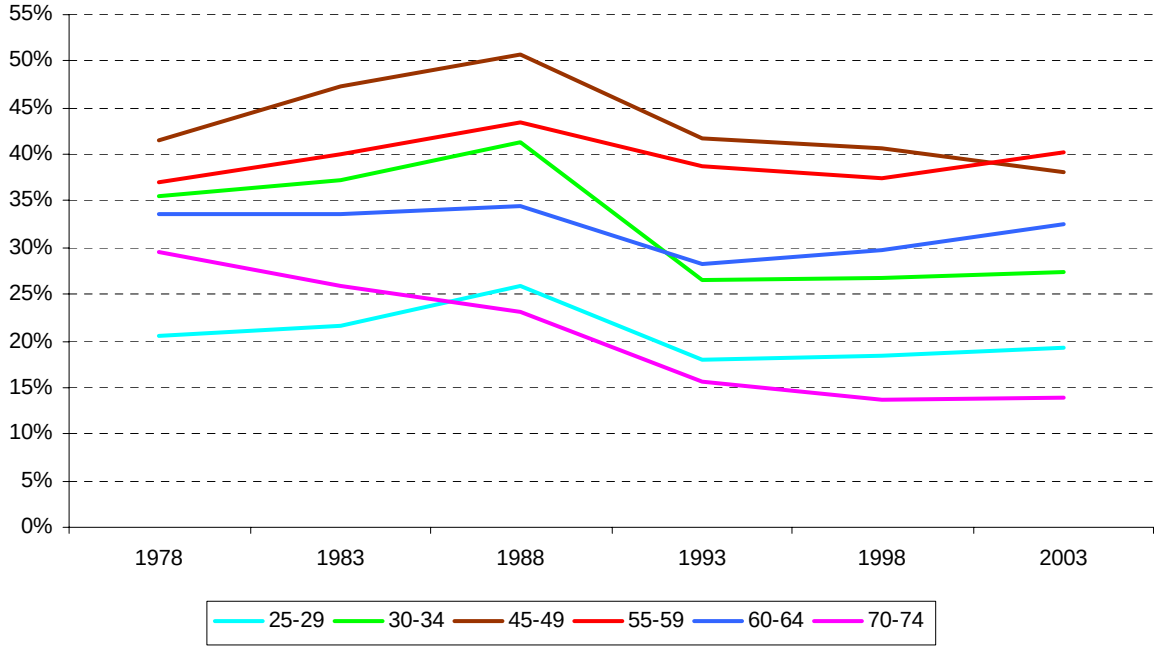
effects here. The cohort-trajectories by age in the following section allow for some insights from a different perspective.

Figure 7: portfolio share invested in saving accounts by age-group



Source: EVS, own calculations

Figure 8: portfolio share invested in life insurance contracts by age-group

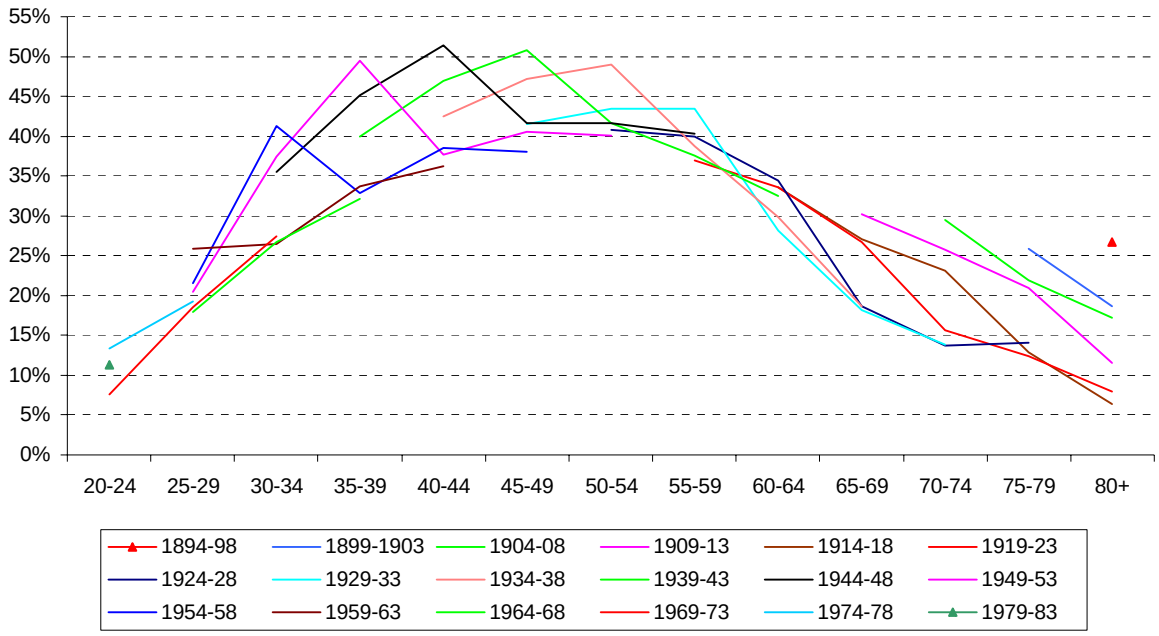


Source: EVS, own calculations

IV.2 Facts and Figures at the Cohort Level

Comparing the changes in participation rates and portfolio shares across cohorts over time we find the pictures to be confounded by age-effects, as different cohorts are observed at quite different stages of their life-cycle. We therefore plot the cohorts over age to compare the different cohorts' behavior at equal stages in their lives. At the same time, these graphs give a first idea of the typical age profile and how it has been changing over the past 20 years. Yet again – following the observations of a specific cohort as she ages we cannot distinguish true age-effects and time-effects – at least not without some identifying assumption.

