Did you really save so little for your retirement? An analysis of retirement savings and unconventional retirement accounts

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Abstract

We use a confirmatory factor analysis to study the relation between the importance of a broad spectrum of saving motives, such as saving for retirement, and saving behavior. Survey data show that many respondents save for retirement in unconventional retirement accounts, such as investments in real estate. We show that finding the retirement motive important does not directly translate in additional retirement savings. We show that the annuity stream generated by conventional and unconventional accounts from age 65 onwards is small and that most savings are residual and are not being put aside for a specific motive.

Keywords: retirement savings, precautionary savings, factor analysis
JEL codes: D12, D91, E21

1 Introduction

The identification of the empirical relevance of saving motives has created several problems to applied researchers in recent years. While there is theoretical consensus that a broad formulation of the intertemporal allocation problem allows the identification of three motives to save (Gourinchas and Parker 2001), it is far from clear what the empirical relevance is of these motives. It is very difficult to quantify the amount of savings that households are putting aside for retirement purposes specifically (such as

retiring early of supplementing future pension benefit), as this type of saving is not in theory separable from others.

Studies on non compulsory retirement savings typically explore the traditional products in the household portfolio, such as annuities and life insurances (Brown et al 2006), but neglect the existence of unconventional retirement accounts. "A house or a pension?" titled The Independent a few years ago and claiming that you could get two for the price of one. We will also show that many home owners regard their home as a pension saving. This is what we mean by unconventional retirement savings: that part of wealth put aside to finance consumption after retirement, which is not held in a traditional retirement account, but invested in real estate or any other saving account.

Life cycle savings, precautionary savings and bequests, are the motives that can be identified. However those who have attempted estimating these models on empirical data have been rewarded with results that are far apart from each other (Kennickell and Lusardi 2004). Recent research by Lusardi (1997) and Mastrogiacomo et. al. (2010) tries to reconcile the empirical literature that estimates precautionary savings as being marginal (Guiso, Jappelli, and Terlizzese (1992)) or very relevant (Carroll and Samwick (1998)). These studies show how results may differ depending on the dataset being studied, the population that is being considered, the method applied and the country that is being investigated. However these studies cannot be more precise concerning the underlying mechanism driving for instance the precautionary saving decisions, nor the decisions to save for other motives, such as retirement. Do for instance 'life cycle savings' identify savings for the future purchase of a durable good, or are they meant to finance consumption after retirement? The answer to this kind of questions is a purely empirical matter, which is complicated if we also include unconventional retirement accounts in the picture. Theory does not allow being more precise on this issue and imposes stringent assumptions to even identify the bequest motive (Gan, Gong, Hurd, and McFadden 2004).

While this discussion is interesting in the framework of the life-cycle model (Browning and Lusardi 1996), psychologists have also looked at this issue. There is an interesting literature on the concept of savings itself (Groenland, Bloem, and Kuijlen 1996). Saving motives have been analyzed in their hierarchical structure (Canova,

Rattazzi, and Webley 2005), the effectiveness of the implementation (Rabinovich and Webley 2007) and their relation to observable characteristics (Erskine, Kier, Leung, and Sproule 2006). Our study is related to this literature, we aim at gauging the relation among saving motives. We further extend the study and try to understand whether those who find the different saving motives more important also save more.

Kennickell and Lusardi (2004) propose an approach which rests in between the economic and the psychological one, as they use micro data on individual beliefs, in order to identify the relevance of saving motives in determining saving behavior. We follow their path, though with a different approach. We look at the relative importance of different saving motives as a determinant of the variation in household savings.

We ask ourselves two questions. First: how does information about the importance of several saving motives at a low hierarchical level (the saving motive, e.g. saving due to supplement social security benefit) relate to the saving factors that can be theoretically isolated (e.g. lifecycle/retirement savings)? Second: once these motives are combined with each other in a saving factor, which is the most relevant and how much wealth accumulation do they explain in unconventional retirement accounts?

The reason we ask these question is that in many western countries (among which the Netherlands, which we deal with in this study) more and more individual responsibility is needed in saving for retirement (and eventually in the future the health care system). A tendency to falling retirement replacement rates due to pension reforms (van Duijn et al 2009) requests individuals to save more in order to maintain the living standards that the old systems had granted. But are future retirees doing that?

Horioka and Watanabe (1997), analyze detailed data on saving targets. They show that their saving motives follow the expected life cycle pattern but are puzzled by the high saving of the elderly for retirement purposes. They compute average saving and dissaving for each motive and find that Japanese respondents accumulate 14% of their savings for no specific reasons, but mostly save for retirement, housing (largely financed by loan repayment) illness, education and marriage, while the bequest motive is negligible. We have found a study also for the Netherlands. Bernoth and van Rooij (2005) observe a direct relation between the size of the household and bequest motives in the Netherlands. By pooling 13 different savings motives they observe that saving for

retirement has become less important over time than saving for purchase of durables in the future.

This is partly motivated by the fact that the vast majority of the respondents believes that compulsory savings do not need to be supplemented to safeguard income at later ages. Nevertheless most also believe that in the mid run social security facilities will become less attractive. In short, when looking at a detailed number of saving motives it seems that in order to say something sensible in terms of retirement savings, we cannot abstract from the other motives to save.

This paper contributes to the existing literature because it provides a description of free retirement savings for the Netherlands detained both in conventional and unconventional retirement accounts. We also show that these savings are so limited that policy makers cannot assume that the progressive reduction in retirement replacement rates will be compensated by personal retirement savings. Beside the use of unconventional accounts for retirement motives suggest the most profitable saving choices are not being taken.

The study is organized as follows. The next section describes retirement savings in our data. Section 3 combines the answer to 12 different savings motives in a reduced number of factors that can be loosely related to theory. Section 4 shows results of a model explaining 'active' savings (where passive returns on equities are subtracted) on the base of these factors. Section 5 concludes.

2 Data and descriptive analysis

In this study we use the DNB household survey (DHS). The DHS is administered by CentERdata, which is associated with Tilburg University, the Netherlands. This is a unique example of a long panel where both data on savings and saving motives are registered. To our knowledge no other data set is able to provide this information.
The survey is sponsored by De Nederlandsche Bank (DNB), the Dutch central bank. The aim of the DHS is, among others, to furnish information on both economical and psychological determinants of savings. The survey is conducted annually with questions

being posted over several weeks, starting 1993/1994. In this study, we use the waves up to and including 2008. Each year, the survey contains approximately 1000-1500 households (well over 2500 individuals) and is an unbalanced panel.

The information used in the present study comes from different parts of the survey, and therefore the sample dimension varies. In this section we describe the accounts in which respondents keep their targeted retirement and also how important they find saving for retirement.

2.1 Observed retirement savings

The best way to investigate the empirical relevance of retirement savings is by documenting the amount of savings that are held in retirement accounts. These accounts can be of different kind, depending on the portfolio choices and individual circumstances of the respondents.

The data has little item non response when it comes to the ownership rates of these accounts. We will now describe both the ownership rates and median values of these accounts.

In Table 1, we show summary statistics on retirement savings on a number of dimensions. Column A reports the ownership rates of several types of employer-sponsored accounts. For most of the sample period this category is dominated by the 'save-as-you-earn deduction arrangement' (in Dutch "spaarloon"). This employer-sponsored savings plan allows employees to deposit a certain amount (about 600 euro per year in 2010, but the amount was higher in the 1990's) of the gross salary onto a separate saving account. Under certain conditions, the saved sum is not subject to income tax and no premiums for social insurance policies have to be paid on it. Also, no money may be withdrawn from this particular savings account for a period of four years. There are a number of exceptions to this rule. The money saved through the save-as-you-earn deduction arrangement may for example be used to pay for the premiums for an annuity or for other life-insurance policies. Also, if no such options are chosen, it is still worth keeping this money in the separate account until retirement, in order to avoid wealth taxes. The table shows that the arrangement was relatively

popular since the introduction (it was first reported in 1995). These accounts contain small amounts (about 2000 euro in 2006 prices) and are not very often cashed out. When they are, about 25% transfers it to a pension annuity, while about 6% transfers it to a single premium annuity (that pays as a lump sum).

Table 1. Free pension savings different accounts, ownership rates and destinations.

