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Where Are the Retirement Savings of Self-Employed?

An Analysis of 'Unconventional' Retirement Accounts

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Where are the retirement savings of self-employed? An analysis of 'unconventional' retirement accounts.

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Abstract

Survey data show that many respondents save for retirement in unconventional retirement accounts, such as investments in real estate. In countries where retirement savings are not mandatory for self-employed, representatives of this group often report this as an argument against making retirement savings compulsory. Our study shows that self-employed retirement savings are low and below individually pre-stated saving intentions, even though this group has generally no occupational pension.

We also study the relation between the importance of a broad spectrum of saving motives, such as saving for retirement, and saving behavior. We show that finding the retirement motive important does not directly translate in additional retirement savings, both for self-employed and employees. The (median) annuity stream generated by conventional and unconventional accounts from age 67 is small; most savings are residual and are not being put aside for a specific motive.

JEL codes: D12, D91, E21.

Keywords: retirement savings, precautionary savings, factor analysis, saving goals.

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1 Introduction

In many countries (e.g. US, the UK, or the Netherlands) self-employed do not participate into the second pillar (collective) pension saving schemes. Alternatively, self-employed could invest in third pillar annuity-alike products. Economists typically state that pension (or retirement) savings consist of second pillar and third pillar savings (see for instance Power and Rider 2002). In these countries the option to make retirement savings compulsory for self-employed is regularly on the political agenda[2], and the counterargument that often appears is that self-employed should be allowed to save freely. An interesting example of how policies exempt self-employed from retirement saving schemes is the automatic enrollment program in the UK, which started in 2013 and ended up excluding the self-employed. If third pillar savings then appear to be low the counterargument typically states that this is due to the fact that many self-employed already save in 'unconventional' ways (that is to say what economists do not typically classify as retirement savings, we could also define this as 4th pillar savings). Saving for retirement on a savings account, using business equity, purchasing real estate, or marrying a partner with a generous partner-pension provision are the anecdotic examples often mentioned[3] to support the presence of unconventional retirement savings. In this paper we will investigate whether this is a valid argument, by carrying out an empirical investigation of the Netherlands as we have data that are informative about unconventional savings.

The quantification of the empirical relevance of saving motives is controversial (Kennickell and Lusardi 2004). Research by Lusardi (1997) and Mastrogiacomo et. al. (2013) 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)) suggesting therefore diverging relevance of other saving motives, like saving for a pension. Economic theory also cannot suggest the answer to this question as it is argued that only three general motives to save

[2] Examples of such debates are for the US the TIME article "Mandatory Savings Accounts Are Coming Your Way" http://business.time.com/2013/05/09/mandatory-savings-accounts-are-coming-your-way/
for the Netherlands: http://www.z24.nl/geld/jongeren-vvd-pvda-en-d66-eigen-pensioenrekening-voor-iedereen

[3] See for instance http://www.telegraph.co.uk/finance/personalfinance/pensions/9044861/Is-property-better-than-a-pension-for-your-retirement-nest-egg.html

(life-cycle or investment motive, precautionary and, partly, bequest) are identified, and pension savings are not separable from life-cycle savings (Gourinchas and Parker 2001).

Assigning non-conventional savings to different purposes is empirically even more challenging and more so if we want to highlight the role of self-employed. Studies on non-compulsory retirement savings typically explore the conventional products in the household portfolio, such as annuities and life insurances (Brown et al 2007), but neglect the existence of unconventional retirement accounts. "A house or a pension?" titled The Independent a few years ago, claiming that you could get two for the price of one.

This issue recalls of different segments of the economic literature concerned with the concept of savings itself (Groenland, Bloem, and Kuijlen 1996), its' hierarchical structure (Canova, Rattazzi, and Webley 2005), the effectiveness of the implementation of saving plans (Rabinovich and Webley 2007) and the relation between saving motives and observable characteristics (Erskine, Kier, Leung, and Sproule 2006). Actually what is important to our purpose is the definition of unconventional retirement savings. With this term we intend all private savings that are not held in first, second or third pillar savings (e.g. saving accounts, home equity, etc.).

Can we identify the empirical relevance of the pension savings motive for wage and self-employed, and the importance of their unconventional retirement accounts? This question is highly policy relevant as our findings oppose the argument that self-employed should be exempted by public saving programs like the one in the UK mentioned above, because they already reach their desired saving level. On the contrary we show the presence of a possible market failure. While self-employed find it increasingly more important to save for retirement, more than wage-employed, they actually do not save more often. This could be due to different explanations, such as procrastination or myopia. We do not research these causes in detail, we are only concerned with the quantification of the problem.

This paper contributes to the existing literature because it provides a description of voluntary retirement savings for the Netherlands, held both in conventional and unconventional retirement accounts. We also show that these savings are limited. Beside the use of unconventional accounts for retirement motives suggests that profitable saving options are not being used. Finally we show also statistics that suggest a low take up of fiscally facilitated pension savings in two target groups, the income-poor and the self-employed.

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 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.

In this section we describe the accounts in which respondents keep their targeted retirement accounts and also how important they find saving for retirement. Here we focus on retirement-related accounts, but Alessie, et al (2002) have described the wealth data in great detail. The only selection applied is that we keep only respondents above 18 and below 65.