Figure 9: age-profile of portfolio shares invested in life insurance by cohort



Source: EVS, own calculations

Looking at figure 9 we can easily see the hump shape in the households' portfolio share invested in life insurance contracts. The portfolio share peaks somewhat before retirement, as other wealth categories exhibit stronger growth at that age. For the early years – 1978-1988 – the younger cohorts' profile lies above their older counterparts. Moving from 1988 to 1993, we observe a slump in portfolio shares, especially for the young cohorts. This is largely due to the rise of stocks and mutual funds in the 1990s. There is an equivalent kink in the portfolio share of securities – just in the opposite direction. The portfolio shares then stabilized at this lower level in the years 1998 and 2003. The kink over time is still visible for the older cohorts but a lot less

pronounced. Instead there are strong cohort differences at old age: younger cohorts hold less of their wealth in life insurance contracts than their predecessors. While those born around 1900 had roughly 25 percent of their wealth in life insurance when they reached age 75-80, today's old only hold about 10 percent of their wealth in life insurance. Partly, this may have been caused by the decreasing popularity of death benefit insurances among the old. We do not have disaggregate data on the type of life insurance except from the 2003 cross-section (see table 5). In 2003 roughly 6.5 percent of the population held death benefit insurance. Among the population aged 50 and below this share is only 1.7 percent. Between age 50 and 65, the share rises to 7.3 percent and averages 15.4 percent for those aged 65 and above. Wealth in death benefit insurance as a share of total life insurance wealth is 1.1, 5.5 and 38.6 percent for the above subsamples.

Table 5: Death benefit insurance by age (2003)

	age			
	<50	50-65	>65	all
ownership rate				
all life insurance	60.2%	63.9%	34.4%	58.2%
death benefit insurance	1.7%	7.3%	15.4%	6.5%
portfolio share				
all life insurance / gross fin. wealth	31.6%	37.5%	14.4%	28.6%
death benefit insurance / total life insurance	1.1%	5.5%	38.6%	8.3%

Source: EVS (2003), own calculations

Generally, the portfolio share invested in life insurance is the only one that exhibits a clear hump over the life-cycle. This is what we would expect for the asset category, which is most important for an individual's old age-provision, given that some assets are used for different purposes. There are a few things to be kept in mind about wealth in life insurance contracts though. First, there are two ways to buy life insurance: by regular payments over a certain time span or by a lump sum payment. Second, there are three different ways they can be paid out: as a lump sum, as an annuity, or as a combination of both. Life insurance products can hence be used in different ways as a mean for old-age provision. We just sketch three short examples and illustrate their implications for what we observe in the data:

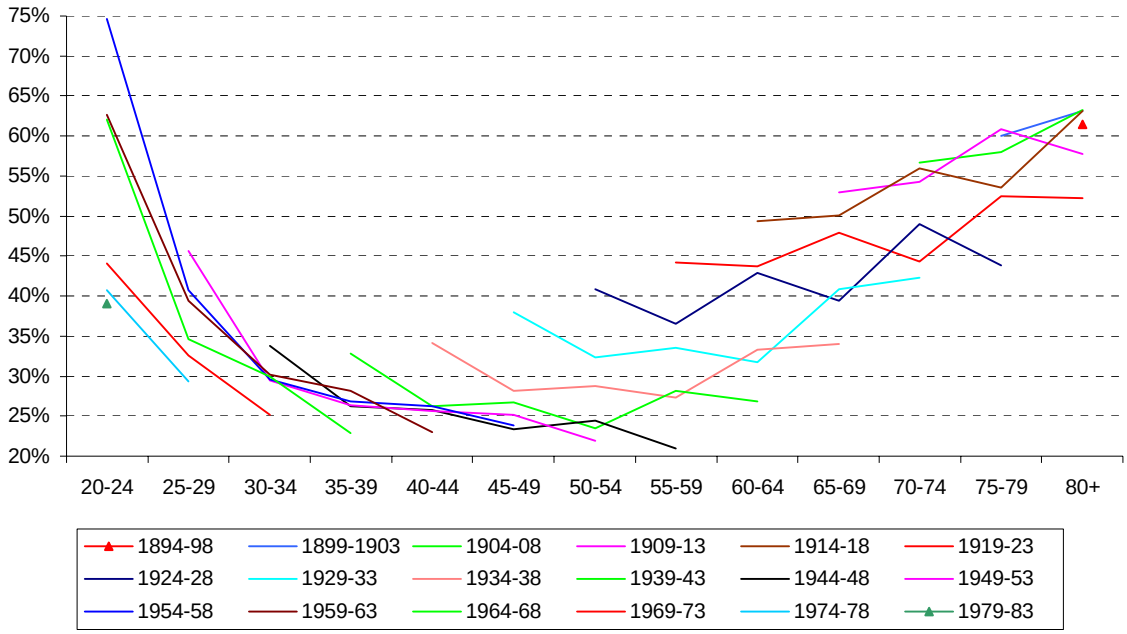
A person that saves regularly until retirement and then chooses a life-long annuity will show up in the data holding life insurance until retirement and none thereafter. A person that saves in other assets to buy a pure annuity at retirement will never show up as an investor in life insurance products in our data, although she uses life insurance to insure against longevity risk or early dissaving for other reasons. Last, a person that saves in life insurance products using a shortened contribution period and then chooses a lump-sum payout to consume out of the cash received:

She will only show up in the data holding wealth in life insurance for a quite short time span. It is not even clear that the lump sum payment received is connected to a retirement saving motive. She could as well plan to bequeath the money or spend it otherwise.