	A	B	A1	A2	A3	A4	N_A	C	D	N_C	E	F	N_E	H
1994	21%	1334					1656	15%	38832	1656	11%	4447	1656	5000
1995	43%	1105					1491	18%	32818	1491	10%	4360	1491	3500
1996	51%	1822					1272	21%	32403	1272	13%	4270	1272	3265
1997	47%	2702	1%	1%	19%	4%	935	23%	31360	907	15%	6920	907	3000
1998	45%	3040	1%	3%	28%	4%	508	24%	27683	504	14%	7599	504	2400
1999	51%	3400	3%	2%	24%	7%	537	24%	26559	536	15%	5312	536	2640
2000	44%						446	27%	16808	335	15%	7787	335	2160
2001	48%	2990	3%	0%	25%	5%	810	30%	35021	618	16%	6479	618	2000
2002	52%	3327	2%	2%	28%	8%	802	33%	19302	654	19%	7962	654	1854
2003	47%	3546	3%	1%	33%	5%	838	30%	20519	753	18%	8273	753	1560
2004	37%	2251	1%	1%	29%	6%	868	29%	14002	635	15%	12345	635	1200
2005	49%	2343	1%	1%	26%	7%	790	31%	20601	709	17%	9646	709	1069
2006	42%	1931	1%	0%	23%	7%	737	30%	18000	676	15%	11000	676	1020
2007	40%	2067	1%	1%	21%	7%	754	31%	18601	710	15%	10501	710	1080
2008	39%	2355	2%	1%	24%	5%	686	32%	19205	628	15%	13425	628	1080
2009	39%	2327	2%	1%	20%	5%	630	30%	20983	596	18%	9603	596	948
sum							13760			12680			12680	
mean	43%	2436	2%	1%	25%	6%		27%	24543		15%	8121		2189

Explanatory note: **A** = ownership rate of employer-sponsored accounts, **B** = median value of employer-sponsored account, **A1** = share of employer-sponsored accounts owners that cashed out in order to buy a house, **A2** = share of employer-sponsored accounts owners that cashed out in order to buy stocks, **A3** = share of employer-sponsored accounts owners that cashed out in order to buy an annuity insurance (pension insurance), **A4** = share of employer-sponsored accounts owners that cashed out in order to buy a single premium annuity, **C** = ownership rate of single-premium insurance and/or annuity insurance (pension insurance), **D** = median (minimum guaranteed) value of single-premium insurance and/or annuity insurance (pension insurance) at reported year, **E** = ownership rate of endowment life insurance policy, **F** = median of all premiums paid into an endowment life insurance policy to reported year, **H** = median yearly private annuity premium. **N** = sample size. Weighted statistics. Median values are expressed in 2006 prices. All medians are conditional on ownership. Last row reports the average of the ownership rates and medians.

Column C reports the ownership rates of private pension annuities. These differ depending on the periodicity of the payments of the premium, but all pay out periodically (for example, annually) from a certain date until the time of death of the insured. These are, therefore, the closest to a third pillar pension. Column E reports the ownership rate (about 15%) of endowment life insurance policies. Contrary to the standard annuity, these products pay out in a lump sum, and so far people have accumulated about 8000 euro in these accounts.

Table 2: Present value of annuities at age 65 for whole sample

	ownerhip rate *ANN*	median value *ANN*	monthly payment starting at 65	mean value *ANN*	N
1994	14%	24850	133	63845	2447
1995	15%	21835	117	61716	2217
1996	16%	23809	128	60409	1980
1997	15%	30448	171	62164	1646
1998	13%	23620	127	48368	1269
1999	16%	19375	104	44929	1102
2000	14%	25386	142	41960	936
2001	17%	25418	143	44695	1348
2002	20%	23410	126	57522	1380
2003	21%	16558	89	43537	1409
2004	17%	16483	89	30973	1304
2005	23%	16186	87	45449	1347
2006	23%	15560	84	36952	1288
2007	23%	15293	83	35259	1166
2008	23%	16291	87	43021	1044
2009	25%	14234	76	30510	963
mean	18%	20547	112	46957	

Explanatory note: Weighted statistics. Median and mean values are conditional on ownership. The monthly payment of the annuity starting at age 65 is computed using an annuity calculator inputting the median value of ANN. The present value is computed at prices 2006.

The median value of annuities each year is about 25000 euro and of endowment policies about 8000 euro. The average age of the owner of such products is 55 years. Column H shows that the premiums being paid each year total about 1000 euro in the past five years. This means that if premiums continue to be paid as described above, the

median value of annuities for annuity owners at age 65 (old age pension entitlement age in the Netherlands) will hardly reach 30000 euro. We have computed this in Table 2.

Table 2 reports the median values, conditional on ownership, of the following product:

$$ANN_{i,t} = D_{i,t} + F_{i,t} + H_{i,t} \frac{1-(1+i)^{-(65-age_{i,t})}}{i} \quad (1)$$

where D is the minimum guaranteed value of single premium insurance and/or annuity insurance (pension insurance) in the reported year, F is the sum of all premiums paid into an endowment life insurance policy until the reported year, H is the yearly private annuity premium, D and F are stocks and H is a flow. In the computation, we assume i=5%. The ownership rates in Table 2 are lower than are those in Table 1, where the products D, F and H are taken separately. As *ANN* is a combination of these products, the median value is also in between those reported in Table 1.

Our computations[1] indicate that such median values at current market conditions could provide an annuity flow of about 112 euro per month, starting at age 65. This is about 10% of the current old age pension benefit, which is about half of the retirement benefit to a median employee.

The means, conditional on ownership, of *ANN* are also reported. These are much higher than are the medians, as the distribution of financial wealth is skewed. Both the median and the mean decrease over time. This might be because of the increase in ownership rates, mostly among households who save small amounts.

In more recent waves, the DHS data have started to include information about free pension arrangements. Since 2004, the following question has been asked: "Have you made other arrangements for your pension apart from the customary pension you build up through your employer?". In line with the results in Table 1, the upper panel of Table 3 also shows that pension annuities are the most popular category of additional arrangements. The middle panel of the table is particularly interesting. There, we analyzed the open-ended answers of those who replied "other arrangements" to preceding questions.

[1] See, for instance, the annuity calculator at http://www.find.co.uk/pensions/annuities_centre/annuities-calculator.

Table 3: Additional questions on savings for retirement preparation and life course scheme

	2004	2005	2006	2007	2008	2009
Preparation (per household):						
annuities	23.3%	23.7%	19.9%	21.2%	22.3%	19.0%
whole life policies	7.5%	8.6%	7.5%	8.7%	9.2%	7.3%
buying extra pension rights via employer	2.0%	1.9%	1.7%	1.3%	2.3%	1.6%
extra periodical payments via employer	1.3%	1.3%	1.2%	1.5%	0.8%	0.4%
other arrangements	5.8%	7.3%	5.5%	8.4%	8.4%	7.8%
Size sample 1	1060	993	958	963	931	873
Other arrangements (individual level)						
Any form of real estate	14.8%	15.5%	17.0%	19.4%	12.3%	14.2%
Any form of free savings	81.5%	74.1%	70.2%	72.6%	77.4%	76.4%
Other mandatory savings (e.g. partner pension)	20.4%	16.4%	23.4%	21.0%	17.0%	19.8%
Does not report any of the previous	1.9%	4.3%	7.4%	6.5%	5.7%	6.6%
Size sample 2	108	116	94	124	106	106
Life course scheme (per household):						
ownership rate				4.2%	4.4%	4.4%
take up due to retirement motives				49.8%	48.0%	55.9%
take up due to family related sabbatical				16.6%	12.3%	4.5%
take up due to other reasons				27.1%	30.9%	33.9%
take up due to precautionary reasons (rainy days)				6.5%	1.7%	5.7%
median amount saved in life course scheme account				861	1680	3084
Size sample 3				955	924	870

Explanatory note: Upper panel reports answer to the question "Have you made other arrangements for your pension apart from the customary pension you build up through your employer?". The answer is positive if at least one person in the household reports having made the arrangement. The middle panel reports the authors'' classification of the open-ended answers to the question "What other arrangements?" that was asked to those selecting "other arrangements". Here we have allowed multiple answers; we take here the individual as a unit and not the household (therefore larger sample size). In the lower panel we show results for the question "Did you put part of your salary into a Life Course Savings account last year?" and an authors' classification of the answer to the question "For what purpose did you use your Life Sourse Savings Scheme?".

In order to classify the answers, we used a search algorithm that identifies part of the string that is being answered. Reporting terms such as "savings", "stocks", "insurances", "money aside" and similar are grouped in the raw 'Any form of free savings' in Table 3. Reporting terms such as "real estate", "apartment", "house" and similar are grouped in the raw 'Any form of real estate'. We also grouped those reporting terms that have some sort of additional compulsory savings, for instance inherited from their partner, from a secondary job in another country or similar circumstances. We also allowed for multiple options, as respondents may report any of the above at the same time. Table 3 shows that our search algorithm spotted about 95% of all respondents, and a quick inspection of those who were not allocated to any of the abovementioned categories either refused to answer or reported that they did not know. Clearly, the largest shares of pension savings that are not captured by the financial products listed so far are free savings and, to a lesser degree, real estate saving. This means that many respondents are preparing for their retirements without purchasing products that are specifically dedicated to this purpose.

The lower panel of Table 3 reports the ownership rates, destinations and median values of the life course savings scheme. This relatively recent saving scheme, which was introduced in January 2006, allows individuals to save up to 12% of their gross incomes in a dedicated account (therefore tax-free) in order to invest the money saved in a sabbatical. This period of vacation can also be moved prior to retirement, thereby allowing early retirement. The maximum amount that can be saved is about twice the saver's yearly salary. The difference to other employer-sponsored accounts is that the life course savings scheme cannot be cashed out.

The table shows that this arrangement is not popular yet. Those who have used it did so mostly in order to retire earlier. The median value of the accounts is growing fast; however, these balances cannot be used to support future retirement income.

