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Measures for savings and saving rates in the German SAVE data set

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Measures for savings and saving rates in the German SAVE data set*

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Abstract: Saving is frequently measured using a one-shot question for total annual saving during the preceding year. This type of one-shot recall question might cause severe measurement errors since saving is a complicated concept which consists of various components, many of which respondents might not be fully aware of. This paper uses the SAVE data to analyze potential errors generated by this kind of questioning and provides remedies in order to construct the most of reliable saving measure given the information at hand.

Keywords: household surveys; savings behavior

JEL classification: D12

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1 Introduction

Savings and saving rates are a key element for the analysis of household behavior. They present the foundation for many different research areas, as e.g., how well households are prepared for old-age (the old-age provision motive), what measures they take to insure against unknown shocks (the precautionary motive), how important consumption smoothing is (the intertemporal substitution motive), among many others, which already have been almost completely by Keynes (1936), to which Browning and Lusardi (1996) added the downpayment motive to complete the list.

For an empirical analysis, micro data on households (or individuals) are needed to get an insight into peoples' actual behavior. The crucial variable is a precise assessment of households' savings. This sounds a lot easier than it can actually be implemented in a survey not only collecting savings and income, but also many additional variables inevitable for a broad behavioristic analysis.[1]

This paper goes to the very roots of respondents' understanding of savings. Do they realize savings just as the residual leftovers on their accounts after subtracting all monthly expenditures from all monthly net income flows? If so, then savings will heavily be underestimated. E.g., credit repayments in that sense would be expenditures but clearly are a savings component[2]. The same applies for monthly contributions to private savings and pension plans, whole life insurances or building society contracts, which might be perceived as an additional income tax even though these are discretionary contributions to build up private wealth. Even more complicated to assess are employers' contributions to occupational pension schemes since these contracts normally only tell the employee the future benefits of this kind of pension scheme.

Four kinds of measures for household savings are typically calculated. The first one is the first difference in net wealth since all savings have to be allocated to any form of financial or real investment. Not looking at the stock of wealth but at the contributions and withdrawals gives the second measure for savings (flow measure). The third one is the residual, or *epsilon* measure of savings which subtracts all expenditures[3] from all compositions of net income[4]. Concerning these measures, one has to be aware of the symmetry of positive and negative values, and to

[1] To visualize the complexity of a simple savings question, just ask yourself: "How much, on average, do I save per month?'

[2] Even though, loan and mortgage repayments have been incorrectly included in the one-shot question on total non-durable expenditures in the Canadian Out of Employment Panel *(COEP),* see Browning and Crossley (2002).

[3] Expenditures then are typically defined as total non-durable expenditures, excluding contributions to any saving accounts.

adjust flow and stock measures. This is the subject of Börsch-Supan *et al.* (1999)'s work. See also Brugiavini and Weber (2003) for a discussion on these saving concepts. The fourth one is to directly include a question on household savings in the questionnaire, leaving it to the respondents to deliver a reasonable assessment of private savings.

Much research has been done for almost all of the above mentioned savings motives, but they are far from being consistent even within a research area restricted to only one of the topics. Apart from differences in the econometric assessment of the topics and variations in their specifications, the data base used is frequently different. But not only the data base itself, also the dependent variable used differs. From which of the four measures are savings calculated from? In a very recent study, Alessie *et al.* (2004) compare savings and saving rates for the Italian Survey on Household Income and Wealth *(SHIW)* and the Dutch Socio-Economic Panel *(SEP)* using different saving concepts. For the flow measure, they compute the saving rate as *(Y-C)/C*- where *Y* is the sum of personal incomes of parents and child, and *C* is non-durable consumption. The procedure to the saving rate relative to consumption instead of income was proposed by Attanasio (1998) to avoid the problems of outliers and zero income observations. Alessie *et al.* (2004) also implicitly equal consumption and expenditures. This might sound tautological, but as Aguiar and Hurst (2004) very recently pointed out, the dramatic decline in expenditures at the time of retirement is matched by an equally dramatic rise in time spent on home production. This argument goes back to Becker (1986), who states that consumption is the output of a "home production" function that uses both expenditure and time as inputs. The innovation of that paper is that the authors empirically disentangle changes in actual consumption from changes in expenditures. Taken together, the results highlight how direct measures of consumption distinguish between anticipated and unanticipated shocks to income, while using expenditure alone obscures this difference and leads to false rejections of the PIH.

This paper presents concisely the main findings for savings and saving rates estimated with the *SAVE* survey. Section 2 quickly summarizes the definition of savings and shows which of the four saving measures can be computed with *SAVE,* while Section 3 concentrates on the assessment and measurement of the one-shot savings question in *SAVE.* Section 4 discusses the results from different correction measures for the one-shot savings question, and Section 5 summarizes this paper's issues.

[4] Income is the sum of all different income components, like wage and capital income, transfer income, and social security benefits.

2 Saving measures in *SAVE*

The *SAVE* survey bears the possibility to calculate savings in three of the four ways described in Section 1. The first one is the first difference in financial wealth components, while the second one would be the *epsilon* measure of savings as the difference between all components of household income and total non-durable expenditures, which are asked in *SAVE*. The third one is a one-shot saving question asking for total savings a household achieved in the last year, without explicitly guiding the respondent by using a comprehensive list of components which typically should be accounted for.

This section quickly depicts and explains potential problems for each these three savings measures.

2.1 First difference in wealth

Financial wealth is asked for the beginning and the end of the calendar year previous to the survey field time. A savings measure often found in the empirical literature on savings and savings behavior is to calculate savings as the difference between financial wealth at the end and the beginning of the preceding year. Ignoring changes in the credit situation or real wealth allocation, including homes, this shows even conceptually a massive flaw. Any reallocations from real to financial wealth or the other way around would be registered as savings/dissavings, even though this is clearly without effect on the total wealth situation. The same is true for short selling, or credit financed investments. Other problems are of empirical nature. Values for the total amount in certain wealth categories like saving accounts, stock, or mutual funds, certainly are as much due to recall error as the one-shot savings or expenditure questions. Additionally, it is impossible to distinguish between 'active' and 'passive' savings (putting money into that financial wealth category, or does market appreciation/depreciation account for higher/lower values at the end of the year?).

2.2 Residual measure

A third savings measure would be to compute savings as the residual measure (difference between savings and expenditures). This savings measure requires two variables to be reliable. The first one is income; see Essig (2005) for a discussion on income values in *SAVE* .