There are two main consequences for our analysis: we would expect a product being used in connection with the retirement saving motive to show persistent participation rates into old age. With life insurance being paid out as a lump sum or as an annuity, participation rates drop back clearly after age 60. A similar argument applies to portfolio shares. We would expect a continuous decline of portfolio shares for a financial asset being purely intended for old-age provision. For the reasons mentioned above the observed portfolio shares in life insurance drop back quite quickly around retirement.

The portfolio share invested in savings passbooks (figure 10) is u-shaped over age. As much as 75 percent of financial wealth was held this way by the young in 1978. The share declined to about 40 percent in 1998 and 2003. Comparing the distances across cohorts at a specific age – which is equivalent to figures 4-7 – the decline of wealth invested in savings passbooks has been strongest for households in their twenties and again for those aged 45 though 60. Especially the very old still hold an almost unchanged share of their portfolio in these safe assets.

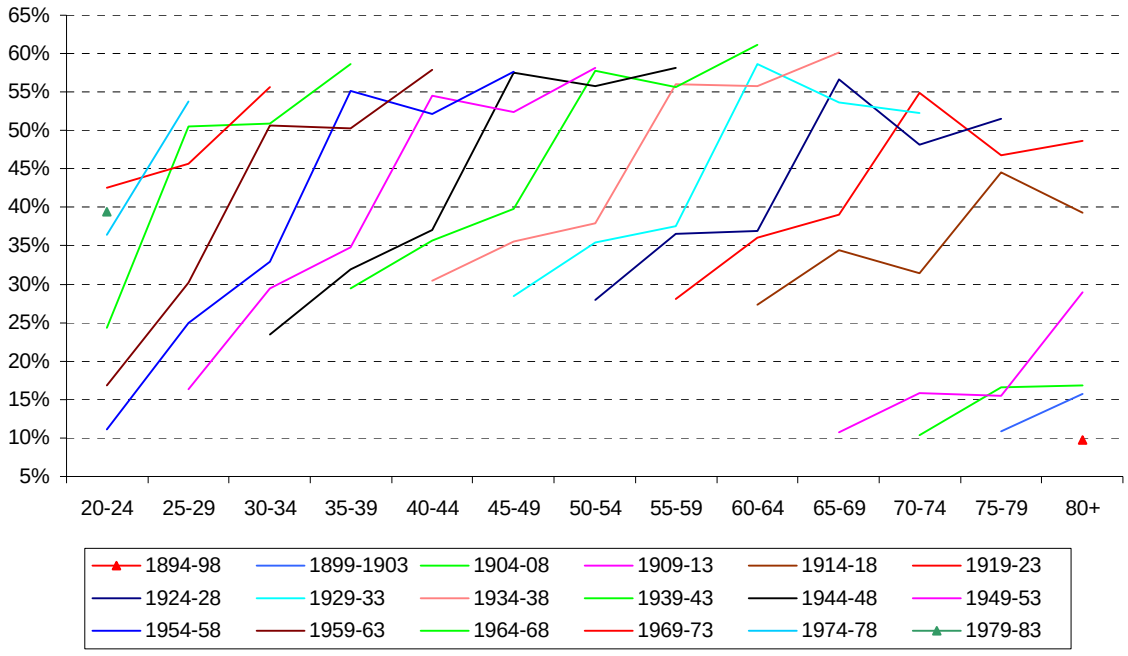
Figure 10: age-profile of portfolio shares invested in savings passbooks by cohort



Source: EVS, own calculations

Figure 11 gives an example how strong trends look like in a plot of cohorts over age. Almost all cohorts show a common development over time: their participation rates in securities rise from 1978 through 1993 and level off thereafter. It seems quite obvious that following a cohort as she ages we do not only capture age-effects only but also time-effects. On top of the common trends, we observe the younger cohorts' profiles to lie above the profile of their predecessor cohort in almost all cases, indicating additional cohort-effects. For the oldest cohorts we observe quite little changes as they age. Instead – differences across cohorts are huge among the old: about 20 percent more of today's old hold securities compared to previous generations. One last stylized fact is nicely illustrated: participation rates in securities hardly subside over age. At the same time some 10 to 15 percent of the retired who held securities in 1993 had exited by 1998, in the boom times of the stock market.[6]

Figure 11: age-profile of participation rates in (all) securities by cohort



Source: EVS, own calculations

[6] Note that this comparison is not based on individual data but on cohort averages of our synthetic panel. Hence we only observe a 10-15 percent net change in the participation rate while the gross turnover might be larger.

IV.3 The Deaton-Paxson Methodology

Connecting the observations on a certain birth-cohort in a graph on age may give a misleading impression that we are truly observing age-effects. Even if we restrict our view to a specific birth cohort this may not be true if time-effects play a role. The age-profile will look steeper if positive time-effects add to the true age-effects. Essentially the slope of the *true* age-profile may even have the opposite sign of what the graphs in the previous section suggest. To add another perspective on how the actual age-profiles might look like, how much investment behaviors change over age, and how much cohorts differ in their investment attitudes we employ the Deaton-Paxson methodology.

IV.3.1 Theoretical considerations

To be able to distinguish age-, cohort- and time-effects any approach has to impose additional structure. Two structural assumptions are usually made: first and often not explicitly discussed, it is assumed that there is an age-profile, which is common to all cohorts. Second, cohort-effects are typically limited to some parameter, which changes the common age-profile along one dimension.