To sum up, in this section we have seen that third pillar savings are only popular among one-third of the Dutch population. These savings are low in the sense that they translate into an annuity that is small relative to the future pension benefit. However, the information in the data also suggests that many respondents are saving for their

pensions in unconventional ways, such as other savings accounts and real estate investments.

We will now look into these unconventional retirement accounts, but first we investigate the retirement saving factor. We will then relate this factor to these more general concepts of wealth accumulation that are not directly meant (but evidently used) for retirement.

2.2 Importance of saving motives

We have seen that many respondents accumulate savings to support their retirements outside traditional retirement savings accounts.

This suggests that we should pool all savings together (excluding conventional retirement savings). We can then try to elicit the impact of retirement saving by relating these pooled measures of savings to the relevance of the retirement saving motive. As explained in the introduction, we have data on the importance of the retirement motive and other motives. These are contained in several different questions that allow the construction of a retirement saving factor as well as other saving factors.

Below, we will discuss the construction of these saving factors, which are based on the answers to 12 questions related to saving motives. These factors are thus the higher hierarchical step, while the motives are the lower. During the sample period, questions on the perceived relevance of saving motives changed. Until 2004, 13 motives were questioned. From 2004, the questionnaire has included 16 questions. However, not all the old motives were questioned consistently. Only 12 motives have been consistently questioned over time using a scale from 1 (very unimportant) to 7 (very important) for each saving motive:

"Is it to you personally of much or of little importance ..."

1. ... to have some savings to cover unforeseen expenses due to illness or accidents
2. ... to have some savings in case I or a member of my family get(s) unemployed
3. ... as a reserve to cover unforeseen expenses
4. ... to leave money to my children (or other relatives)
5. ... to give presents or other gifts to my (grand)children
6. ... to pay for my children's (or other relatives') education

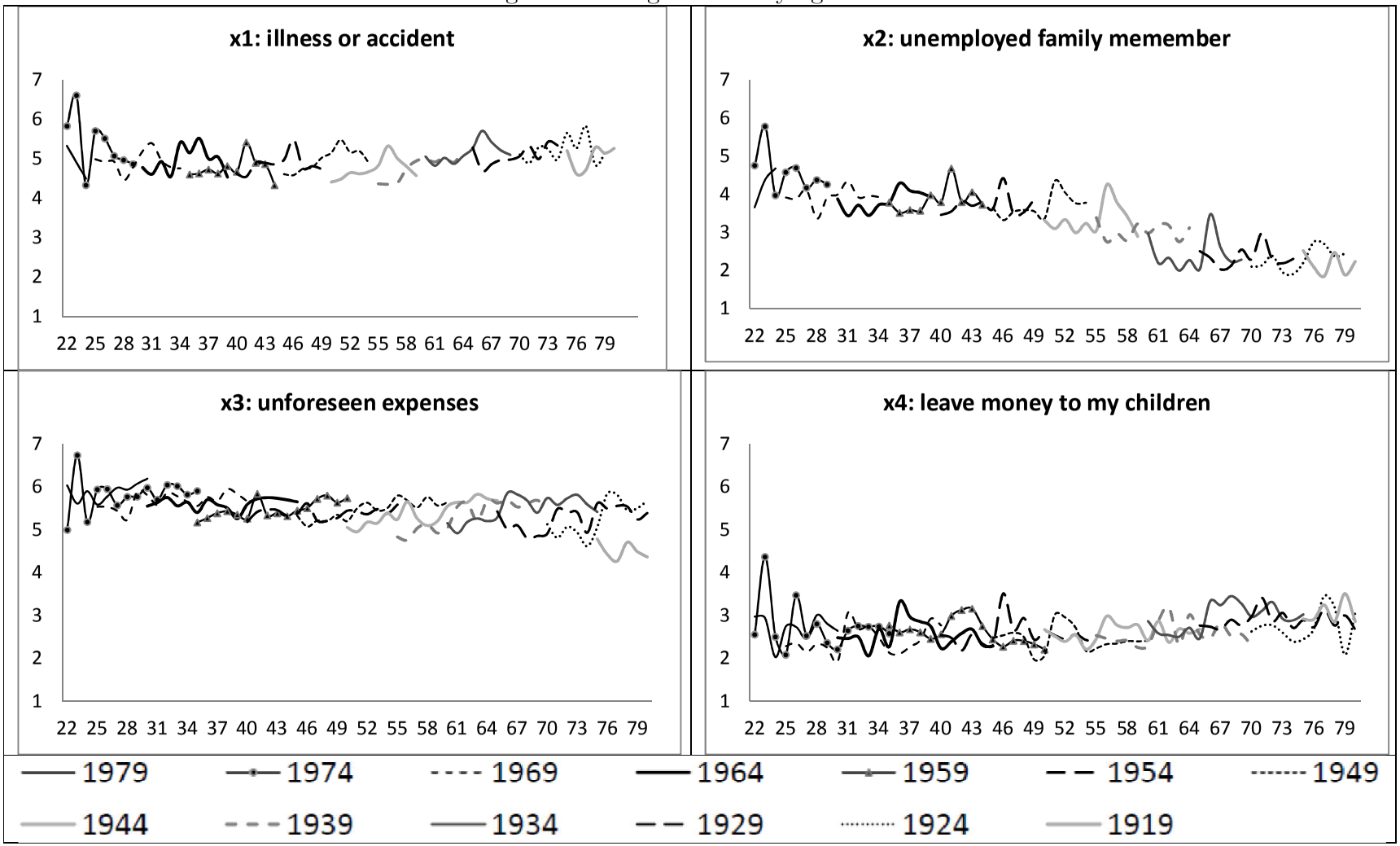
7. ... to buy durable goods such as furniture, electric appliances, in the future
8. ... to generate income from interests or dividends
9. ... to set up my own business
10. ... to supplement retirement pension, some extra money for when I am retired
11. ... to buy a house in the future
12. ... to supplement the social security benefit.

Figures 1, 2 and 3 show these saving motives by age and cohort. This helps us understand whether the answers to these questions correspond at least to common sense. The importance of precautionary savings on financial reserves (x3) is high all along the life cycle and does not differ among cohorts. This is peculiar. From a life cycle perspective, older cohorts should have more certainty about future income because, for instance, they have accumulated more pension rights. We will show that active savings differ by cohort, although here the importance of this special form of precautionary motive does not differ. The importance of saving for children's educations (x6) diminishes over age. This is plausible because as children age households have less need to spend out on additional education. This is also in line with the household life cycle (Apps and Rees 2001).

Saving for durables (x7) is on average constant over the life cycle; however, important cohort differences are evident. Younger people attach more importance to this motive at any age, even after retirement. This is in line with the idea that younger cohorts more often benefit from productivity growth. Finally, the pension motive (x10) slightly increases over age, without showing particular cohort differences.

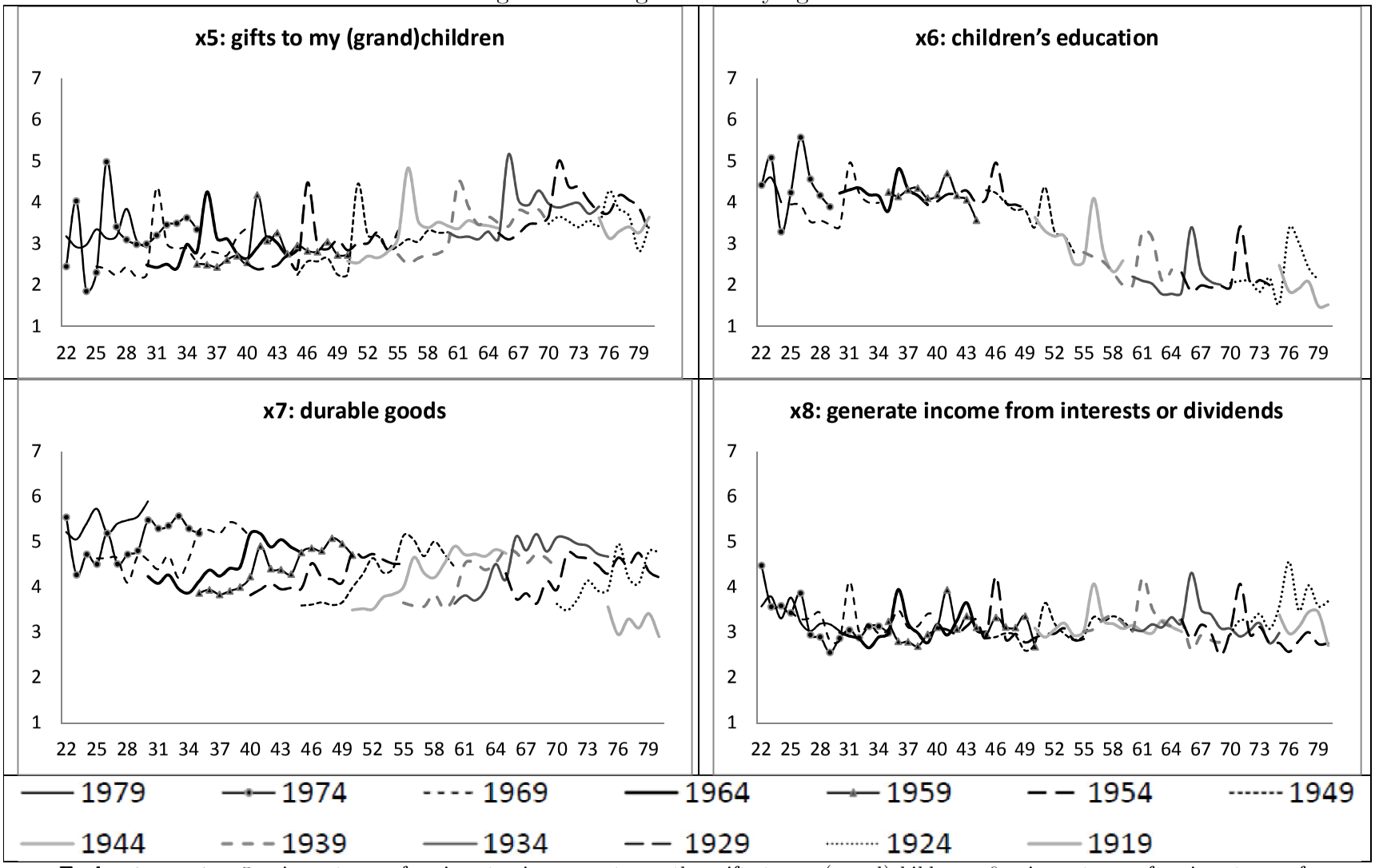
Overall, the importance of saving motives is in line with standard predictions by the life cycle model and, when it differs, it recalls already known empirical patterns about consumption and retirement.