The other variable, expenditures, has been proven to be a rather imprecise measure for households' expenditures, cf. Browning *et al.* (2003) or Winter (2004). Knowing these results before including the expenditure questions, there were also four sub-items included from which is known that they are typically remembered very well; based on these sub-items, Browning

et al. (2003) proposed a method to impute total non-durable expenditures in a way to fitting factual values much better than the one-shot question's values. This is done by Essig (2004) for the *SAVE* data using the *EVS* 1998 as an external data source.

Even if expenditures were assessed correctly by this procedure, there is still a conceptual problem. Durable consumption goods are difficult to assess. First of all, there are no data on durables in *SAVE*. Second, durables affect savings not by the time they are purchased, since they represent at that time wealth in equal size, neglecting transaction costs. More relevant is the useful economic life to calculate the depreciation rate, which about represents the periodical consumption value. But these data are extremely difficult to assess, for which not even diary-based consumption and expenditure data are a reliable data source.

2.3 One-shot saving questions

The *SAVE* questionnaire also contains a direct one-shot question to yearly savings. This might well be subject to the same problems being discussed in the context of the one-shot expenditure question.

The following section will explain more deeply the possible problems and correction methods for this one-shot savings questions.

3 Reliability of one-shot savings measure

This section argues that filtering might cause an underestimation of savings, and discusses the treatment of credit repayments, contributions for life insurances and different pension plans. I will also compare the values to the official numbers from the German Federal Reserve bank.

3.1 Problems due to filtering

The direct question for total last year's savings in *SAVE* follows a set of preliminary questions. These include who in the household actually makes the financial decisions, whether respondents talk with other persons inside/outside the household about financial concerns, and who files for the income tax declaration. Next, respondents were asked about the reception of one-off payments like inheritances, tax refunds etc. as well as about the allocation of these one-off incomes. Questions checking whether the household pursuits a certain savings goal and by what time that goal shall be reached follow. In addition, a 'meet-ends' question is included as well as a filter question for a self-assessment of actual savings behavior[5]. The one-shot

[5] 'I/we save a fixed amount regularly,', 'I/we put something aside each month but I/we decide on the amount according to the financial circumstances', 'I/we put something aside when we have something left over to save', 'I/we do not save because we do not have enough scope financially to do so', '/we do not save because we would prefer to enjoy life now'.

question was asked as: 'And finally: Could you tell us how much money you and your partner together have saved in the year 2000?', only for respondents who did not choose the fourth or fifth item of the filter question[6] and did not refuse to answer to the filter question.

Table 1: Origin of nonpositive numbers for one-shot savings question

		TPI 2001	CAPI 2001	CAPI 2003	RR 2003	TPI 2004
N	660	1169	486	2184	483
obs. lost due to filterin	11.2%	17.0%	18.4%	24.2%	17.0%
ref. in filter	1.4%	0.6%	0.6%	0.6%	1.0%
# HH for one-shot savings question	586	970	396	1655	401
does not apply / did save nothing	20.3%	21.2%	20.3%	19.5%	22.0%
refusals	4.3%	17.2%	18.5%	15.5%	3.2%
positive values for savings	442	597	241	1076	301
imputed zero saving values					
in % of all obs. for savings	29.4%	40.0%	40.8%	43.6%	34.5%

Source: All *SAVE* subsamples.

Table 1 shows the different stages which lead to zero values of savings (be these zeros correct or incorrect). Due to filtering, 19.5% of all respondents were not asked for their savings.

To see what the filtering implies for the resulting data, I apply the statistical error types I (rejecting a true hypothesis) and II (not rejecting a false hypothesis) to the filtering process. Filtering bears the chances of a type-II error (household does not save, but should do so according to the filter process; this is depicted in Table 2) as well as of a type-I error (household saves but was cancelled out in the filtering process). The type-I error will lead to an underestimation of savings and saving rates since for these households zero savings are assumed.

Table 2: Display of the type-II error

	TPI 2001	CAPI 2001	CAPI 2003	RR 2003	TPI 2004
regular savings					
N	391	417	186	769	249
% of zeros in savings question	14.3%	10.1%	9.1%	10.9%	16.1%
% refusals	4.1%	18.7%	21.5%	14.3%	3.6%
flexible savings					
N	57	277	110	437	52
% of zeros in savings question	14.0%	14.1%	16.4%	14.7%	19.2%
% refusals	3.5%	19.9%	20.9%	19.2%	3.9%
saves occasionally					
N	89	276	98	449	84
% of zeros in savings question	53.9%	45.3%	45.9%	38.8%	39.3%
% refusals	5.6%	12.3%	10.2%	14.0%	2.4%

[6] "can't save / don't want to save".

Source: All *SAVE* subsamples.
Notes: The share of zero values should be rather low for the first two categories. The difference of the shares is very small for the filter-categories "saves regularly a fixed amount" and "saves flexibly". For the third filter category "saves occasionally", the share of zeros is very high (43.5%).

Households claiming not being able (or willing) to save show the following pattern which is depicted in Figure 2. The dependent variable refers to the filter question and takes on the value 1 if the respondent answered not being able / willing to save and 0 otherwise.

Significant variables which raise the probability for not being able/willing to save are dummies for: retirement; unemployment and partial unemployment; whether the respondent is partially, little ('geringfügig'), or not employed; separated/divorced; and a dummy for credit repayments. Negative significant dummy variables are: self-employed; females; households living in Eastern Germany; and dummy variables for the ownership of financial wealth categories all financial wealth categories except bonds. Second-order polynomials for income and age are also negative significant, but not depicted in Figure 2.

Insignificant variables, which are not depicted in Figure 2 are: dummies for schooling; dummies for the job type except self-employed; dummy variables for kids and kids living in the same house; a partner dummy; and dummies for the different *SAVE* subsamples.

An important insight from the analysis of the savings ability is that households might *not* consider credit repayments being savings. This is shown by the positively significant coefficient of credit repayments (since the dependent variable takes on the value one if not being able /willing to save). Not adding credit repayments to savings therefore would lead to an underestimation of savings.

When looking at the values given for the one-shot savings question, one can see that about one fifth of respondents answered to having zero savings or below[7], further 13% refused to give values. In the following analyses for zero values and refusals will be separated.

Figure 3 shows marginal effects of different significant regressors for the probability to give zero values. Next to the results in Figure 2, one can see that values for savings ability are consistent with the probability to give zero values: households saving regularly a fixed amount answered significantly less frequently with zero values than households who save only occasionally. While credit uptakes influence saving measures consistently, credit repayments are not understood as savings (as shown before); again, the coefficient is positive significant.