Yet, considering different possible changes to the public pension system and their theoretical implications on the optimal age trajectories it is obvious that cohorts might well differ in more than just one dimension: Postponing the legal retirement age we would expect wealth accumulation to take a slower pace to a lower level at retirement, as time in retirement is shortened and thereby the financial resources needed for the time after retirement. At all ages until retirement the implicit safe investment from wage earnings will account for a larger share of total wealth while the share of financial assets will be smaller. Hence we would expect the portfolio share of risky assets to be higher at all ages until retirement for cohorts expecting a later retirement age. If cohorts expect different replacement rates in the public pension system they will accumulate different amounts of wealth to compensate for the changes in the pension system. In this case, cohorts differ throughout retirement in their different implicit save investments from the pension payments. If the public pension system is less generous, the cohort's financial wealth will be invested more safely, as it depends more on its private savings. Extending the argument to life insurance, we would expect the portfolio share of life insurance to start declining at later age if the retirement age is postponed. Its portfolio share will be higher

throughout the entire life-cycle if replacement rates are lower, as life insurance offers the nearest substitute to a public pension. Therefore, restricting cohort effects to change the age-profile along only one dimension might not be a trivial restriction to impose.

For the estimation there remains the issue of multicollinearity. That is, given the age and the year of birth of a certain observation, we can always calculate the year of observation and vice versa. Hence, the estimators will not be identified. All studies relying on a decomposition of age-, cohort- and time-effects therefore have to either restrict some of the effects or ensure identification through the choice of functional form.

There is good reason to assume that all three effects might be important, though. Age-effects are suggested by various theoretical models and by financial intermediaries' recommendations as discussed earlier. Cohort-effects will matter e.g. if generations differ in their risk-aversion, rate of time preference or – if the utility function is not of CRRA form – on their initial endowments. As argued above, also changes to the social security scheme may induce cohort-effects. The German pension reform enacted in 2004 implicitly introduced different replacement rates for future cohorts. Last but not least time-effects: Wealth levels are certainly affected by the chosen valuation date. And unless households continually reoptimize their portfolio this will also induce time-effects in the portfolio shares. Also – if the different number of items in the questionnaires induces differences in coverage across years, this implies time-effects.

Assuming that all three effects matter, identifying restrictions are required. The procedure suggested by Deaton and Paxson (1994) treats the time-effects as orthogonal deviations from a possible linear trend. We can think of this as a business-cycle effect, e.g. caused by valuation date effects in wealth holdings. The second necessary assumption to ensure identification is that the time-effects add up to zero.

Let the general model be

$$y = \beta + A\alpha + C\gamma + Y\psi + u\,,$$

where A, C, and Y are matrices of age, cohort, and year dummies respectively. Let A_i (i=1…N) denote the age-dummies, C_j (j=1…M) the dummies for the birth-cohorts, and Y_t (t=1…T) the dummies for the years of observation. The restrictions proposed by Deaton and Paxson imply that T-2 year-dummies are included in the regression, which take the following form:

$$\textit{for } t=3,\ldots T: \qquad Y_{ijt}^{\ *} = Y_{ijt} - \left[(t-1)Y_{ij2} - (t-2)Y_{ij1}\right].$$

The year-effects can easily be calculated from the estimated coefficients in the transformed equation and the implied restrictions.

Although we generally adopt the fundamentals of the procedure proposed by Deaton and Paxson we make some minor modifications: To obtain age-saving profiles that also have some meaning in terms of the levels of life-cycle saving rates we choose not to drop one age-dummy from the estimation but include all age-dummies and drop the constant instead. We further add the restriction that not only the year effects have to add up to zero but also the cohort effects. The estimates can be interpreted as cohort effects relative to the average cohort. Also the estimated coefficients of the age dummies get a different interpretation: they now display the predicted saving rates over the life-cycle for the average cohort excluding any year effects. In the original Deaton-Paxson specification both, age- and cohort-effects, describe changes relative to the arbitrarily chosen reference categories, which are dropped from the estimation. We estimate:

$$s_{ijt} = \sum_{i=1}^{N} \alpha_i A_{ijt} + \sum_{j=2}^{M} \gamma_j C^*_{ijt} + \sum_{t=3}^{T} \psi_t Y^*_{ijt} + u_{ijt},$$

where C* and Y* are the transformed dummies.

IV.3.2 Results

Participation rates

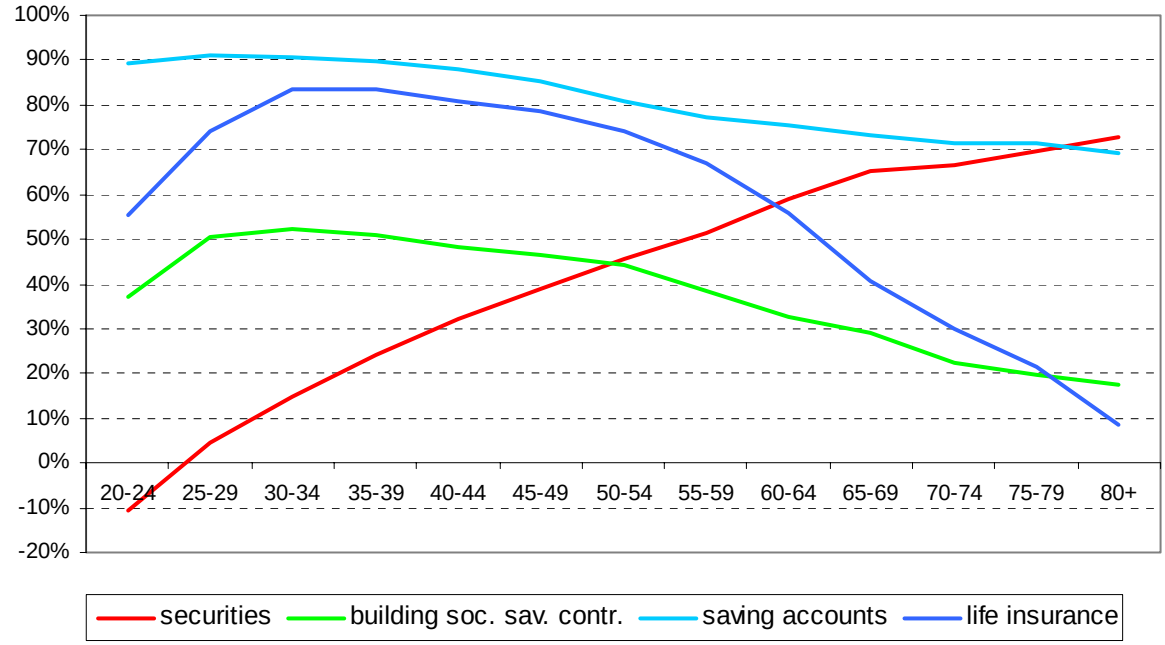
Treating the estimated year-effects (see Appendix, figures 16, 17) as correction of business-cycle effects and other short-term fluctuations we focus on the estimated age- and cohort-effects.