Figure 1: saving motives by age and cohort



Explanatory note: x1 = importance of savings to cover unforeseen expenses due to illness or accidents, x2 = importance of savings in case I or a member of my family get(s) unemployed, x3 = importance of savings as a reserve to cover unforeseen expenses, x4 = importance of savings to leave money to my children (or other relatives).

Figure 2: saving motives by age and cohort



Explanatory note: x5 = importance of savings to give presents or other gifts to my (grand)children, x6 = importance of savings to pay for my children's (or other relatives') education, x7 = importance of savings to buy durable goods such as furniture, electric appliances, in the future, x8 = importance of savings to generate income from interests or dividends

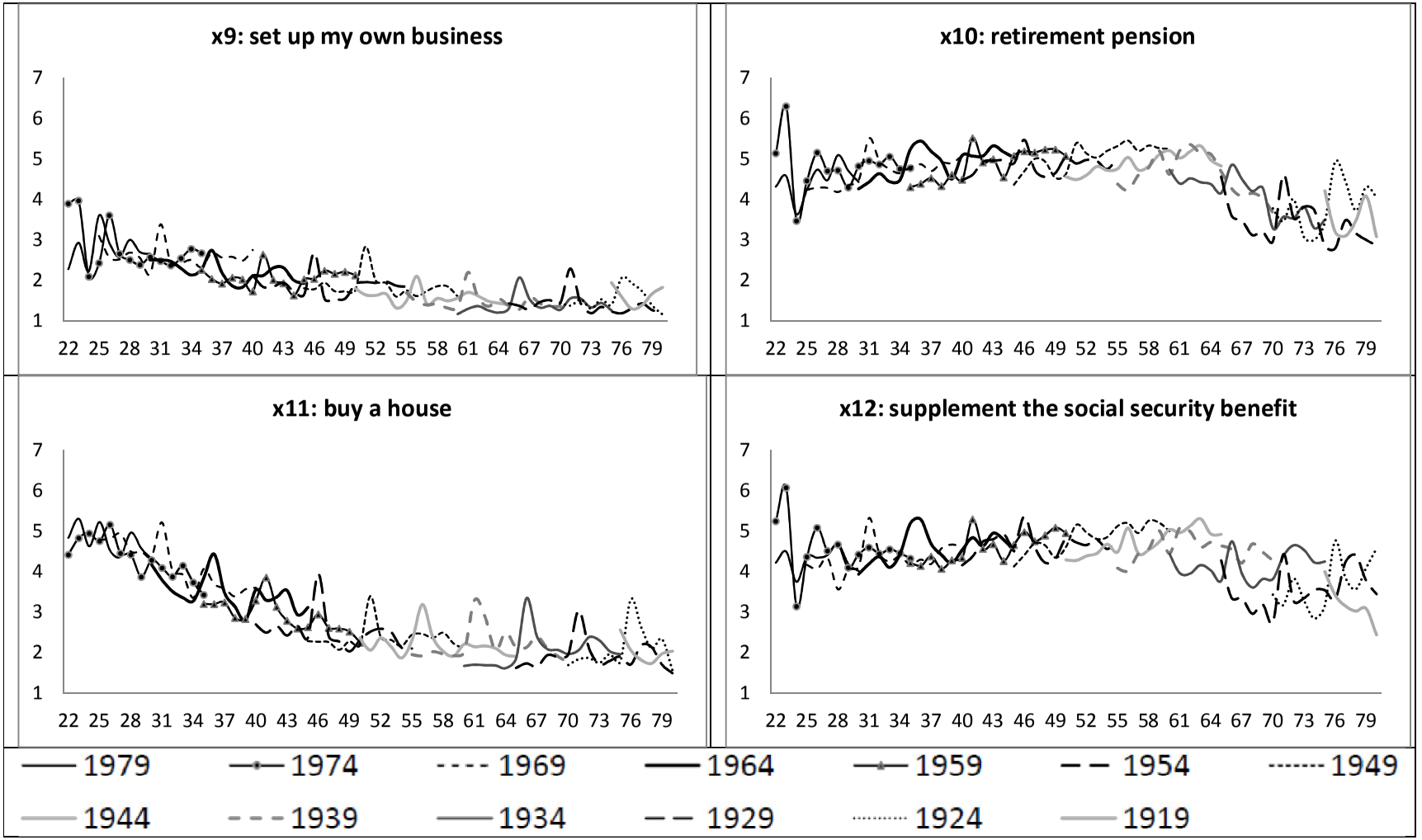


Figure 3: saving motives by age and cohort. x9 = importance of savings to set up my own business, x10 = importance of savings to supplement retirement pension, some extra money for when I am retired, x11 = importance of savings to buy a house in the future, x12 = importance of savings to supplement the social security benefit.

Table 4 shows the ranking of all motives for the whole sample and for two age-related subgroups. Evidently, the importance of the two precautionary motives (x1 and x3) scores highest, higher than do the retirement motives (e.g. x10 and x12), life cycle motives (e.g. x11 and x6) and bequest motives (e.g. x4 and x5). However, we are not interested in the ranking itself, but in the relation between these motives, and specifically the factors we include them into, and saving accumulation. We now move onto investigate the former.

Table 4: Ranking of self reported importance of saving motives

Saving motive	Short description	Whole sample	age 45-80	age 20-45
x3	unforeseen expenses	5.44	5.4	5.6
x1	expenses due to illness	4.76	4.7	4.9
x10	supplement retirement pension	4.58	4.6	4.6
x12	supplement the social security benefit	4.43	4.4	4.6
x2	unemployed	4.12	4.0	4.3
x7	buy durable goods	3.68	3.6	3.9
x5	gifts to my (grand)children	3.24	3.4	3.0
x6	children's education	3.18	2.8	3.8
x9	set up my own business	3.00	2.9	3.1
x11	buy a house in the future	2.70	2.2	3.4
x8	income from interests or dividends	2.69	2.6	2.9
x4	leave money to my children	2.64	2.7	2.6
N		18147		

Explanatory note: the ranking is based on the whole sample. The table reports average evaluations. For a full description of the saving motives see Section 2.2

2.3 Construction of active savings

We want to group saving motives into saving factors (see next section) and relate these factors to active savings. We start by defining active savings. The DHS provides detailed information on household assets and liabilities, which enables us to calculate an approximation of active household savings. The survey also has a specific question on the amount of money put aside in the past 12 months. The question is formulated as follows: 'About how much money has your household put aside in the past 12 months?'. This question is answered by a subsample. Answers to this question come in seven

categories, where the first interval is 'less than €1,500' and the last '€75,000 or more'. We assign to each respondent an amount of active savings equal to the middle point of the interval chosen, or to the lower bound if the category chosen is the last. Evidently, those who do not save or even dissave are not accounted for in this way. In order to solve this problem we combine different variables present in our data. The first is the answer to the question 'Did your household put any money aside in the past 12 months?', which can be answered yes or no. The second is the question 'How is the financial situation of your household at the moment?', which allows the following five answers: 1) there are debts, 2) need to draw upon savings, 3) it is just about manageable, 4) some money is saved and 5) a lot of money can be saved.

Those who answer that no money was put aside or that they just about manage their financial situations are imputed as zero savings. Those who did not put aside money and either are in debt or drawing upon their savings are imputed as a (negative) measure of active savings, which we will describe below. Finally, those who answer that they did put money aside in the past 12 months, but did not answer the question on active savings, are imputed as a (positive) measure of active savings, if they claim that some money or a lot of money can be saved.