The corresponding analysis of refusals for saving values will only be mentioned here. Only four variables from the set of 39 explanatory variables were significant: unemployed, occasional

savers, households from the two TPI subsamples and households with credit repayments have a lower probability to refuse the answer. For occasional savers and credit repayers this can be explained by the fact that these types have a higher probability of answering with zero values.[8] Income, age, schooling, and job variables have no influence on refusals.

Looking at the values from the one-shot saving question, one can observe in 27 cases saving rates which exceed net monthly income when savings is recalculated for a mensual measure.[9] For three of these 27 cases high savings can be explained by high one-off income sources.[10] For the remaining 24 cases, saving rates are up to 1100% what in turn can heavily affect means. Four reasons for these values can be thought of. (1) Respondents gave wrong numbers which were recorded "correctly" (in CAPI interviews). (2) Respondents gave correct numbers which were recorded incorrectly (in CAPI interviews). (3) Respondents thought of the correct values but gave wrong numbers concerning one or two decimal places; these values were then recorded "correctly" (in CAPI interviews). (4) Respondents thought of and registered correct values which were then incorrectly scanned and transferred to computer data by the survey agency (in P&P interviews). There is a fifth possibility, which also occurred with the data at hand, but was recognized by the author and corrected accordingly by the survey agency: variables can be coded incorrectly, which gives implausible values for any observation or no variation between observations. This is the most unproblematic case.

The 24 implausible cases distribute to the modes P&P with 10 cases (1.4%) and CAPI with 14 cases (0.8%). There are two ways of dealing with these 24 cases. First, all of these cases can be coded as missings. Second, if it is believed that errors in the transmission process are responsible for the high savings / saving rates and if the error lies in the imprecision of one decimal place, savings can be divided by 10. The latter way was applied here.

3.2 Perception of savings

Figure 1 might be helpful to illustrate the challenge of precisely measuring savings. A household is planning the acquisition of a consumption good which, since depicted as a durable good, he will consume for a certain time period. This acquisition can be financed in two ways. First, he can take up a credit (Figure 1, left hand side), or he can save the financial means needed (Figure 1, right hand side). When only looking at the latter case, one would ne-

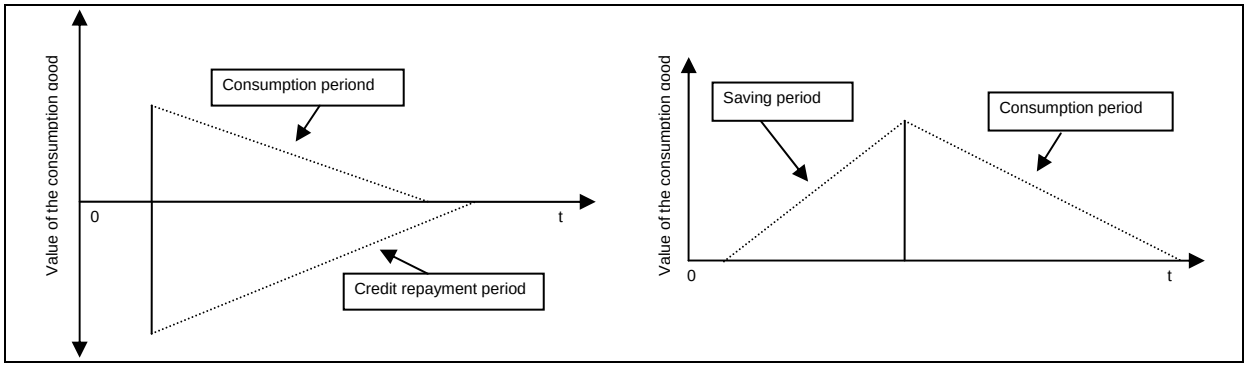
[7] Cf. Table 1. Negative savings are censored to zero due to the question ("did not save / have dipped into savings").
[8] Running a multinomial logit regression with the three choices "Positive values", "zero/negative savings", "refusal", the results are in line with the findings from the binary model.
[9] For the procedure for checking income values, see Essig (2005).

glect households with a higher time preference who prefer to consume now rather than after the saving period. Credit repayments thus are savings as well as the accumulation of assets.

3.2.1 Credit repayments

Credit repayments only compare to savings if they are not produced by wealth reallocations. Balance sheets would be shortened if credits were repaid through the liquidation of wealth. This is why I only add credit repayments to savings if they do not exceed 50% of net income.[11] If zero saving values were given, savings just equal credit repayments. This procedure is costly in the sense of data loss due to consistency reasons if observations are dropped if values for savings *or* credit repayments were refused.

Figure 1: Financing a consumption good



Notes: The depicted consumption good is a durable; its consumption period about equals the depreciation period. If consumption is immediate (voyages, dinners etc.) the consumption period reduces to 0, such that the downward sloping line of the consumption period would become a vertical line. The value of the credit is larger than the value of the consumption good if interest rates are positive, as depicted.

At the same time, credit uptakes as such would typically not affect savings, as in most cases the uptaking of a credit would be related to the acquisition of a durable good of similar size (equal size + interest rate markup + adminstration fees). This would result in a 'longer balance' since the liquidity inflow faces an expenditure position (capital asset) of equal size (e.g. durable consumption goods like furniture, cars, technical equipment etc.; housing). Credit uptakes therefore will not be subtracted from savings; only repayments will be added.[12] In total, 32% of respondents declared to repay credits, and 5% to have new credits taken up. 64% of all homeowners are indebted, and 38% of tenants.

[10] *SAVE* asks for one-off payments like inheritances, lottery gains, or tax refunds. 78% of all surveyed households declared not having received any one-off income sources; the most common income source of the group which received any or several one-off payments tax refunds was the most common case.
[11] This rather high share of net income can be reasonable since high debit interest rates might force households to quick repayment.
[12] There is no way in the data to tell whether the credit uptake is used to finance a durable or non-durable consumption good, and thus I implicitly assume the usage for a durable good.

3.2.2 Contributions to life insurance

Having controlled for credit repayments, it is still unclear what exactly households have in mind when thinking about savings. Is it the sum which remains on the account at the end of the month (the balance of labor, capital and transfer income and total expenditures)? This certainly would underestimate savings, since it neglects credit repayments, as argued. Additionally, other expenditures are not completely consumption expenditures. Regular contributions to certain capital investments (whole life insurances, saving plans, building society contracts) could well be perceived as additional taxes on income. Heckman selection regressions for gross saving rates[13] on an income and age polynomial and a set of household and individual characteristics and a set of dummy variables for the ownership of each financial wealth category and for credit repayment show that five of the six financial wealth dummies are positively significant except for whole life insurances. This might be an evidence that contributions to whole life insurances are possible not included in respondents' saving values. This section will explain how this can be remedied.