Looking at the age-effects, we should note, that although the age-profiles are depicted for the average cohort, they still only imply relative changes over the life-cycle. Hence, the percentage scale can only be interpreted as relative differences in the participation rate or in the portfolio share across age-groups. Consequently, we can observe both – negative numbers as well as numbers beyond 100 percent.

Looking at the age- and cohort-effects in participation rates (figures 12 and 13) for saving accounts, we see the previous results (see figure 4) supported: while there are little changes in the participation rate over the life-cycle, we observe a clear trend over cohorts. The oldest cohorts (born before 1928) are rather homogeneous, but all subsequent cohorts are increasingly less likely

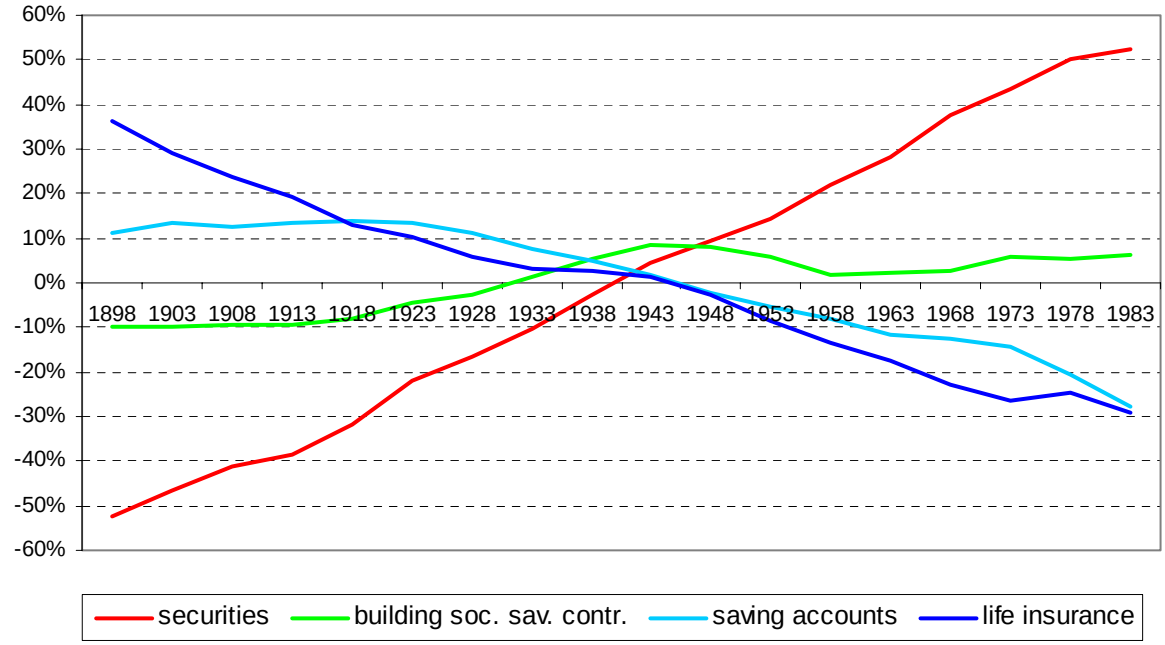
to hold saving accounts. For building society saving contracts we observe a similar trend in the opposite direction.

Figure 12: Age-effects in participation rates (relative scale)



Source: EVS, own calculations

Figure 13: Cohort-effects in participation rates (relative scale)