2.1 Conventional retirement savings

We investigate first the empirical relevance of voluntary retirement savings by documenting the amount of savings that are held in traditional retirement accounts (annuity-alike accounts). The data has little item non response when it comes to the ownership rates of these accounts. We will describe the ownership rate and median values.

In Table 2.1, we give an overview of the traditional retirement accounts by showing the summary statistics on ownership and balances[4]. We show all recent years and some selected past

[4] This table is based on the un-imputed data provided by CenterData. CenterData imputes missing balances to balance-owners using regression techniques. We use here only reported balances and specify the difference in sample size between the ownership and the balance questions. When we define the wealth aggregates needed in the regression analysis (financial wealth) we will merge our data to the imputed ones by CenbterData.

waves (the complete overview counts 20 waves and is available from the authors on request). Not all those who report being owners of an account also report its' value. We have aggregated the ownerships and the balances at household level. This is done in order to avoid issues of intra-household allocation that can arise with self-employed[5]. Row A reports the ownership rates of several types of employer-sponsored accounts (the most common is known in Dutch as "spaarloon", introduced in 1994, see also Alessie, Hochguertel and Van Soest (2002), and dropped from the survey in 2012) that exert maximum fiscal advantage if retained long into the future. The table shows that the arrangement was relatively popular since the introduction. These accounts contain small amounts (about 2000 euro in 2006 prices, see row B) and are not very often cashed out. When they are, about 25% transfers it to a pension annuity, while about 5% transfers it to a single premium annuity (see columns A1-A4). These accounts are not allowed to self-employed, as they have no employer. Row C reports the ownership rates of private pension annuities and row D the median value of the minimum guaranteed payment, if available. Row 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 (row F).

[5] For self-employed, who are at risk of default, with bankruptcy law in the Netherlands holding them often personally responsible, it is convenient to officially own only their business.

Table 2.1. Free pension savings different accounts, ownership rates and destinations, selected years

	1994	1997	2001	2003	2005	2006	2007	2008	2009	2010	2011	2012	2013	sum	mean
A	20%	37%	42%	39%	41%	38%	35%	35%	37%	30%	32%	25%			36%
B	1334	2627	2990	3285	2276	1750	1931	2401	2388	2518	1657	1564			2267
A1		1%	3%	2%	1%	1%	2%	2%	2%	1%	1%	0%			2%
A2		1%	0%	0%	1%	0%	0%	0%	1%	1%	1%	1%			1%
A3		17%	24%	34%	25%	25%	22%	25%	22%	17%	21%	13%			23%
A4		3%	5%	5%	7%	7%	6%	6%	4%	2%	4%	4%			5%
NA	*2167*	*1668*	*1350*	*1396*	*1346*	*1290*	*1185*	*1075*	*1028*	*1164*	*1010*	*1092*	*1242*	*26791*	
C	14%	22%	28%	30%	30%	29%	29%	30%	29%	28%	29%	26%	19%		25%
D	37405	27131	22427	21223	20233	17583	20667	19205	18979	18741	18312	19437	24409		22494
NC	*2167*	*1427*	*919*	*1097*	*1098*	*1114*	*1049*	*931*	*951*	*977*	*924*	*984*	*995*	*22713*	
ND	*254*	*232*	*141*	*181*	*201*	*193*	*192*	*185*	*177*	*178*	*171*	*165*	*125*	*3515*	
E	10%	14%	14%	16%	15%	14%	14%	14%	17%	13%	14%	13%	10%		13%
F	4447	6920	7476	8273	8852	12000	11318	12483	8303	8433	10071	9578	9589		8379
NE	*2167*	*1427*	*919*	*1097*	*1098*	*1114*	*1049*	*931*	*951*	*977*	*924*	*984*	*995*	*22713*	
NF	*194*	*118*	*92*	*127*	*120*	*118*	*111*	*109*	*121*	*101*	*103*	*87*	*73*	*2256*	
G	20155	22144	17444	16557	15471	17000	17715	18149	16132	16509	17396	17605	17858		17563
G1	12372	6728	6002	9038	9019	8517	10629	11700	11540	12126	12302	12098	14312		9354
NG1	*381*	*279*	*239*	*312*	*298*	*268*	*237*	*219*	*213*	*194*	*167*	*142*	*121*	*4766*	
H	1071	1500	683	1728	1000	816	780	787	788	745.5	744	780	780		1106
NH	402	391	343	394	320	397	391	361	325	318	296	278	254	6723	

Explanatory note: Figures at household level. A = ownership rate of business accounts, B = median value of business account, A2 = share of business accounts owners that cashed out in order to buy a house, A1 = share of business accounts owners that cashed out in order to buy stocks, A3 = share of business accounts owners that cashed out in order to buy a life-long annuity, A4 = share of business accounts owners that cashed out in order to buy a single premium annuity, C = ownership rate of life-long annuity, D = median (minimum guaranteed) value of life-long annuity at (current) year, E = ownership rate of single premium annuity, F = median all premiums paid into a single premium annuity to (current) year, G = D+F, G1 = median balance of life-long annuity (assuming a 2% return on premiums), H = median yearly annuity premium (based on variables koo10xx and kap9xx) after dropping 1% outliers. NA, NC, NE = sample size based on non-missing ownership. ND, NF, NG1, NH = sample size based on non-missing balance. The table is constructed using the original yearly data, not the imputed data provided by CenterData.