Whole life insurance represents the Germans' most important instrument of private old-age provision, cf. Walliser and Winter (1999). 52% of all male respondents answered to own a life insurance contract as well as 34% of all respondents (weighted; unweighted: 38%). This share is below the values observed in the EVS 2003 where the share for all respondents is at 46%. The ownership of life insurance contracts strongly differs between the SAVE subsamples.

Table 3: Life insurances: ownership rates

	TPI 2001	TPI 2004	CAPI 2001	CAPI 2003	RR 2003	all
Ownership rates	50.6%	27.5%	39.2%	32.4%	26.4%	33.5%
Panel comparison	↔		↔			
only in 2001 / withdr.	33.1%		17.2%			
neither in 2001 nor in 2003/2004	40.3%		52.4%			
in both 2001 and 2003/2004	22.5%		24.5%			
only in 2003/2004 / new contr.	4.1%		6.0%			

Source: All *SAVE* subsamples.
Note: Weighted values.

Table 3 shows the differences in ownership rates between the subsamples. It should be taken into account that the first line only shows values for the whole subsample; thus the observation that ownership rates dropped between 2001 and 2004 in the TPI subsamples by 23% is not valid. This is shown in the panel comparison where, of course, only values are shown for households being observed in both years. For these households, some differences occurred between 2001 and 2004: 33% claimed to having owned life insurances only in the first year,

[13] The original values given to the one-shot question.

only 4% in the year 2004 if they had none in 2001.

The decline in life insurance ownership has also been documented by Braun *et al.* (2002), Figure 22b, with values measured with the *EVS,* but the 2003 wave reports even lower values than predicted by Braun *et al.* (2002) (52% predicted for 2003, 45% reported in the *EVS* 2003[14]). Similar results are reported by the Gesamtverband der deutschen Versicherungswirtschaft (GDV) (2003). For the past year, trends for life insurances are summarized as follows: (1) significant growth of contributions for new contracts where one-off payments grew higher than the regular contributions; (2) significant reduction of new contracts; (3) growth of new contributions, and (4) growing contract payments (Leistungsausahlungen).

Contributions for life insurance contracts are normally paid on a regular monthly basis and therefore have a similar character to contributions for the public pension system (GRV), which might lead households to the thinking not to include the contributions into savings, but to view them as some sort of tax.

When considering wealth data, one should keep in mind how they were asked in the surveys. *SAVE* is, as most general-purpose surveys, not diary-based, but collects recall information. Values are thus much more due to response error. When looking at the wealth information closely, one can see that in 8 cases, wealth at the beginning and the end of last year differ by the factor 10, 100, 1000 and 10,000 (ex.: wealth at the beginning of the year = 12,000 €, wealth at the end of last year: 12 €), so it must presumed that households think of the same value in both cases but the observed value is wrong by one of the four errors mentioned above. These eight values have been corrected accordingly.[15]

Contributions to life insurances approximately calculated by the difference in life insurance wealth at the end and the beginning of the year. If numbers were correct, the difference includes the internal rate of return as well as the reduction of the cash-in penalty. One has to take account of the possibility that wealth was removed in that period (negative contributions), and further that this difference, recalculated for a monthly basis, does not exceed a certain income share. If this would be the case, then this wealth difference might only be realized by the reallocation of wealth and not by savings from current disposable income. This share of income which is to be assumed with 1/3, which is less than the assumed share for credit repayments with 1/2 since the contributions would take place on a regular basis. High debit interest rates

[14] Own calculations.

might force higher repayment rates which is the reason to allow for higher shares.

3.2.3 Old-age provision

Occupational pension schemes In 2001, the SAVE questionnaire included the financial wealth category "Other contractually defined private old-age provision, e.g. special old-age provision assets or private pension policies". After 2001, this question was split up into three separate questions: (1) occupational pension schemes[16]; (2) fiscally subsidized private old-age provisions ('Riester-Rente')[17] and (3) other contractual private old-age provisions[18]. Along with the split, the design was slightly changed. Individuals are not only asked for the pension wealth at the beginning and the end of each year, but also for employer and employee (own) contributions separately for each pension scheme.

If the three sub-items for private pensions are aggregated in 2003 and 2001 and compared to the year 2001, the following results can be seen.

Table 4: Private old-age provision: ownership changes

	TPI 2001	TPI 2004	CAPI 2001	CAPI 2003	RR 2003	all
Ownership rates	19.40%	24.40%	11.70%	26.60%	20.20%	19.10%
Panel comparison	<—>			<—>		
only in 2001 / withdrawal	4.10%			11.90%		
neither in 2001 nor in 2003/2004	65.60%			63.70%		
in both 2001 and 2003 / 2004	13.40%			8.50%		
only in 2003/2004 / new contr.	16.90%			15.90%		

Source: All *SAVE* subsamples.
Note: Weighted values.

The results from Table 4 can be divided into the three pension schemes, which is presented in Table 5.

When we only look at fully dependently employed, the ownership rates of occupation pension schemes rises to 20.4%. This is less than half the values Kortmann (2003) finds (44% for men and 39% for women) using data from private and public employers, pension fonds and

[15] This procedure was done accordingly for all components of financial wealth. In *SAVE* , financial wealth consists of six categories in 2001; in 2003, private old-age provisions was asked in a more detailed manner, which raises the number of financial wealth categories to eight. If only one value was available for the beginning or the end of the last year due to refusal, the missing value was replaced by the observed one thereby assuming no wealth difference.
[16] This comprises defined pension plans, pension fonds and 'Direktzusagen'.
[17] E.g. 'staatlich geförderte und zertifizierte Sparanlagen, die nicht vor Ruhestandseintritt auflösbar sind.'
[18] Which in Germany is: 'Altersvorsorge-Sondervermögen oder private Rentenversicherungsverträge, die nicht staatlich gefördert werden bzw. abgeschlossen wurden, bevor es solche Fördermöglichkeiten gab'.

'Pensionskassen', and all administrators of private pension schemes in the public service[19]

Table 5: Ownership rates of different old-age provisions

	CAPI 2003	RR 2003	TPI 2004	all
Occupational pensions	13.3%	11.2%	14.1%	12.0%
Fiscally subsidized old-age provisions	5.8%	4.7%	5.9%	5.1%
Other old-age provisions	13.2%	7.6%	9.8%	8.9%
conditional on full employment[a]				
Occupational pensions	19.5%	17.5%	20.4%	18.4%
Fiscally subsidized old-age provisions	7.6%	7.9%	9.2%	8.1%
Other old-age provisions	19.0%	13.3%	14.7%	14.5%

[a] For couples: if male partner is fully employed.
Source: All *SAVE* 2003 and 2004 subsamples.
Note: Weighted values.