The active saving measure used in the imputation is based on the first difference of net financial wealth excluding pension savings (the reason for this will be explained in the next section) and this isolates passive savings in the form of capital gains (Berben et al. 2006). This variable is further used to compute the individual savings rate. This is the ratio between active savings (as defined above) and permanent income (see Kapteyn et al. 2005 for a definition of this variable), which is also used as a dependent variable later on.

In Figure 4, we plot the development of the savings rate by age and cohort. The figure shows a decrease in savings rates. In the plot, we also isolate five years of the birth cohort to show that, at a given age, the savings rate for younger cohorts is somewhat higher. This cohort time effect is less visible when only looking at levels (results available from authors on request). This suggests that these cohort differences are (permanent) income-related. The figure shows that on average the variation in

savings levels is small (between 1000 and 5000 euro each year). The higher savings rates of the young (about 10–15%) are because of the low permanent incomes of this cohort.

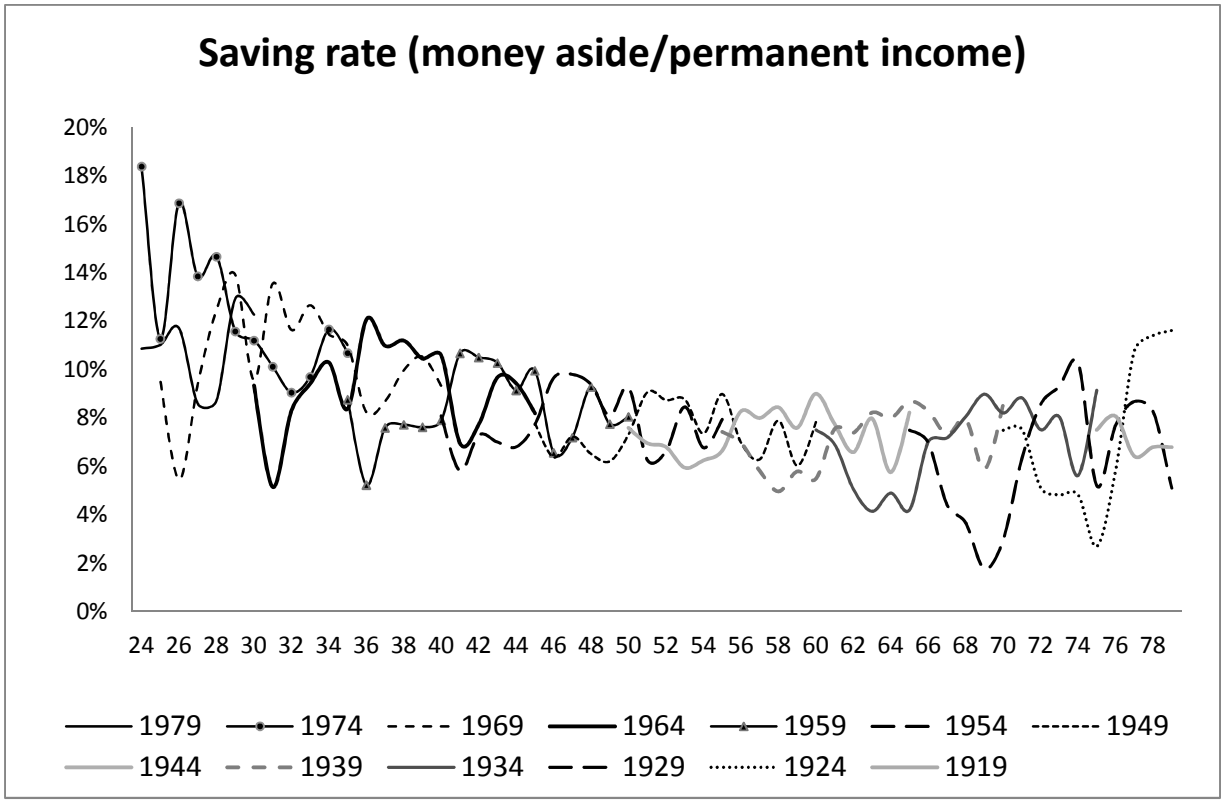


Figure 4: Saving rate over age and cohort. The saving rate is plotted at the median and outliers due to too low permanent incomes are removed.

3 From saving motives to factors

Let us now group the information on saving motives (low hierarchical variables) with saving factors. As shown in Table 5, we associate the different questions to specific factors. Saving motives are then analyzed in their hierarchical structures (Canova et al. 2005). Following that approach, we attempt to distinguish between 'salient goals' (such as precautionary savings in general) and specific motives (health risk and unemployment risk, which we observe in the data). This association raises many questions. Take, for instance, saving for a pension. While few would object to including variable x10 in this

factor, it is less obvious that individuals might buy a house in order to finance future retirement. Variable x11 could indeed also be associated with the life cycle saving factor.

Table 5: Classification of survey questions into saving factors

Variable	Factor	Survey question (motive): Is it to you personally of much or of little importance?
x1	Precautionary	to have some savings to cover unforeseen expenses as a consequence of illness or accidents
x2	Precautionary	to have some savings in case I or a member of my family get(s) unemployed
x3	Precautionary	as a reserve to cover unforeseen expenses
x4	Bequest	to leave money to my children (or other relatives)
x5	Bequest	to give presents or other gifts to my (grand)children
x6	Bequest	to pay for my children's (or other relatives') education
x7	Life-cycle	to buy durable goods such as furniture, electric appliances, or bicycles in the future
x8	Life-cycle	to generate income from interests or dividends
x9	Life-cycle	to set up my own business
x10	Pension	to supplement my retirement pension, to have some extra money to spend when I am retired
x11	Pension	to buy a house in the future
x12	Pension	to supplement my social security benefit

As stated in Section 2, the analysis of the open-ended question about retirement preparation suggests that many people see their houses as an investment for their retirement. In order to deal with this we will do two things. The first is to estimate different specifications where we join and disjoin the life cycle and the pension factor. The second is to rely on a more structural empirical strategy.

We will jointly estimate all factors imposing one-way relations between motives and factors and discuss these relations. A powerful tool to handle this econometrically is confirmatory factor analysis (CFA; Kolenikov 2009). We will factor analyze the data by grouping the variables into four factors, namely 1) Precautionary factor (variables x1–x3), 2) Bequest factor (variables x4–x6), 3) Life cycle factor (variables x7–x9) and 4) Pension factor (variables x10–x12).

Standard statistical packages offer the possibility of carrying out exploratory factor analysis. For CFA, the model structure must be specified in advance: the number

of factors must be postulated as well as the relations between those factors and the observed variables. To return to the example above, the relation between variable x11 and the life cycle factor is here explicitly imposed as being equal to 0. While this may seem a strong assumption, it has the clear advantage that all factor loadings are estimated conditional on this assumption. Formally:

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \\ x_7 \\ x_8 \\ x_9 \\ x_{10} \\ x_{11} \\ x_{12} \end{pmatrix} = \begin{pmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \\ \mu_4 \\ \mu_5 \\ \mu_6 \\ \mu_7 \\ \mu_8 \\ \mu_9 \\ \mu_{10} \\ \mu_{11} \\ \mu_{12} \end{pmatrix} + \begin{pmatrix} 1 & 0 & 0 & 0 \\ \lambda_{2,1} & 0 & 0 & 0 \\ \lambda_{3,1} & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & \lambda_{5,2} & 0 & 0 \\ 0 & \lambda_{6,2} & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & \lambda_{8,3} & 0 \\ 0 & 0 & \lambda_{9,3} & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & \lambda_{11,4} \\ 0 & 0 & 0 & \lambda_{12,4} \end{pmatrix} \begin{pmatrix} \xi_1 \\ \xi_2 \\ \xi_3 \\ \xi_4 \end{pmatrix} + \begin{pmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \\ \delta_{11} \\ \delta_{12} \end{pmatrix} \qquad (2)$$

$$\mathbf{V}(\xi) = \Phi, \quad \mathbf{V}(\delta) = \mathbf{diag}(\theta_1,...,\theta_{12}), \quad \mathbf{Cov}(\xi,\delta) = 0$$

Here λ_j, $j = 1,...,12$, are the factor loadings to be estimated, ξ_k, $k = 1,...,m$ (where $m =$ 4, in this case) are the latent factors and δ_j are the measurement errors.

Linear relations are postulated to hold between the factors and observed motives:

$$y_{ij} = \mu_j + \sum_{k=1\,jk}^{m} \lambda\xi_{jk} + \delta_{ij}, \qquad j = 1,...,p \qquad (3)$$

Relative to exploratory factor analysis, we will evidently not allow for a free form of the variance and covariance matrix, but we will assume some zeros at specific cells.