The median value of annuities each year is about 22500 euro and of endowment policies 8000 euro while the average age of the owner is 55. In row G we report the sum of the minimum guaranteed value of life-long annuities and of the stock of single premium annuities (about 17500 euro). In row G1 we compute the current value of the life-long annuity by using the information on current premiums and origination date and assuming a return of 2% each year. This amount is on average smaller than the minimum guaranteed value. Row H shows that the premiums being paid each year both in life-long and endowment annuities. The average is mostly below 1000 euro years. This means that if premiums continue to be paid as described above, the median value of annuities from age 67 will hardly reach 30000 euro in present value. Notice that the number of observations varies over the different items. For instance the number of observations in rows NG1 and NH varies because in the first data on premiums and origination dates are used, while in the second the latter is not needed.

In Table 2.2 we compare the poor (lower 20% income distribution) to the rich (upper 20%) and the self-employed[6] to the non-self-employed. All these definitions are taken at household level, as are the balances that we describe. So wage-employed are those households with either one or two employees, while self-employment identifies households where there is at least one self-employed[7].

The table provides some interesting insights. First, the ownership of (partly) fiscally facilitated[8] savings is more common among the rich than the poor. The rich also have higher median savings in these accounts. The second interesting finding is that being a self-employed does not imply a much higher ownership of fiscally facilitated pension savings; the difference in Table 2.2 is significant but small. Finally, when self-employed own these accounts, they save significantly more (both in means and medians). But again differences are small.

[6] Self-employed are identified in different ways in the survey. We use question IZ1: "Were you also self-employed, or free profession/free-lance in 2005? Being the director of a public/private limited company is employment on a contractual basis", which is available for all waves.

[7] This means that we identify as self-employed also those who are self-employed only on a part-time basis. When we check this by looking at pension funds membership we notice that 1/3 of our self-employed also have a pension fund membership, 1/3 has not and for the remaining 1/3 the pension fund information is not available. Ideally we would like to monitor only the behavior of those who have no pension arrangements. This is however asking too much of the data due to the non-responses. Additionally it would be arbitrary to drop those part-time self-employed at present, without being able to check this for the past in many cases due to attrition.

[8] The fiscal facilitation is typically fully granted to those with missing occupational pension contributions. This is always the case for self-employed, but lower thresholds of tax exemptions are also available to the wage-employed.

Table 2.2 : Annuities by income level and income type

	lower 20% income distribution	upper 20% income distribution	at least one self-employed in the household	no self-employed in the household
mean gross household income	11435	83605	37149	45441
owns either life-long annuity or single premium annuity	21%	47%	33%	28%
mean of the sum of the balance of life long plus single premium annuity, conditional on this sum being larger than zero	21419	28047	29984	22021
median of the sum of the balance of life long plus single premium annuity, conditional on this sum being larger than zero	7267	13073	11746	10139
N = number of owners of either life-long or single-premium annuity	747	1550	967	5374
N= number of positive items in the sum of life-long and single premium annuities	549	1384	761	4232

Explanatory note: The differences in ownership rates are statistically significant at conventional levels. Weighted statistics. The balance of life-long annuity is computed assuming a 2% return on premiums, when current premiums are assumed constant from origination to current year. The group of self-employed and non-self-employed above are mutually exclusive.

We should not worry if self-employed save less often than wage-employed if they intend to do so. However in Figure 2.1 we show that self-employed find saving for retirement increasingly more important relative to wage-employed. Also we show that, self-employed are twice more likely to miss their saving target. The latter is defined using the variables OPZIJ12 (are you planning to save next year?) in *t-1* and OPZIJ (did you save last year). Those who planned to save, but do not manage, are defined as missing their saving target. This suggests a possible market failure and thus possibly the necessity of policy intervention.