Following the arguments from the last section, one should also consider to impute private old-age pensions and add the contributions to savings. There are two problems associated with that procedure. First, nonresponse is very high.[20] This clearly is the consequence of the problems immanent in the complexity of this topic. Employee and especially employer contributions for occupational pension schemes are certainly less well known than own contributions to other private pension schemes or life insurances. Second, answers are frequently inconsistent: the difference of stocks equals the contributions in many cases, but the question asked for monthly contributions. It can be assumed that respondents gave a crude approximation for the pension stocks, and took the year's differences as contribution measures. These values have been divided by 12, accordingly. Still, the refusal level is an issue; a correction of savings by these contributions is associated with a high loss of observations. An alternative would be an imputation of contributions, measured as certain percentage of net income for households, who own the respective private pension category. The contributions to occupational pensions relative to *net* income are measured as 3.1%/3.0% (mean/median; weighted values) for the *SAVE* 2003 and 2004 data; N=372, after imputation.

Unfortunately, there is no possibility to check these numbers by an external data source; the *EVS* represents in this respect no outside data source, and numbers for occupational pension scheme contributions have never been estimated relative to net income. The best differentiated data source for occupational pensions so far is Kortmann (2003).

Fiscally subsidized private pension schemes The contribution rates for 'Riester'-pensions can be imputed relatively easy: the so-called 'Riester'-stairs gives an lower and up-

[19] 'Träger öffentlicher Zusatzversorgungsleistungen.
[20] Conditional nonresponse is at over 70% for stocks and 66% for contributions for occupational pensions. For the other two private pension schemes, values are comparable.

per bound for private contributions. In 2002, 1% of last year's gross income are the necessary investment to receive full fiscal subsidies. It rises gradually rises to 4% in 2008. Own contributions and subsidies accrue the pension plan. The full regulation is shown in Table 6.

Table 6: Minimum and maximum contribution rates to 'Riester' saving plans

Investment year	Minimum contribution rate in % of gross income	Maximum contribution for fiscal subsidies	
2002 and 2003	1%	525 €	
2004 and 2005	2%	1,050 €	reduced by basic
2006 and 2007	3%	1,575 €	and child allowances
2008 and later	4%	2,100 €	

Note: In principal, lower contributions than the minimum are possible, but subsidies will reduce accordingly and thereby the incentives.

For the current contracts, the following steps were made: (1) 'Riester'-contributions refer to gross income, but *SAVE* only collects net income. The ratio of gross to net income for the average income earner was 64%, which was taken as a proxy for all households. Contributions therefore have to be multiplied by the inverse value of about 1.6. (2) Maximum contributions are given by the values shown in Table 6. (3) For *SAVE* , the years relevant to impute current contributions are the years 2003 and 2004, only.

If one is interested in projecting values over the life cycle, minimum contribution rates have to be calculated as weighted averages of the numbers in Table 6 with the weights being the years to retirement: the younger and thereby the longer retirement age lies ahead, the higher is the weight for the 4% value for calculating *average* contribution rate. Example: minimum contributions are 3.5% for a today 40-year-old entering retirement at age 65, 3.2% for a 50 year old, 2.0% for a 55-year-old, and 2% for a 60 year old.

Other private old-age provisions Like for the situation of occupational pension schemes, external data sources are limited, which requires to take another look at the data in *SAVE*. 281 respondents claimed to own private pensions in 2003 and 2004. In the data for stocks and contributions, we only observe 21 cases containing full information. The procedure is comparable to dealing with occupational pensions.

1. For all observations which include stocks as well as contributions: If contributions equal the difference of year's end and year's beginning, they were in sum (employer and employee's contributions) or, if only one is available, separately divided by 12 since monthly

contributions were mixed up with annual contributions.

2. If either employer or employee's contributions were refused, the other value was *not* imputed since I assumed that other private contributions were made without employers' contributions (unlike for occupational pensions).

3. After that, contributions were compared to net income. If that share was higher than 20%[21], the contributions were calculated as the difference between the two stock values, divided by 12.

4. In the next control stage, the mean of the corrected shares was calculated conditional for shares being smaller than 30% of net income; this conditional mean was used to impute the missing contributions relative to the net income.

5. Contributions being larger than 30% were replaced by the conditional mean share as well. In total, the mean contribution share (of all original and imputed values) is at 5.2% of net income.

3.3 Imputed rent

If comparing the wealth situation at old age, it seems advisable to take the housing wealth into account since this typically represents the household's largest wealth asset. This can be done in two ways. First, one could treat housing wealth as if it was paid out as an annuity over the rest of the life cycle. The second alternative is to use the imputed rent of the owner-occupied housing. This construct compares the housing wealth to comparable market rent payments a household had to pay if he would sell the house and rent a similar object.

Estimates for the imputed rent relative to the worth of the concerning housing are about 3.9% p.a. (median) and 4.7% (mean) based on weighted values in the *EVS* 1998. These values are slightly below those of the Ring Deutscher Makler (RDM).[22]

Comparing values from the *EVS* and the RDM, I presume a value of 5% p.a., or 0.42% per month.

The difference of the imputed rent and the annuity method lies in the time horizon. While it is infinite for the first one, the second one depends on the duration of the annuity payments

[21] This is assumed a lower share than for life insurances and credit repayments since the regular contributions to old-age provisions are typically not a high share of monthly net income.

[22] Values are shown separated for houses/flats which were built before/after 1940. The RDM publishes these numbers for 256 cities and regions. In Eastern Germany, these values are much higher than in Western Germany. This means that in the Eastern part, purchase prices for houses are much lower. Munich, for example, shows very low imputed rent values which can be translated in the belief that housing worth will not significantly deteriorate and can collect rent payments for a long time horizon, or otherwise, the market is assumed to be less volatile.

which is in the case at hand given by the year of death. A simple example would make this clear. Assume a house worth 500,000 e. If it was sold and the sum annuitized for a monthly rent payment with the duration given by the difference of life expectancy minus the retirement entry age, which is assumed to, say, 30 years, it would pay a rent of 2,071.21 € per month if real interest rate was 2.8% percent p.a. The same housing wealth assumed as monthly imputed rent would then be 2083.33 e, nearly exactly the same amount. Of course, this comparison is highly age-dependent: A shorter life expectancy clearly would raise the annuity, while the imputed rent delivers the higher value for later years of death.[23]

There is another way to retrieve an additional income flow from home ownership: reverse annuity mortgages. The reverse mortgage pays a regular income, and typically is available regardless of current income. The amount one can borrow depends on age, the current interest rate, other loan fees, and the appraised value of the home. Generally, the more valuable the home is, the older one is, the lower the interest, the more one can borrow. No payments are needed, because the loan is not due as long as the house is one's principal residence. The loan is repaid when the occupation of the home ceases (by death, or by selling the home).