Source: EVS, own calculations

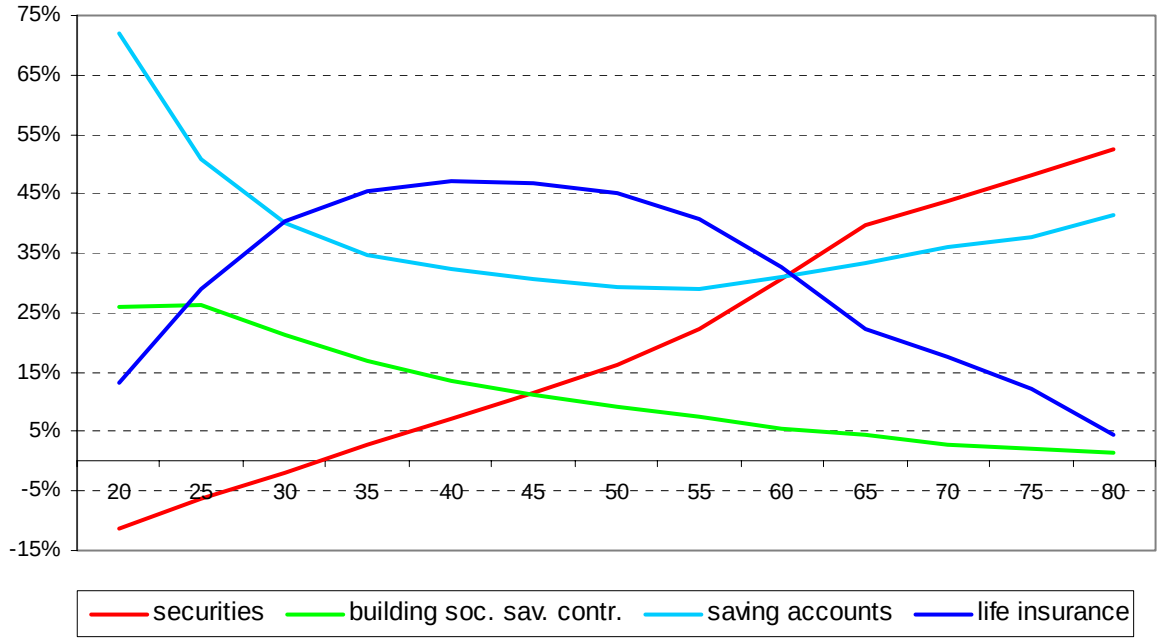
The oldest cohorts have a lower probability of holding building society saving contracts. This likelihood increases steadily for the cohorts born between 1920 and 1940 and remains flat for the younger cohorts. The life-cycle profile is slightly hump-shaped but flatter than the corresponding trajectory for life insurance contracts. The age-profile for life insurance indicates that the likelihood of holding life insurance increases until about age 35 and starts a slow decline from that age on. Participation rates start dropping back more sharply around age 60, when an increasing share of contracts becomes due. Looking at the cohort-effects we observe a clear downward trend over the generations, which only slowed down for the very youngest cohorts. Obviously the Deaton-Paxson decomposition picks up two trends at separate parts of the age-distribution. As the oldest cohorts are also observed largely at old age, the downward trend for these cohorts corresponds to the declining importance of death benefit insurance. The further decline of the cohort effects for the young cohorts is obviously "caused" at the other end of the age distribution where the young cohorts are largely observed. The cohort-effects obviously give a summary of two declining trends, which happened at different times and at different parts of the age-profile. It is quite obvious that the assumption of a unique age-profile, which is shifted between cohorts but remains unaltered in its shape, is a counterfactual. The same applies to the age- and cohort-profiles for the participation rates in securities.

Portfolio shares

Moving on to the analyses of the portfolio shares we make the same observations concerning the suitability of the underlying assumption of a unique age-profile. The cohort-effects of both, portfolio shares invested in life insurance and in securities, as well as the age-effects of the latter cannot be interpreted in a sensible way corresponding to the assumptions made. For the remaining asset classes – building society saving contracts and saving accounts – the estimated age-profiles again support our first impression from the pure descriptives. Saving accounts make for a relatively high portfolio share at young ages. Their importance is reduced strongly until age 40, bottoms out at around age 55 and increases steadily until old age. The portfolio share of life insurance takes a pretty much the inverted path: we observe a strongly increasing portfolio share up to age 40, which starts to decline slowly around age 50 and declines faster from age 60 on. Interpreting the age-profile of the portfolio share invested in life insurance we should be highly cautious though, as argued above. The importance of building society saving contracts is highest

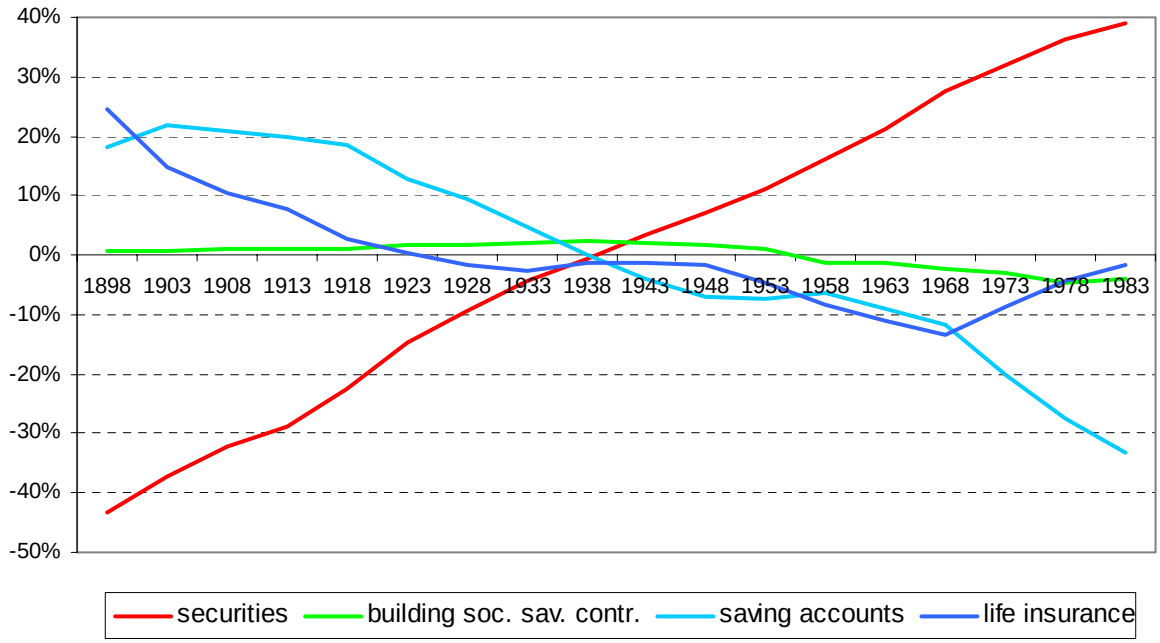
at young age and starts declining early in the life-cycle when other financial assets gain more and more importance in private households' portfolios.