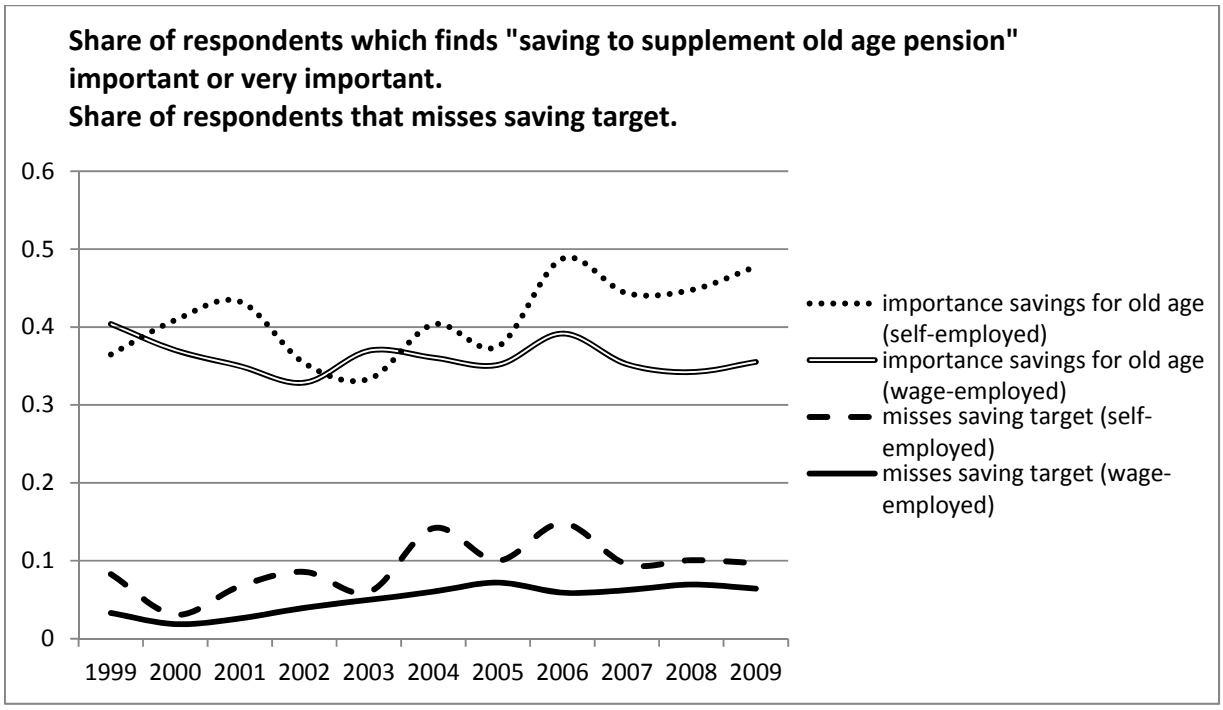

Figure 2.1

Based on the evidence above, we can extrapolate and try to proxy the type of annuity payment that these individuals will receive from age 67 (the social security age) onwards.

Table 2.3 reports the median values, conditional on ownership, of the product:

$$ANN_{i,t} = G1_{i,t} + F_{i,t} + H_{i,t}\frac{1-(1+i)^{-(67-age_i)}}{i} \qquad (1)$$

where G1 is the current value of single premium insurance and/or annuity insurance (pension insurance) cumulated up to 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 (both in endowment and annuity insurances), *G1* and *F* are stocks while *H* is a flow.

Table 2.3: Present value of annuities (sum of annuity and endouwoment insurance) at age 67 for whole sample (selected years)

	Non self-employed households						At least one Self-employed in the household					
	ownerhip rate	median value ANN (PV)	median value ANN (FV)	monthly payment starting 67	mean value ANN (PV)	N	ownerhip rate	median value ANN (PV)	median value ANN (FV)	monthly payment starting 67	mean value ANN (PV)	N
1994	18%	12612	15488	79	54171	476	37%	46430	58071	296	95363	86
1997	24%	16744	19605	100	47312	320	36%	18729	24517	125	87689	61
2001	24%	32872	39320	201	48798	307	29%	22427	27916	142	31720	26
2002	28%	29702	35771	182	49992	362	27%	52179	53792	274	63197	32
2003	30%	24572	31393	160	43313	421	24%	35458	47095	240	57956	25
2004	22%	22128	26752	136	46815	299	23%	30727	40600	207	57965	27
2005	30%	20874	26485	135	39611	390	30%	25093	29828	152	46215	35
2006	32%	19465	24157	123	35041	373	35%	28189	35149	179	44020	43
2007	32%	21166	26136	133	34778	342	36%	23558	29887	152	34237	38
2008	32%	21493	26319	134	37431	305	40%	21646	25892	132	42139	37
2009	35%	21351	24923	127	43125	303	37%	24746	28568	146	51222	44
2010	29%	18741	21733	111	31057	280	27%	19535	24800	126	34707	31
2011	34%	18772	22578	115	30367	260	40%	17723	22595	115	30704	38
2012	30%	19678	23538	120	29275	225	29%	16995	20300	104	27330	34
2013	20%	19619	22995	117	29533	203	21%	24609	29730	152	48914	23
mean / sum	26%	19340	23276	119	39530	6384	32%	26815	32385	165	57015	794

Explanatory note: Weighted statistics. Median and mean values are conditional on the balance in the account being positive. The amount of observations is based on the ownership question. The annuity account is derived taking the sum of annuity (koo10) and endowment (kap9) insurances. The monthly payment of the annuity starting at age 67 is computed using an annuity calculator inputting the median value of ANN. The present value is computed at prices 2006. PV = present value. FV = future value. N=number of non-missing balances in the account.

In the computation, we assume *i=1%*, which we make on purpose very generous. This is a present value (PV), but we also compute the future value (FV) by multiplying $ANN*(1+i)^{(67-age)}$. The ownership rates in Table 2.3 are higher than are those in Table 2.1, where the products G1, 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 2.1. Our computations[9] indicate that such median values at current market conditions could provide an annuity flow of about 120 euro per month, starting at age 67 for wage-employed and 165 for self-employed. This is about 10%-20% 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 after 2001, mostly among households who save small amounts.

2.2 Unconventional retirement savings

Since 2004, question DNB911 has been added to the DHS survey: "Have you made other arrangements for your pension apart from the customary pension you build up through your employer?". If option DNB195 (other arrangements) is chosen as an answer, then question DNB92A is asked, which is an open-ended question on the nature of these arrangements. In Table 2.4 we analyzed the open-ended answers of those who replied "other arrangements" to a question about retirement preparation. The routing of this question is unfortunate because it only asks about these arrangements to those who have no conventional retirement savings, thus excluding the possibility that one may save both in conventional and unconventional ways at the same time. We take these results on "other arrangements" as inspiration for subsequent analysis on the whole sample, though here only a subgroup reports this information.