4 Computing savings and saving rates

After the discussed steps of calculating different possibly unconsidered monthly savings, the question arises: what kind of difference does it make? Does it only affect households who have rather high monthly savings anyway, or does this also significantly change the picture of savings we get for poorer households? I will also quickly mention the results for the other two savings measures in *SAVE* (difference in financial wealth and residual meausue).

4.1 Corrected one-off savings measure

The effects of four different saving measures are shown in Figures 4 and 5. Differences between net and gross savings[24] are 1.4%/0.2% (mean/median), N=2391. The means and median values are summarized in Table 7.

Table 7: Saving rates with different savings components

	Gross saving rates	Net saving rates	Net + LIC[a]	Net + LI + POAC[b]
Mean	9.4%	10.8%	11.4%	12.3%
Median	3.5%	3.7%	4.2%	5.1%
Standard error	23.7%	30.7%	31.1%	31.5%

[23] Assuming that the annuity depends on individual subjective life expectancies and not on standardized life tables.
[24] Gross savings are defined as the values retrieved from the one-shot savings question, while net savings are gross savings plus credit repayments.

Share of HH with 0 savings	43.1%	42.6%	40.4%	35.6%

[a] LIC = Contributions to whole life insurances.
[b] POAC = Contributions to private old-age pension schemes.
Source: SAVE 2003 and 2004.
Notes: Weighted values. N=2391 —> only values if all measures were observed for each observation. The official statistics of the German Federal Reserve bank show values of an average of 10.8% for saving rates in 2003.

The results of Table 7 make one point very clear. Adding different contributions, debt repayments etc. to gross savings does not change much for households which do not save at all. The share of non-savers goes down from a high rate of 43% to 35% after adding five flow measures (credit repayments, contributions to life insurances, occupational, fiscally subsidized and other private old-age provisions). This means that the inequality of the savings distributions will not decrease but rather increase after correcting the one-shot savings question. The largest drop in non-saver rates is achieved when accounting for all private old-age provision types which is an additional hint that respondents might systematically ignore certain saving components which require contributions on a regular basis.

The results from Table 7, though, must be seen in the light that the one-shot savings question probably suffers heavily from underreporting. A similar analysis for the one-shot total non-durable expenditure question can be found in Essig (2005b). But unlike response rates for the expenditure question, direct and indirect refusals for the savings question are much more frequent. So in addition to the probably underreported values itself, there is an information loss due to these refusals, as well as through the type-I error in the filtering process. In addition, many of the zero values might well be no true zeros, as shown in Section 3.

4.2 Other savings measures

Calculating saving rates from first differences in financial wealth shows values of 5.2 (mean/median) with 2123 observations for *SAVE* 2003 and 2004 with 8.2% observations being below zero, and 52% being exactly zero, which supports the previous findings that respondents tend to repeat values (year's beginning values for year's end).

The residual measure of savings, no matter whether the one-shot or the imputed non-durable expenditure measure is used for the computation, proves to be extremely noisy. As is shown by Essig (2005b), about one fourth of the imputed non-durable values are higher than net income. The mean/median saving rates are 22%/33% [25]; using the one-shot expenditure values, saving rates rise to 49%/60%. Values reach implausible values, e.g. the one-shot expenditure question takes on values up to 17 times the corresponding monthly income. The question

[25] If income is not used in the estimation and imputation step, saving rates are 12.0%/28%; cf. Essig (2005b).

explicitly only asked for *normal* non-durable expenditures, supported by show cards.

Computing savings by any of these two means seems little promising. Stocks of financial wealth are very often the same for the beginning and the end of the year, or implausibly remote. Non-durable expenditure values are also problematic. Even though the imputed values do a slightly better job, they entail other problems, cf. Essig (2004).

5 Conclusions

This paper shows potential flaws of and limited possibilities to correct a one-shot saving question. Any measure to 'correct' the values given by the respondents is associated with rather untestable hypotheses. Hints are shown that respondents indeed do not include contributions to whole life insurances. For that reasons, the one-shot measures are corrected for credit repayments (=net savings), contributions to whole life insurance, and to old-age pension schemes. Mean values rise from 9.4% from the original one-shot question values to 11 .4% when including credit repayments and imputed contributions to life insurances, and to 1 2.3% when additionally including contributions to all three types of private old-age provision. It is unclear, though, which of these items is already part of the values and are therefore accounted for twice. The share of non-savers, in contrast, does not change remarkably when including credit repayments and contributions to life insurances; the drop is larger when adding contributions to private old-age provisions.