Table 6 shows the factor loadings and the covariances and correlations of four different specifications. In the first, three factors are elicited from the analysis, because the pension motive is taken together with the life cycle motive. In the second, we split the life cycle into two factors, thereby isolating saving for retirement or pensions. Next, the λs are grouped by latent variable. Also, the φs, the covariances, are reported. All parameters are freely estimated, with the exception of the loadings that are used for

identification. These are set equal to 1 and have no standard errors. This means that the contribution of each motive to the latent saving factor is compared with this reference. Take, for instance, retirement savings in the second specification. Motive 12 (importance of social security) is also close to 1. This means that motive 10 (importance of pension) and 12 are similar determinants of the latent factor. This is also revealed in the descriptive analyses, where on average these motives are very close across cohorts and periods (see Figure 3). At the bottom of the table, we also report some indicators of reliability (R2). These express the proportion of the variance of the observed saving motives explained by the model. If we had regressed the observed saving motives on their latent factors, this could be thought of as the resulting R-squared (R2).

One possible issue that arises is that in our CFA model the variables responsible for the pension factor, such as social security and pension, are closely related and, therefore, actually measure similar concepts (definitely so for all those who do not have a second pillar pension). In addition, the correlation with savings for a house (x11) is weaker. In order to tackle this, we estimated a third specification in which x10 and x12 are allowed to correlate. The results of this last specification are added into the third model in Table 6. In order to appreciate the difference in this specification (which returns a significant correlation between these two motives), we look at the R2. The reported R2 for the motives x10 and x12 decreased, while the one for x11 increased. All other results are approximately unchanged. This indicates that the pension factor is based on the covariances of the three motives associated with it and, to a lesser extent, on the covariances between the past three and the remaining nine observed motives.

This is reassuring and shows that our classification is defendable. Although the pension factor now contributes less to explaining the covariance between x10 and x12, all results are still significant. The last model in the table still accounts for the four separate saving factors, but now only on the basis of eight motives. This implies that only four loadings are freely estimated (plus the reference loading equal to 1). This last specification also confirms that when we remove the correlation between the importance of saving for a pension (x10) and social security (x12) by dropping the former, the proportion of the variance of x11 explained by the model increases. In the appendix, we also report a table with correlations among saving motives.

Table 6: Results confirmatory factor analysis

	3 factors		4 factors		Corr. errors		4 factors 8 motives		
	Coeff	St. err.	Coeff	St. err.	Coeff	St. err.		Coeff	St. err.
Log likelihood	-410480		-408451		-381255			-262881	
Loadings Precautionary									
λ1,1	1	.	1	.	1	.			
λ2,1	1.05	0.02	1.08	0.02	1.08	0.02	λ1,1=	1	.
λ3,1	0.76	0.01	0.80	0.01	0.80	0.01	λ2,1=	0.58	0
Loadings Bequest									
λ4,2	1	.	1	.	1	.	λ3,2=	1	.
λ5,2	0.895	0.013	0.89	0.01	0.89	0.01	λ4,2=	1.33	0
λ6,2	0.878	0.014	0.87	0.01	0.88	0.01			
Loadings Life-cycle									
λ7,3	1	.	1	.	1	.	λ5,3=	1	.
λ8,3	0.47	0.02	0.52	0.02	0.67	0.02	λ6,3=	0.80	0.02
λ9,3	0.63	0.02	0.91	0.03	0.74	0.02			
λ10,3	2.10	0.04							
λ11,3	0.82	0.02							
λ12,3	2.13	0.04							
Loadings Pension									
λ10,4			1	.	1	.			
λ11,4			0.34	0.01	0.96	0.02	λ7,4=	1	.
λ12,4			1.00	0.01	1	0.01	λ8,4=	0.89	0.02
$\mathrm{Cov}(\xi_j, \xi_k)$,			Type equation here.						
Precautionary-precautionary	1.19	0.03	1.14	0.03	1.14	0.03		1.82	0.06
Bequest-bequest	2.10	0.04	2.11	0.04	2.11	0.04		1.40	0.05
Precautionary-bequest	0.49	0.02	0.48	0.02	0.47	0.02		0.40	0.02
Life cycle-life cycle	0.57	0.02	0.70	0.03	0.74	0.03		0.74	0.03
Bequest-life cycle	0.31	0.01	0.53	0.02	0.58	0.02		0.56	0.02
Precautionary-life cycle	0.61	0.02	0.81	0.02	0.77	0.02		0.58	0.02
Pension - pension			2.63	0.04	0.83	0.03		0.98	0.04
Life cycle - pension			0.93	0.03	1.08	0.02		1.17	0.02
Bequest - pension			0.59	0.02	0.61	0.02		0.64	0.02
Precautionary - pension			1.21	0.02	0.97	0.02		1.08	0.03

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Var[error]									
θ1	1.53	0.02	1.58	0.02	1.59	0.02			
θ2	2.81	0.04	2.81	0.04	2.81	0.04	θ1=	2.31	0.05
θ3	1.27	0.02	1.23	0.02	1.22	0.02	θ2=	1.34	0.02
θ4	0.94	0.03	0.93	0.03	0.93	0.03	θ3=	1.64	0.04
θ5	2.04	0.03	2.04	0.03	2.06	0.03			
θ6	2.93	0.04	2.94	0.04	2.92	0.04	θ4=	2.08	0.07
θ7	2.48	0.03	2.35	0.03	2.31	0.03	θ5=	2.31	0.03
θ8	1.94	0.02	1.88	0.02	1.74	0.02	θ6=	1.59	0.02
θ9	2.64	0.03	2.29	0.03	2.46	0.03			
θ10	1.01	0.02	0.91	0.02	2.71	0.03			
θ11	3.20	0.03	3.28	0.04	2.82	0.04	θ7=	2.61	0.04
θ12	1.04	0.02	0.97	0.02	2.80	0.04	θ8=	2.86	0.04
Cov error x10-x12					1.83	0.03			
R2									
x1	0.44		0.42		0.42				
x2	0.32		0.32		0.32		x1=	0.44	
x3	0.35		0.37		0.37		x2=	0.31	
x4	0.69		0.69		0.69		x3=	0.46	
x5	0.45		0.45		0.45				
x6	0.35		0.35		0.36		x4=	0.54	
x7	0.19		0.23		0.24		x5=	0.24	
x8	0.06		0.09		0.16		x6=	0.23	
x9	0.08		0.20		0.14				
x10	0.71		0.74		0.23				
x11	0.11		0.08		0.21		x7=	0.27	
x12	0.72		0.73		0.23		x8=	0.21	
			Correlation equivalents of covariances						
Precautionary-bequest	0.31	0.01	0.31	0.01	0.31	0.01		0.25	0.01
Precautionary-life cycle	0.74	0.01	0.91	0.01	0.84	0.01		0.50	0.02
Precautionary - pension			0.70	0.01	1.00	0.01		0.81	0.02
Bequest-life cycle	0.28	0.01	0.44	0.01	0.46	0.01		0.55	0.01
Bequest - pension			0.25	0.01	0.46	0.01		0.55	0.01
Life cycle - pension			0.69	0.01	1.39	0.02		1.38	0.02

From these checks, we conclude that neither the structure that we imposed in one nor the assumptions about the underlying correlations between the different motives seem to be particularly restrictive, and that the factors that we predict can be used in our analysis of active savings. In order to visualize the results we use the estimates of the model with four factors to compute the factors. To get an idea of the difference in levels between factors we also de-standardize the predicted factors (which now have means of zero) by subtracting the original mean and dividing by the standard deviation. As an illustration, we report results for the precautionary saving factor and the pension factor in Figure 5.

In the upper panel of the figure, we report the standardized predictions of the pension and saving factors. The advantage of looking at standardized predictions is that it is easier to compare patterns by age and time among saving factors because the level is the same. The upper panel of Figure 5 shows that there is an interesting time effect between ages 55 and 60. This is represented by the vertical distance between the segments corresponding to the average cohort year of births, 1949 and 1939.

It seems that both the pension and the precautionary factor are higher for the youngest cohort age. This evident time effect is probably related to the restrictions that have been applied to the 1949 cohort in terms of early retirement since 2004. This cohort (dotted line in Figure 5) has a higher level of saving factor.

In the lower panel of Figure 5, we de-standardize the predictions of the CFA. Owing to the high mean and low standard deviation of the motives that underline the precautionary factor, the level of the two factors differs. This shows that on average the precautionary factor has a higher value than does the pension factor. Descriptive statistics for the saving factors and some background characteristics are reported in Table 7.