Table 2.4: Unconventional retirement arrangements (self-reported)

	2004	2005	2006	2007	2008	2009
Any form of real estate	15%	15%	15%	19%	12%	15%
Any form of free savings	81%	81%	81%	73%	77%	81%

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

Other mandatory savings (e.g. partner pension)	20%	20%	20%	21%	17%	20%
Does not report any of the previous	2%	2%	2%	6%	6%	2%
N	108	108	108	124	106	108

Explanatory note: The routing presents first 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 it. The table reports an own classification of the open-ended answers to the question "What other arrangements?" that was asked to those selecting "other arrangements" in the previous question. We have allowed multiple answers; we also take the individual as a unit and not the household (therefore somewhat larger sample size).

In order to classify the open-ended 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 row ‘Any form of free savings’ in Table 2.4. 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 suggest 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 2.4 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. This suggests that most unconventional pension savings are free savings and, to a lesser degree, real estate savings.

To sum up, in this section we have seen that third pillar savings are owned by one-third of the Dutch population. These savings are low as they translate into an annuity that is small relative to the future pension benefit both to wage-employed and to self-employed. However we suspect that many respondents may be saving for their pensions in unconventional ways, such as other saving accounts and real estate investments. We support this speculation by showing that when a question on unconventional arrangements is asked (unfortunately the routing excludes those who also have conventional retirement savings), these are the most popular answers. Furthermore we show also evidence in support of the idea that self-employed more often do not fulfill their saving intentions relative to wage-employed.

In order to elicit the share of pension savings in these unconventional retirement accounts, we will next construct a retirement saving factor.

2.3 Importance of saving motives

The presence of unconventional retirement accounts suggests that we should pool all savings together (excluding conventional retirement savings) and elicit the impact of retirement saving by relating these pooled measures 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.

Table 2.5 shows the ranking of all motives for the whole sample and for two employment-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), investment (in the future) motives (e.g. x11 and x6) and bequest motives (e.g. x4 and x5). For most motives including retirement, there is a significant difference between wage-employed and self-employed. Self-employed find it more important to save for retirement, but not for precautionary savings (in line with Hurst et al. 2010). We are also interested in the relation between these motives, and specifically the factors we include them into, and saving accumulation. We now move onto investigate the definition of a retirement saving factor, next we will use it explain unconventional retirement savings.

3 From saving motives to factors

As shown in Table 3.1, we associate the different questions to specific factors. Take, for instance, the factor “saving for 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 also be associated with the more general “investment saving factor” as we split life-cycle savings in two components: pension factor, for old age savings, and investment factor (such as future purchase of a house or education) .

Table 2.5: Ranking of self-reported importance of saving motives

Saving motive	Short description	Whole sample	Non self-employed	Self-employed	significant difference
x3	unforeseen expenses	5.44	5.46	5.30	yes
x1	expenses due to illness	4.76	4.77	4.81	no

x10	supplement retirement pension	4.58	4.55	4.90	yes
x12	supplement the social security benefit	4.43	4.41	4.77	yes
x2	unemployed	4.12	4.09	4.08	no
x7	buy durable goods	3.68	3.73	3.53	yes
x5	gifts to my (grand)children	3.24	3.26	3.19	no
x6	children's education	3.18	3.18	3.37	yes
x9	set up my own business	3.00	2.91	3.42	yes
x11	buy a house in the future	2.70	2.69	2.97	yes
x8	income from interests or dividends	2.69	2.68	3.16	yes
x4	leave money to my children	2.64	2.65	2.75	no
N		17910			

Explanatory note: The unit of analysis is the head of the household. The ranking is based on the whole sample. The table reports average evaluations. The questions are asked as follows: "How important is it to you to have some money saved? Please indicate on a scale from 1 to 7 how important it is to you, 1 being 'very unimportant' and 7 being 'very important': to supplement my general old-age pension(x12); so I can buy an apartment or house in the future (x11); so that I generate income from interests or dividends (x8); so I can leave money to my children (or other relatives) (x4); to have some savings to cover unforeseen expenses (x3); so I have some extra money to spend when I'm retired (x10); to set up my own business (x9); so I can give money or presents to my children and/or grandchildren (x5); to have some savings to cover unforeseen expenses as a consequence of illness or accidents (x1); to have some savings in case I or a member of my family get(s) unemployed (x2); so I can buy durable goods (such as furniture, electrical equipment or bikes) in the future(x7)"

The analysis of the open-ended question about retirement preparation suggests that many people see their houses as an investment for their retirement. So we first estimate different specifications where we join and disjoin the investment and the pension factors. We also rely on a more structural empirical strategy to account for this classification issue. A powerful tool to handle this econometrically is the SEM routine in Stata that encompasses also confirmatory factor analysis (CFA; Kolenikov 2009). We 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).

Table 3.1: 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	Investment	to buy durable goods such as furniture, electric appliances, or bicycles in the future
x8	Investment	to generate income from interests or dividends
x9	Investment	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

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. 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.

In the appendix, we report a table with correlations among saving motives and the results of the CFA model. We can now score individuals in terms of their different saving factors. As an illustration, we report results for the precautionary saving factor and the pension factor in Figures 3.1 and 3.2, with lowess smoothing. While the model delivers standardized predictions (with zero mean) we report here the de-standardized figures. Figures 3.1 and 3.2 show that there is an interesting time effect mostly between ages 55 and 70. This is represented by the vertical distance between the segments corresponding to the average cohort year of births, 1949 and 1929.

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 after the 1949 cohort in terms of early retirement since 2004. The 1944 cohort (scattered line in Figure 3.1) has indeed a lover pension saving factor.