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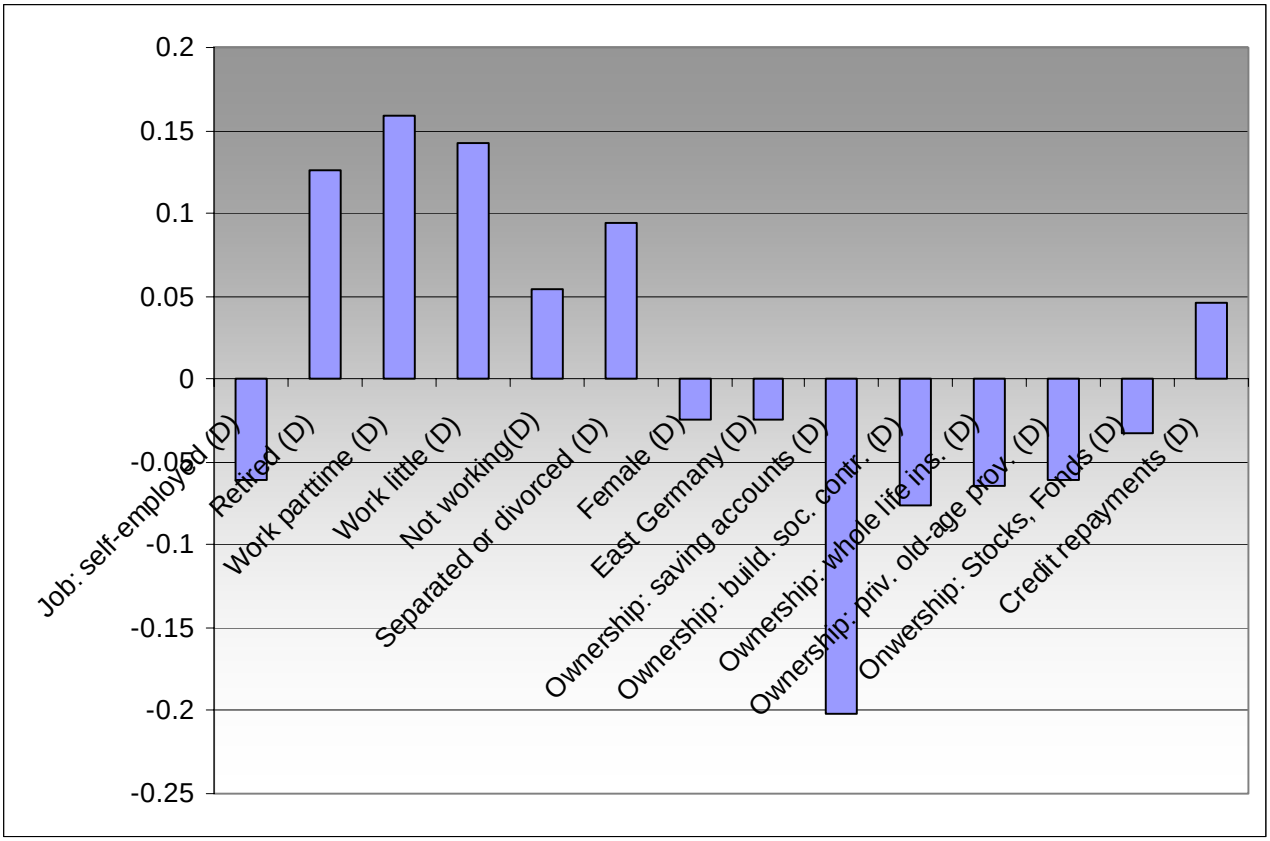
Figures

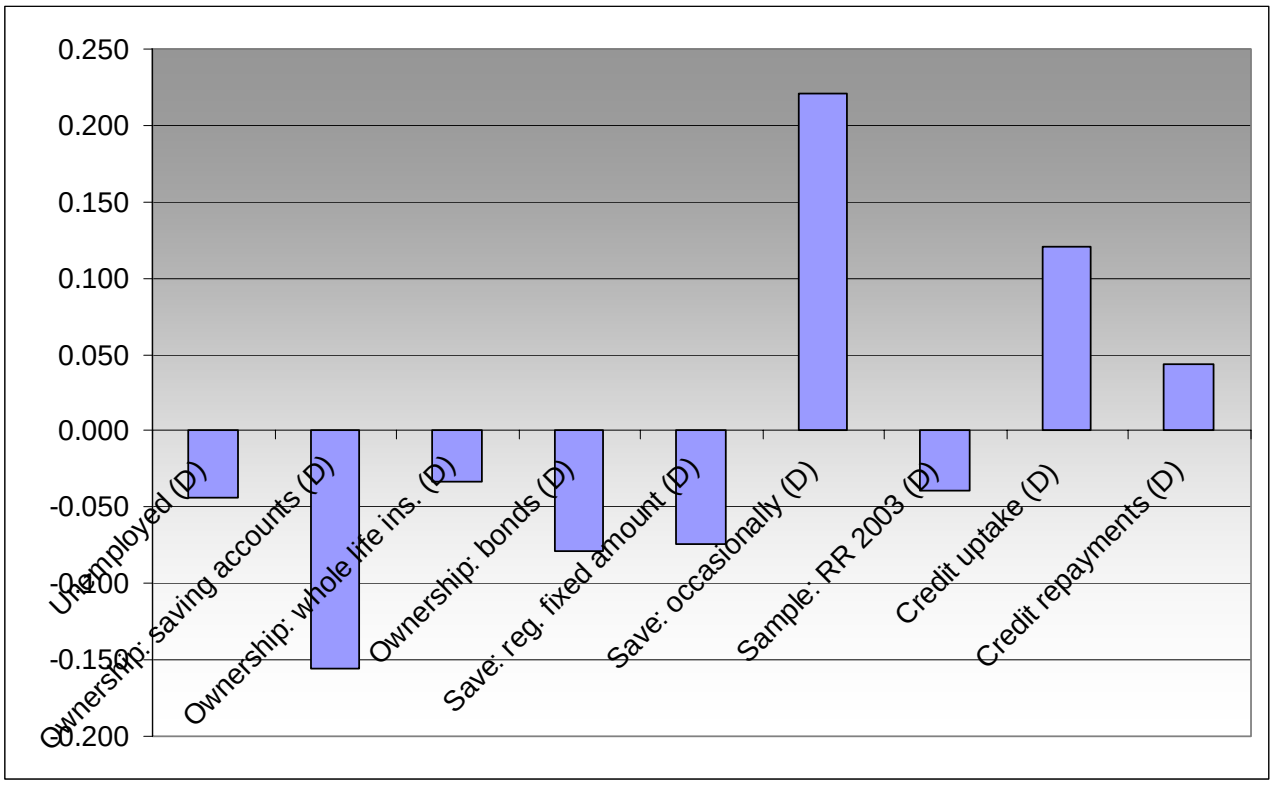
Figure 2: Marginal effects: influence of household- and individual characteristics on the savings ability



Source: All SAVE subsamples.

Notes: Dependent variable takes on the value 1 if respondent answered not being able / willing to save and 0 otherwise (one of the first three categories of filter question). Only significant coefficients displayed. Income and age not displayed: negative influence up to 23.000 €/months and up to age 57 years. Columns show the marginal effect of a change from 0 to 1. Ex.: Owners of saving accounts have 21% lower probability not being able to save. The brighter the figure, the higher the probability for savings capability.