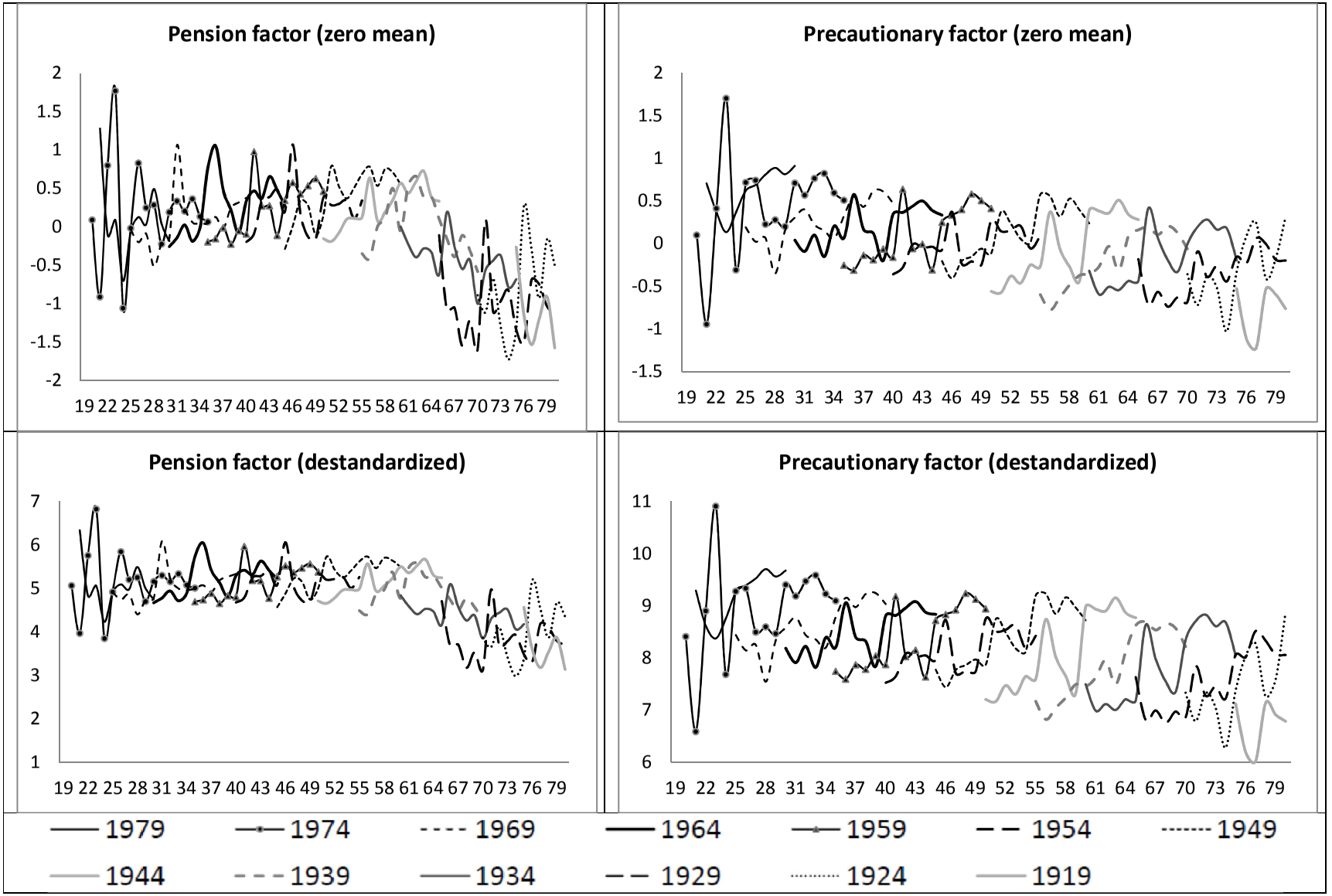

Figure 5: Pension and precautionary saving factor in by age and cohort

Table 7: Descriptive statistics

	Sample saving rate analysis				Sample housing wealth analysis			
	mean	sd	min	max	mean	sd	min	max
Age head	51.07	13.65	21	87	51.27	12.73	23	86
Age head square	2794	1443	441	7569	2790	1353	529	7396
Age head cube	162223	122084	9261	658503	160114	114508	12167	636056
Education 2	0.51	0.50	0	1	0.50	0.50	0.00	1.00
Education 3	0.29	0.46	0	1	0.33	0.47	0.00	1.00
Education 4	0.15	0.35	0	1	0.14	0.34	0.00	1.00
Bequest Factor	4.15	2.17	1.45	10.12	4.29	2.16	1.45	10.12
Pension Factor	5.21	1.98	1.24	8.68	5.17	1.96	1.24	8.68
Life-cycle Factor	4.82	1.60	1.47	10.32	4.77	1.60	1.47	10.32
Precautionary Factor	8.15	2.15	1.71	11.94	8.10	2.18	1.71	11.94
Saving rate	0.15	0.18	-0.90	0.90				
Net housing wealth/ perm. income					6.4	5.97	-4.21	63.99
Self employed	0.32	0.47	0	1	0.24	0.42	0	1
Male	1.17	0.38	1	2	1.13	0.34	1	2
Gross income	31545	30941	0	580353	35312	31092	0	580353
Permanent income	23833	12541	1010	232635	25608	11575	5058	232635
Cohort	5.84	2.82	0	13	5.99	2.63	0	13
N	11372				7310			

4 Multivariate analysis

4.1 Factors and savings

In the structural model, we introduced saving factors as personality traits. These can be considered exogenous determinants of saving choices. However, the fact that these may be exogenous does not mean that the factors are unrelated to each other.

A quick look at the correlations reveals that the precautionary and pension factors have a correlation of about 0.5 (the highest). This is plausible because uncertainty about future income may, at the same time, generate precautionary or pension savings. When risk elements are introduced into the Dutch pension system, it will be even more difficult to separate pension and precautionary savings.

When we estimate the association of saving factors to savings, we must take this into account. Typically, those who have a tendency to save, save more for all motives.

But the attitude to saving is an unobservable characteristic. If this characteristic is time invariant, that is to say it is an individual fixed characteristic, we can isolate it by estimating a fixed effect model (Table 8). Models 1 and 4 list the results for a fixed effect model where, respectively, active savings (divided by permanent income) and net housing wealth (also divided by permanent income) are the dependent variables. We divide by permanent income (for a definition, see Kapteyn et al. 2005) in order to account for the larger buffers of the wealthier in saving decisions. In Models 2 and 5, we estimate the fixed effect model using three stages of OLS regressions in order to account for any residual common determinant in the saving factors that is accounted for by observables. As a benchmark, we also estimate two OLS regressions in Models 3 and 6.

Let us look at Model 1 first. It shows that when the factors are statistically significant, they are also positive. This embodies the intuition that when a saving factor is active, it is associated with higher savings. As, however, the factors are de-standardized indices it is difficult to interpret the magnitude of these effects. In order to do that, we simulate a factor increase by one standard deviation.

We computed that an increase in the pension factor by one standard deviation increases savings from about 15.3% of permanent income to 16.1%. One additional standard deviation in the precautionary factor increases savings to 15.9%, somewhat less than the pension factor. As the average permanent income is about 24000 euro per year, an increase by 0.8% translates into additional savings of 200 euro. Similar computations using Model 4 indicate that one additional standard deviation in the pension factor increases housing wealth by about 14% of permanent income, that is to say about 3500 euro worth of additional pension savings in the form of net housing wealth (whose median value is about 122000 euro).

A simpler way to look at the results of, for instance, Model 1 is to compute mean effects based on the estimated coefficients. The constant term (0.097) indicates that 10% of permanent income is being saved for no specific factor. As the mean savings rate is about 15%, the saving factors only explain the remaining 5% points of the savings rate, that is one-third of the total. Only 2% points are pension savings,[2] while 2.5% points are for precautionary reasons.

[2] This is the product of the estimated coefficient and the mean of the pension factor (0.0039238*5.2).

Table 8: Estimation results

	Dep. variable: active savings/permanent income			Dep. variable: housing wealth/permanent income		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	FE	3SLS (bs)	OLS	FE	3SLS (bs)	OLS
Precautionary factor	0.00310***	0.00320***	0.00375***	0.168***	0.193***	0.159***
Bequest Factor	-0.000783	-0.000896	-0.00591***	0.0576*	0.0465**	0.327***
Life-cycle factor	0.00148	0.00147	0.0102***	0.0537	0.0656**	0.149
Pension factor	0.00392***	0.00355**	0.00606***	0.00874	0.00363	0.0205
Constant	0.0972***	0.000383***	0.0588***	4.501***	0.00192	2.905***
Observations	11372	11372	11372	7310	7310	7310
R-squared	0.004	0.004	0.026	0.014	0.012	0.027
Precautionary factor						
Age head		0.0573*			0.130***	
Age head ^2		-0.000874			-0.00232**	
Age head ^3		6.95e-06*			1.64e-05***	
Cohort		-0.111***			-0.124***	
Permanent income		-1.50e-06			-2.93e-06*	
Transitory income		1.82e-06***			1.81e-06***	
Education 2		-0.0937*			-0.150*	
Education 3		-0.0864			-0.139	
Education 4		-0.0749			-0.142	
Male		-0.00460			0.00590	
Self employed		-0.00254			-0.00478	
Bequest Factor						
Age head		0.0340			0.0486	
Age head ^2		-0.000860			-0.00122	
Age head ^3		6.60e-06**			9.24e-06*	
Cohort		-0.00682			-0.00167	
Permanent income		6.51e-07			-1.32e-07	
Transitory income		-4.08e-07			-2.84e-07	
Education 2		-0.186***			-0.176**	
Education 3		-0.179***			-0.164**	
Education 4		-0.190***			-0.225***	
Male		-0.0136			0.0357	
Self employed		0.00598			-0.0174	
Life-cycle factor						
Age head		-8.07e-05			0.0779**	
Age head ^2		0.000142			-0.00143**	
Age head ^3		-8.04e-07			9.52e-06**	
Cohort		-0.0388***			-0.0452***	
Permanent income		1.18e-06			-2.94e-07	
Transitory income		-5.38e-07			-2.30e-07	
Education 2		-0.118***			-0.224***	
Education 3		-0.124***			-0.224***	
Education 4		-0.130***			-0.239***	
Male		-0.00571			0.0232	
Self employed		-0.00297			-0.00925	

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Pension factor		
Age head	0.0128	0.0489
Age head ^2	-0.000146	-0.000855
Age head ^3	8.84e-07	5.67e-06
Cohort	-0.0212**	-0.0281**
Permanent income	-4.06e-07	-1.24e-06
Transitory income	7.53e-07*	8.81e-07
Education 2	-0.101**	-0.119
Education 3	-0.102**	-0.0869
Education 4	-0.103*	-0.0981
Male	-0.00864	-0.0101
Self employed	0.0227	0.0409

Figure 5 shows that assuming no time variation in the propensity to save for retirement may be restrictive. The graph shows an evident time effect for the cohorts 1949 and 1939, the former being included in a pension reform that requires extra savings in order to preserve early retirement entitlements. It could well be that the unobservable taste for saving changes over time, for instance because of the aging of the respondent or inclusion in a specific cohort. This calls for explicitly modeling the relation between those observables (such as cohort identifiers), the saving factors and savings rates (or housing wealth) jointly.