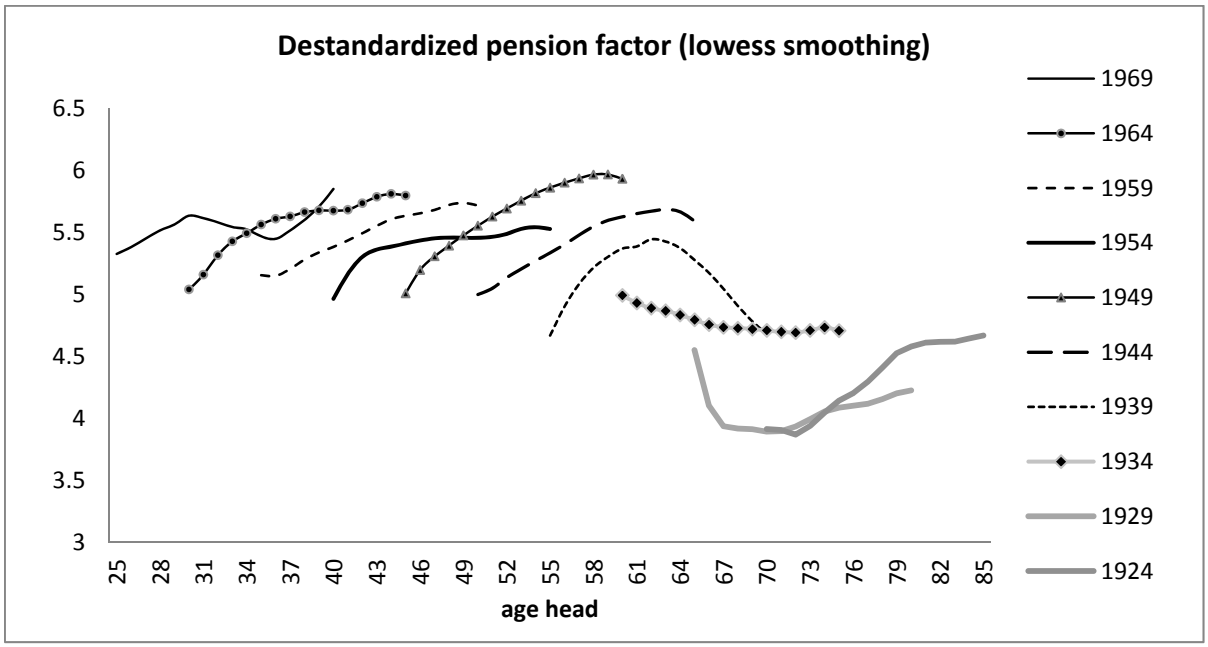

Figure 3.1: Pension saving factor in by age and cohort

In Figures 3.2, we de-standardize the predictions of the CFA for the precautionary factor. Due 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.

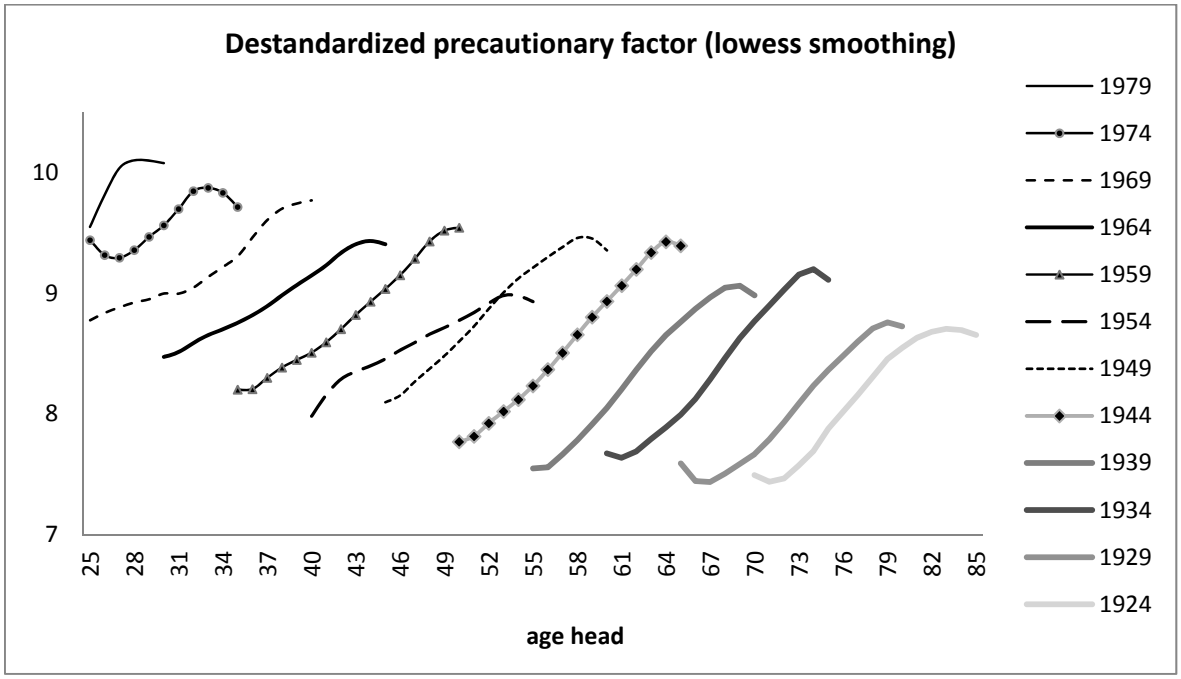

Figure 3.2: Precautionary saving factor in by age and cohort

The last piece of evidence on the saving factor is a multivariate analysis of the pension saving factor, in Table 3.2. It shows that self-employed have a significantly higher pension factor, even if we correct for household background characteristics. This is in line with the anecdotic evidence mentioned above, related to the policy discussion on the retirement savings of self-employed.