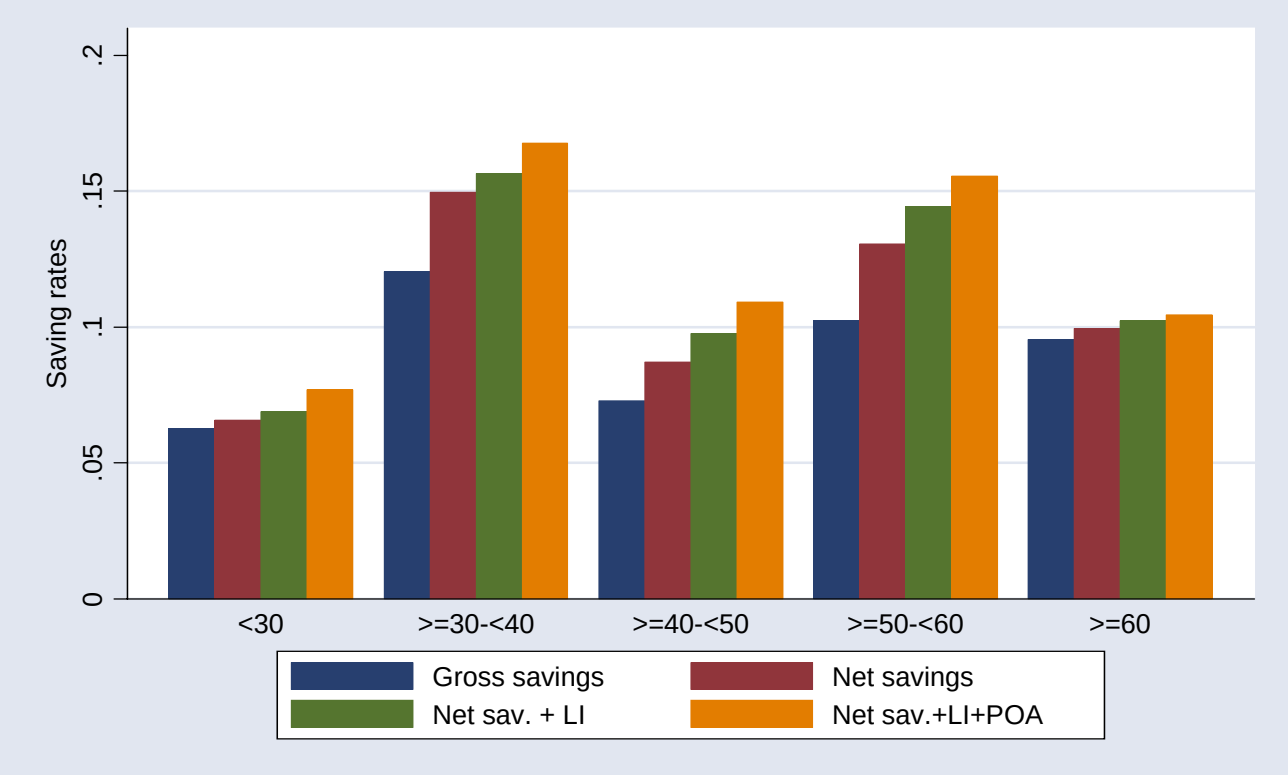
Figure 3: Marginal effects: influence of household- and individual characteristics on the savings ability



Source: All *SAVE* subsamples.

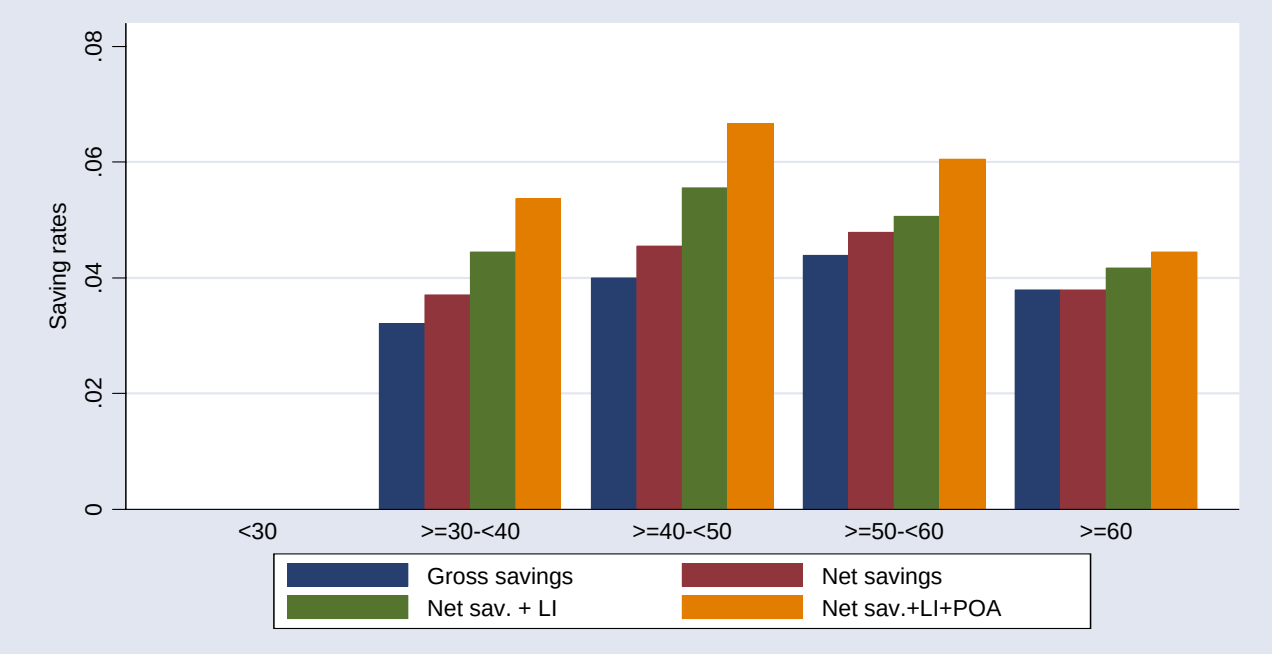
Notes: Conditional estimation for respondents who save according to the filter question. Dependent variable takes on the value 1 if respondent answered having nothing saved in the previous calender year or even dipped into savings. Only significant dummy variables displayed. Income is negative significant up to 19.500 €. Columns represent hight of marginal effects from a change from zero to one of the independent variables. Ex: saving accounts owners have a 16% lower chance of having zero or negative savings in the previous year. or even dipped into savings. The brighter the figure, the higher the probability for positive saving values.

Figure 4: Different measures for saving rates by age classes: means



Source: SAVE 2003 and 2004.
Notes: Weighted values. Only observations shown if no variable is missing. LI = Contrib. to whole life insurances; POA = Contrib. to priv. old-age pension schemes.

Figure 5: Different measures for saving rates by age classes: medians



Source: SAVE 2003 and 2004.
Notes: Weighted values. Median values for households < 30 years are zero. Only observations shown if no variable is missing. LI = Contrib. to whole life insurances; POA = Contrib. to priv. old-age pension schemes.

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