We estimate the following model:

$$\begin{cases} W = precautionary * \beta_1 + bequest * \beta_2 + lifecycle * \beta_3 + pension * \beta_4 + \varepsilon_0 \\ precautionary = X' \beta_{p1} + \varepsilon_1 \\ bequest = X' \beta_{p2} + \varepsilon_2 \\ lifecycle = X' \beta_{p3} + \varepsilon_3 \\ pension = X' \beta_{p4} + \varepsilon_4 \end{cases} \tag{4}$$

where $E(\varepsilon\varepsilon') = \Sigma, \quad E(\varepsilon) = 0$ for all disturbances, W is in turn active savings or net housing wealth, both divided by permanent income, and the household and time indices are suppressed. The estimation is carried out by a three-stage OLS regression. This means that all factors (dependent variables in this case) are explicitly taken to be endogenous to the system and are treated as correlated with the disturbances in the system's equations. The Xs are exogenous to the system and uncorrelated to the disturbances. These can be considered as instruments for the endogenous factors.

The estimations in Model 2 have bootstrapped standard errors (100 replications). This means that both the CFA and the model in expression 4 are being bootstrapped jointly. The main equation is again a fixed effect model, in the sense that we transformed the variables to represent deviations from the household means. Therefore, the constant term is not directly comparable.

Relative to the fixed effect model, the coefficients in Model 3 deliver similar results, with a slightly smaller average effect of pension savings, namely 1.8% (that is 0.00355*5.2). This means about 450 euro of the 3500 saved on average in the past year. As this variable is a flow, it is interesting to determine the annuity value of this flow. This is:

$$ANN2_{i,t} = S_{i,t} \frac{1-(1+i)^{-(65-age_{i,t})}}{i} \tag{5}$$

where i=5%, PI is permanent income and S is the amount of pension savings in active savings:

$$S_{i,t} = 1.8\% * PI_{i,t}$$

Notice that we do not include the stock of non-pension savings that are already accumulated in the accounts of each individual, but only the perspective annuity if S was invested in an annuity. The reason for not including the rest of financial wealth is that the pension saving factor was not significant in that analysis, likewise for housing wealth (this means that when this residual financial wealth is a dependent variable, the results were not statistically significant). In addition, these residual savings are limited (on average about 8000 euro), and if the share of pension savings hidden in these accounts was proportional to that of the savings rates, then these would add up about 12%[3], that is to say only about 1000 euro to the final value at age 65 of ANN2.

Our computations are contained in Table 9 where we compare the variables ANN and ANN2 by year of birth. Table 9 shows that putting aside about 2% of permanent income until age 65 will return a final annuity value below 5000 euro. This will not result in an additional annuity of substantial value.

[3] This is the relative weight of pension savings into the average saving rates: 1.8%/15%.

Table 9: Annuity value in euro

year of birth	median value ANN	median value ANN2	monthly payment ANN starting 65	monthly payment ANN2 starting 65	N
>=1977	5309	5079	27	26	644
1972-1976	19928	5839	107	30	1880
1967-1971	16269	5540	87	29	2141
1962-1966	16797	5595	90	30	3034
1957-1961	17250	4899	93	-	3159
1952-1956	21206	4620	114	-	3517
1947-1951	21295	3430	114	-	3264
1942-1946	19969	2352	107	-	2744
1937-1941	27905	1817	156	-	1429
1932-1936	18328	972	99	-	897
1927-1931	13549	415	73	-	137

Notice that if we ignore the observed and unobserved common determinants of the saving factors by estimating a pooled OLS such as in Model 3 of Table 8, we would conclude that pension savings make up a larger fraction of the savings rate (0.00606*5.2 = 3.1% points) relative to Model 2. In the OLS model, the share of precautionary savings is also somewhat larger (0.00375*8.15=3% points) relative to Model 2. This because in the OLS model only 5.8% points of the saving depend on no specific factor.

Similar conclusions are also derived when we look at the model for housing wealth. However, here the pension factor is not statistically significant while the bequest factor is. A large fraction of net housing wealth rates (that are on average 6.4 times permanent income) is not explained by the models. If we look at Model 5, we conclude that the precautionary factor explains about 1.4 permanent incomes (thus about 35000 euro detained in housing wealth), while the bequest motive is only about 6000 euro.

5 Conclusions

Third pillar free pension savings are of limited importance to the median Dutch person. The descriptive evidence shows that the returns of an annuity that could be bought by median pension wealth will increase the pension benefit by about 10% of the current

social security benefit (which is about half of the median retirement income). Our sample reports that people save for retirement in unconventional ways, for instance by leaving money in a savings account or investing in real estate (typically the primary residence). We build up saving factors based on a set of observed precautionary, bequest, life cycle and pension motives in a structural framework.

We conclude that these factors motivate little additional savings in those unconventional accounts. We observe a savings rate of about 15% of permanent income. About two-thirds of this rate cannot be attributed to any saving motive, while about 2% points can be attributed to pension savings. This finding is robust to several checks. Most importantly, we account for individual fixed effects as those who have a taste for saving might save more for every purpose, making the saving motives endogenous to the savings rate. In order to account for time varying characteristics that could affect this endogeneity, we also estimate a three-stage OLS regression where the saving factors are treated as endogenous. We find that accounting for this additional form of endogeneity does not affect our results.

The large amount of purposeless savings could, of course, be employed in the future to support pension income by those who own savings upon retirement (all our analysis is conditional on ownership). However, it would be more profitable for individuals to invest their savings into pension annuities if this money is reserved to support pension income, rather than keeping savings in non-pension accounts.

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Appendix 1 : Correlation of motives

Table a1: Correlation matrix for saving motives

	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12
x1	1	0.30	0.43	0.19	0.19	0.17	0.27	0.14	0.27	0.41	0.21	0.41
x2	0.30	1	0.37	0.13	0.21	0.13	0.18	0.14	0.31	0.40	0.21	0.33
x3	0.43	0.37	1	0.06	0.12	0.09	0.18	0.09	0.43	0.31	0.17	0.30
x4	0.19	0.13	0.06	1	0.56	0.50	0.24	0.16	0.04	0.15	0.18	0.15
x5	0.19	0.21	0.12	0.56	1	0.37	0.14	0.13	0.15	0.15	0.12	0.15
x6	0.17	0.13	0.09	0.50	0.37	1	0.15	0.22	0.03	0.18	0.23	0.19
x7	0.27	0.18	0.18	0.24	0.14	0.15	1	0.24	0.18	0.32	0.32	0.35
x8	0.14	0.14	0.09	0.16	0.13	0.22	0.24	1	0.10	0.16	0.45	0.17
x9	0.27	0.31	0.43	0.04	0.15	0.03	0.18	0.10	1	0.19	0.23	0.18
x10	0.41	0.40	0.31	0.15	0.15	0.18	0.32	0.16	0.19	1	0.21	0.74
x11	0.21	0.21	0.17	0.18	0.12	0.23	0.32	0.45	0.23	0.21	1	0.24
x12	0.41	0.33	0.30	0.15	0.15	0.19	0.35	0.17	0.18	0.74	0.24	1

Explanatory note: x1 = importance of savings to cover unforeseen expenses due to illness or accidents, x2 = importance of savings in case I or a member of my family get(s) unemployed, x3 = importance of savings as a reserve to cover unforeseen expenses, x4 = importance of savings to leave money to my children (or other relatives), x5 = importance of savings to give presents or other gifts to my (grand)children, x6 = importance of savings to pay for my children's (or other relatives') education, x7 = importance of savings to buy durable goods such as furniture, electric appliances, in the future, x8 = importance of savings to generate income from interests or dividends, x9 = importance of savings to set up my own business, x10 = importance of savings to supplement retirement pension, some extra money for when I am retired, x11 = importance of savings to buy a house in the future, x12 = importance of savings to supplement the social security benefit.