Table 3.2: Multivariate analysis of the pension factor

	coeff	S.E.
Self-employed in the household	0.256***	0.0521
Age of the head	0.0226***	0.00339
Head year of birth	0.0468***	0.00341
Head employed	0.0891**	0.0370
Head education	-0.140***	0.0237
Family size	-0.0413***	0.0158
Household income	0.00124**	0.000535
Constant	-86.85***	6.795
N	18,147	
Groups	5,684	

4 Multivariate analysis

We now test whether those scoring highest with the saving factors also save more. It is not possible to carry out this piece of analysis separately for self-employed as this group is too small. We will therefore use a dummy for self-employed as a control in the analysis. The active saving measure used is based on the first difference of net financial wealth excluding pension savings 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 and permanent income (see Kapteyn et al. 2005 for a definition of this variable).

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 (see appendix) 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 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. If this characteristic is time invariant, it is an individual fixed characteristic that we can isolate by estimating a fixed effect model (Table 4.1). This specification accommodates the concerns about the lower risk-aversion of the self-employed (see Fuchs-Schundeln and Schundeln 2005).

Models 1 and 4 list the results for a fixed effect model where, respectively, active saving[10] (divided by permanent income) and net housing wealth (divided by permanent income) are the dependent variables. We divide by permanent income in order to account for the larger buffers of the wealthier in saving decisions.

Table 4.1: 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	0.00298***	0.00340***	0.00359***	0.165***	0.204***	0.157***
Bequest Factor	-0.000768	-0.000865	-0.00584***	0.0645**	0.0656	0.367***
Investment factor	0.00148	0.00146	0.00929***	0.0611*	0.0790*	0.125
Pension factor	0.00371***	0.00368***	0.00608***	-0.00311	-0.0100	-0.000314
Constant	0.104***	0.101***	0.0669***	4.396***	3.993***	2.851***
Observations	11,372	11,372	11,372	7,310	7,310	7,310
R-squared	0.004	0.004	0.026	0.016	0.016	0.029
Precautionary factor						
Age head		0.0648*			0.125**	
Age head square		-0.00100			-0.00225**	
Age head cube		7.90e-06**			1.64e-05***	
Cohort		-0.121***			-0.131***	
Permanent income		-1.62e-06			-1.35e-06	
Transitory income		1.97e-06***			1.97e-06***	
Education 2		-0.0961*			-0.130	
Education 3		-0.0886			-0.123	
Education 4		-0.0764			-0.104	

[10] This is measured at household level and excludes all second and third pillar savings, such as annuities and life insurances, and also excludes housing. It is based on the variable OPZIJ (how much did you put aside in the last 12 months?) combined with the first difference in financial wealth (net of price effects) if OPZIJ is missing.

Male	-0.00455	-0.00464
Self-employed	-0.00336	-0.00600
Constant	7.509***	6.803***
Bequest Factor		
Age head	0.0335	0.0474
Age head square	-0.000844	-0.00109
Age head cube	6.47e-06*	8.15e-06*
Cohort	-0.00760	-0.0184
Permanent income	6.51e-07	4.50e-07
Transitory income	-4.06e-07	-4.14e-07
Education 2	-0.185***	-0.151**
Education 3	-0.178***	-0.154**
Education 4	-0.188***	-0.159**
Male	-0.0136	0.00370
Self-employed	0.00613	-0.0151
Constant	3.982***	3.701***

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Investment factor		
Age head	0.00186	0.0534
Age head square	0.000118	-0.000899
Age head cube	-6.06e-07	6.32e-06
Cohort	-0.0437***	-0.0628***
Permanent income	1.20e-06	9.08e-07
Transitory income	-5.25e-07	-2.16e-07
Education 2	-0.124***	-0.210***
Education 3	-0.130***	-0.209***
Education 4	-0.136***	-0.211***
Male	-0.00629	-0.00523
Self-employed	-0.00305	-0.00206
Constant	5.160***	4.744***
Pension factor		
Age head	0.00916	0.0598
Age head square	-8.91e-05	-0.00105
Age head cube	5.48e-07	6.80e-06
Cohort	-0.0191*	-0.0361**
Permanent income	-3.01e-07	-5.05e-07
Transitory income	6.96e-07	8.10e-07
Education 2	-0.109**	-0.131*

Education 3	-0.111**	-0.118
Education 4	-0.114**	-0.129
Male	-0.00974	-0.0113
Self-employed	0.0240	0.0222
Constant	5.304***	4.849***

Explanatory note: Education 2 is secondary vocational education, Education 3 is secondary education, Education 4 is university or college education.

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. Model 1 shows that when the factors are statistically significant, they are also positive. This suggests that when a saving factor is active, it is associated with higher savings[11].