Figure 14: Age-effects in portfolio shares (relative scale)



Source: EVS, own calculations

Figure 15: Cohort-effects in portfolio shares (relative scale)



Source: EVS, own calculations

The other lesson to be learned from this attempt to use a simple approach to decompose the trends we observe at the aggregate level is that the assumption of a unique age-profile may be a dangerous one. Only if this assumption holds, we will be able to separate the trends correctly, and eventually use the decomposition for a projection of future development. For the homogeneous assets – in our case saving accounts and building society saving contracts –, which are also mainly associated with just one saving motive, the assumption of a unique age-profile might work rather well. Looking at life insurance as it is captured in the EVS, we analyze a much more diverse category of products. Death benefit insurance, annuity insurance and whole life insurance are used for quite different purposes. Especially whole life insurance is widely used in Germany as a mid-term investment ("5+7" contracts[7]) and not to provide for old age. Because these heterogeneous products are pooled we observe separate changes to the age-profile of the compound measure. At best, we might have two unique age-profiles overlapping which were consecutively subject to cohort shifts: first, the declining importance of death benefit insurance. And second, the declining popularity of mid-term investments in whole life insurance, following the decline in guaranteed interest rates and the reduced subsidization of these products.

Generally, the decomposition into age- and cohort-effects crucially depends on the assumption of a unique age-profile. Any interactions – i.e. changes to the age-profile across cohorts – cannot be captured appropriately. There are a number of possible causes of such changes to the age-profile: Shifts in the retirement age will also shift the point in the life-cycle where households switch from saving to dissaving. Higher endowments at young age will allow an earlier access to the stock market if we think of the entry decision as subject to entry cost. A later start into work life, changes in household composition, as well as changes in earnings risk are other well known facts which will likely cause changes in the shape of the age-profiles rather than just shifts.

V. Conclusion

We start out from a comparison of aggregate trends in German households' portfolio shares and participation rates derived from micro data and from the National Accounts. We find the broad trends supported by both data sources: safe investments with banks, especially saving accounts

[7] These contracts typically consist of five years of contributions into the contract, followed by seven years of neither further contributions nor withdrawals. After the total of twelve years the investor can choose between a tax-free lump sum payment and a life-long annuity.

have played an important role in private household portfolios and still do so. Their portfolio share is continuously and strongly declining though. Life insurance has gained substantial importance since the 1960s. The rise of life insurance has been slowed with the increasing popularity of stocks and mutual funds in the 1990s. While participation in life insurance products dropped back in the last years, especially mutual funds saw a strong and steady growth. Their popularity continued through the stock market downturn. Mutual funds could still generate saving inflows while direct investments in stocks lost some of their previous importance. We find that only few investors finally quit the stock market though.

Looking at the underlying developments at the age- and cohort-level, we find that the rising importance of securities as well as the declining share of saving accounts can be found at almost all ages. Only the old participated in these changes to a lesser extent. With life insurance we observe a declining importance for the old and for the very young. Yet the reasons are likely quite different. For the old death benefit insurance has lost most of its previous importance. For the young, the declining guaranteed interest rates as well as the less favorable tax treatment of whole life insurance may have been the main reasons. If the young saved more in annuity insurance contracts to compensate for the reduced generosity of the public pension system, we don't see it in the data yet. The young might plan to use stocks, mutual funds and other securities to build up a stock of wealth until retirement to then buy an annuity from the accumulated wealth. But the reforms might just be too recent for behavioral adjustments to already show up in the data.

Comparing our findings with theoretical models a few things are apparent: first, portfolio composition clearly changes over the life-cycle. Second, the share of safe assets is highest for the young and bottoms out around age 55. That is, it starts increasing before the average retirement age and increases further throughout retirement. This latter fact is in line with most theoretical models and financial intermediaries' recommendations. The finding of high shares of safe investments at young age would be in line with those theoretical models, which include risky income streams and borrowing constraints. Third, we find the portfolio share invested in securities to be increasing for almost all cohorts. The share is still increasing or at least roughly constant for the cohorts in retirement. German retirees have been shown to not dissave much of their wealth throughout retirement (Börsch-Supan, Reil-Held, and Schnabel, 2002). Both facts would be in line with models including a bequest motive, as suggested by Abel (2002). Forth and last: we would expect life insurance to gain importance for the young cohorts. That is, because annuity insurance is a close substitute to public pensions, which have been cut back by the recent pension reform.

Last, we conclude that using a decomposition of the observed trends at the aggregate level into age- and cohort-effects strongly depends on the assumptions that there is a unique age-profile and cohort differences all take the form of parallel shifts to this age-profile. Both assumptions might well be at odds with what theoretical considerations of the changes to the public pension scheme imply. If such factors induce sufficiently large differences in the age profiles across cohorts the results from the decomposition in age-, cohort- and time-effects might not have the desired interpretation. The next step will therefore be to parameterize the differences across age, cohorts and over time in a microeconometric model of portfolio choice.

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Appendix

Table 6: Coverage rates in the EVS 1978-1988

	1978			1983			1988		
type of asset	FA	EVS	EVS coverage rate	FA	EVS	EVS coverage rate	FA	EVS	EVS coverage rate
saving deposits	459.1	216.3	47.1%	545.8	229.9	42.1%	699.6	273.7	39.1%
building society saving contracts	93.5	86.7	92.7%	122.8	112	91.2%	118	102.2	86.6%
time deposits	36.8	n.a.	n.a.	125.7	34.1	27.1%	144.3	37.4	25.9%
securities	240.4	103.4	43.0%	441.9	163.9	37.1%	646.4	211.2	32.7%
saving bonds	59.9	n.a.	n.a.	128.5	47.4	36.9%	164.5	72.1	43.8%
bank bonds	48	n.a.	n.a.	128.5	40.1	31.2%	104.3	29.7	28.5%
government bonds	46.6	n.a.	n.a.	69.1	26.9	38.9%	75.6	24.5	32.4%
stocks	55	n.a.	n.a.	71.2	32.3	45.4%	134.5	48.7	36.2%
mutual funds	24	n.a.	n.a.	31.8	8.4	26.4%	73.3	17.3	23.6%
other securities	6.9	n.a.	n.a.	12.8	8.8	68.8%	94.2	18.9	20.1%
life insurance									
other claims		n.a.	n.a.		n.a.	n.a.		n.a.	n.a.
private pension funds		n.a.	n.a.		n.a.	n.a.		n.a.	n.a.
other claims		n.a.	n.a.		n.a.	n.a.		n.a.	n.a.
gross financial wealth	829.8	406.4	49.0%	1236.2	539.9	43.7%	1608.3	626.9	39.0%