A simple way to look at the results of, for instance, Model 1 is to compute mean effects based on the estimated coefficients. The constant term (0.1) indicates that 10% of permanent income is being saved for no specific factor. This is in line with the observation of Hurst et al. (2010), that other unobserved factors, mostly for the self-employed, motivate individual to save, and not specifically precautionary savings (Fossen et al. 2013). 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,[12] while 2.5% points are for precautionary reasons. The bequest factor was not active in Models 1 to 3.

Figure 3.1 shows that assuming no time variation in the propensity to save for retirement may be restrictive. The graph shows an evident cohort-time effect for the cohorts 1949 and 1944, 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 system:

[11] The factors are de-standardized indices. We simulate a factor increase by one standard deviation. 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).

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

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

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 X's are exogenous to the system and uncorrelated to the disturbances. These can be considered as instruments for the endogenous factors. One remarkable result is that the self-employment indicator is not significant, so this group has no more unconventional retirement savings relative to wage-employed.

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.[13] 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:

$$ANN2_{i,t} = S_{i,t} \frac{1-(1+1)^{-(67-age_{i,t})}}{i} \tag{5}$$

where *i=1%*, and *S* the amount of pension savings in active savings:

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

With *PI* being permanent income. Our computations are contained in Table 4.2 where we compare the variables ANN and ANN2 by year of birth[14].

[13] 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.

[14] 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

Table 4.2 shows that putting aside about 2% of permanent income until age 67 will return an annuity with a median future value for many self-employed of about 7000 euro. This will therefore not result in an additional annuity of substantial value (additional 50 averaging out all cohorts).

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 4.1, 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. This indicates that housing wealth and the pension factor are not related in a statistically significant way and that housing wealth can be expected to be retained until death. 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.

savings hidden in these accounts was proportional to that of the savings rates, then these would add up about 12%[14], that is to say only about 1000 euro to the final value at age 67 of ANN2.

Table 4.2: Annuity value in euro

Cohort year of birth	ownership rate	median value ANN (PV)	median value ANN2 (PV)	median value ANN (FV)	median value ANN2 (FV)	monthly payment ANN (FV) starting 67	monthly payment ANN2 (FV) starting 67	N
Non self-employed								
>=1977	15%	9854	8078	14818	11690	75	59	105
1972-1976	21%	24543	8077	33745	11425	171	58	289
1967-1971	25%	19763	7701	26732	10799	136	55	313
1962-1966	28%	18563	6929	23390	9348	119	47	604
1957-1961	29%	17158	6527	21391	8508	109	43	596
1952-1956	32%	19657	6139	23035	7523	117	38	789
1947-1951	32%	17896	4653	19499	5537	99	28	740
1942-1946	33%	17086	3657	18665	4136	95	21	600
1937-1941	28%	18916	2884	20567	3190	104	-	256
1932-1936	28%	14477	1889	15367	2003	78	-	176
1927-1931	20%	24085	1289	25063	1341	127	-	22
At least one self-employed in the household								
>=1977	14%	19535	5948	27473	8516	139	43	20
1972-1976	13%	40445	7352	56165	10430	285	53	24
1967-1971	34%	16995	3967	21579	5295	110	27	71
1962-1966	38%	25664	4117	32231	5588	164	28	92
1957-1961	28%	18541	3949	22623	4772	115	24	108
1952-1956	35%	24853	3592	28568	4223	145	21	154
1947-1951	39%	30104	3306	34310	3688	174	-	143
1942-1946	39%	23933	2315	27186	2533	138	-	110
1937-1941	43%	41840	2226	46563	2421	236	-	58
1932-1936	32%	24988	1293	26525	1400	135	-	12
1927-1931	27%	6697	607	6900	626	35	-	2

Explanatory note: We present medians conditional on the value being positive. N = number of observations with positive balance for ANN

5 Conclusions

Third pillar free pension savings are of limited importance to the median Dutch person. When we zoom into sub-groups, we observe that the rich are more often owners of such savings and save more, while being self-employed does not explain the ownership. This is interesting as this group has in general no occupational pension, less often meets pre-stated savings targets and more often finds saving for retirement important. When self-employed have an annuity, the balance of these products is higher than that of wage-employed, though not high enough to deliver a substantial income stream after age 67.

The descriptive evidence on the whole sample shows that the returns of the annuity, that could be bought by median free pension wealth, will increase the pension benefit by about 15-25% 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 construct 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 and this figure is not significantly higher for self-employed. 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 this means that at some later ages self-employed will need to re-plan their saving/consumption profile.

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Appendix

Table a1 reports the correlation among the saving 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.

Our implementation of the SEM model is explained below. Formally:

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

$$\mathbf{V}(\xi) = \Phi, \quad \mathbf{V}(\delta) = \mathbf{diag}(\delta_1, ..., \delta_{12}), \quad \mathbf{Cov}(\xi, \delta) = 0$$

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 do not allow for a free form of the variance and covariance matrix, but we will assume some zeros at specific cells.

Table a2 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. 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 a2. 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.

Table a2: 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 Investment									
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
Cov$\left(\xi_j, \xi_k\right)$,									
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
Investment - investment	0.57	0.02	0.70	0.03	0.74	0.03		0.74	0.03
Bequest- investment	0.31	0.01	0.53	0.02	0.58	0.02		0.56	0.02
Precautionary- investment	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
Investment - 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
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			

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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-investment	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- investment	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
Investment - pension			0.69	0.01	1.39	0.02		1.38	0.02