Source: Lang (1997), absolute numbers in billion DM

Figure 16: Time-effects in participation rates (relative scale)

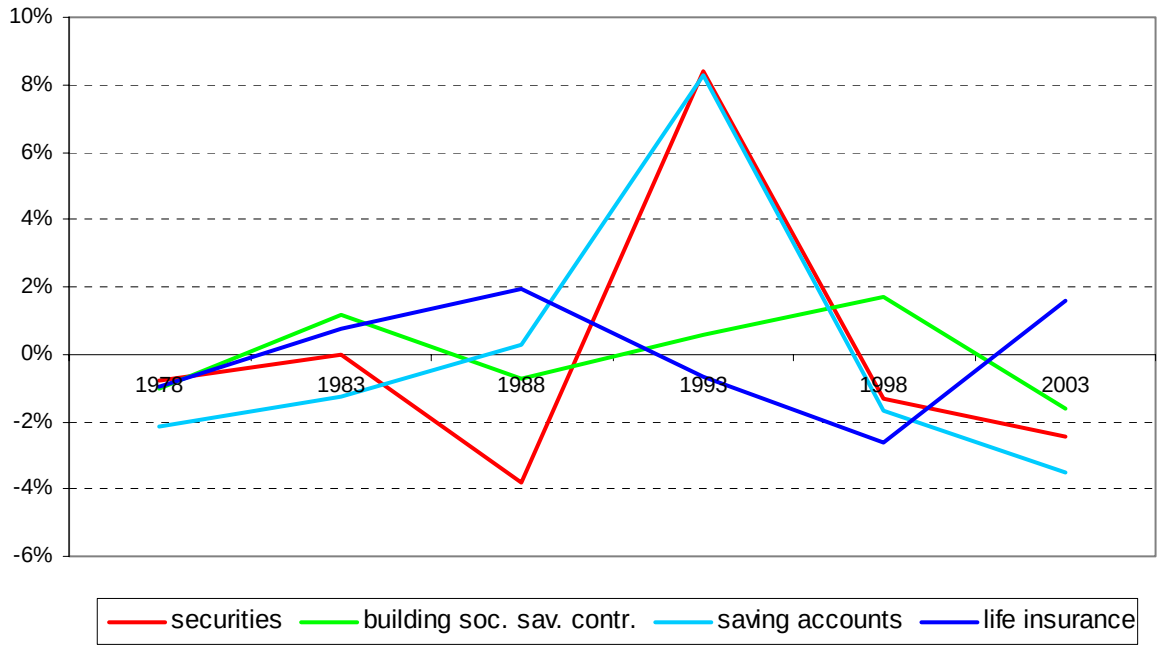
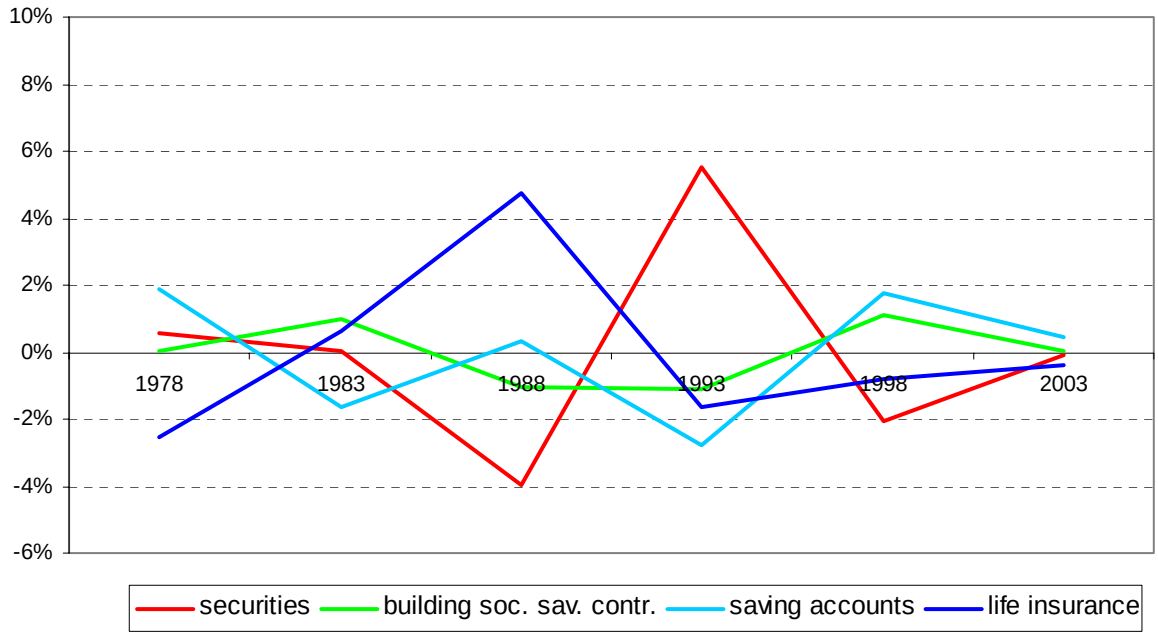


Figure 17: Time-effects in portfolio shares (relative scale)



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