Modigliani's Life Cycle Hypothesis presence amongst Norwegian pensioners
Master Thesis

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Contents

I. INTRODUCTION 3

Hypothesis: 5

Aim and Scope 5

Definitions and expressions 7

II. THEORETICAL BACKGROUND The Life Cycle Saving Hypothesis (LCH) 8

Permanent income hypothesis (PIH) 11

Norway and its pensioners: 12

III. METHOD 14

Case study of Norwegian consumer patterns 14

Qualitative approach, an exploratory analysis of previous research 15

Quantitative approach 15

Data: The income and wealth survey, 2003 15

Data 16

Challenges and modifications with the dataset 17

The models to detect LCH pattern 18

IV. QUALITATIVE ANALYSIS Previous findings from Norway – is the LCH present? 18

Exploring the AFP pensioners 18

Exploring a longitudinal study 20

Exploring pensioners' own response to why they save 23

Conclusion, from previous research 25

V. THE QUANTITATIVE ANALYSIS 27

Conclusion, from the regressions 32

VI. DISCUSSION OF HYPOTHESIS 32

The consequences of today's saving pattern 32

An alternative explanation; converging infinite saving scoop with smooth consumption 35

VII. CONCLUSION 35

VIII. SOURCES: 37

IX. APPENDIX 38

Abstract

The aim of this thesis is to determine to what extend Modigliani's Life Cycle Hypothesis is present amongst Norwegian pensioners' behavioural pattern. The high economic growth the pensioners have experienced during working ages should have given them the opportunity to accumulate the level of wealth needed for a smooth consumption throughout their lifetime.

Keywords: Life cycle hypothesis, LCH, Norwegian pensioners' consumption.

I. INTRODUCTION

In 1985, the Royal Swedish Academy of Science decided to award the Alfred Nobel Memorial Prize in Economic Science to Professor Franco Modigliani. It was granted for his pioneering analyses of savings and financial markets.

In this paper I will address his work on savings analysis, which is dominated by his 'Life Cycle Saving Hypothesis' (LCH). The LCH is founded on the idea that people try to 'smooth' their consumption over their lifetime. Consequently, increases in production and economic growth will increase savings more than consumption. The increased savings would not have been anticipated, and surpluses will be created from increasing incomes without increasing consumption.

I will use Modigliani's own presentations from 1985 as theoretical framework for the LCH. The thesis has developed to a more refined model since then, including for instance interest rates higher than zero and hyperbolic discounting[1]. This paper's theoretical departure will be "purer" than most economics today, which makes my theoretical frame somewhat less complex, but allows a plain framework with clear and set restrictions. The potential information loss of using the less complex theory was discussed in Brumberg and Modigliani' early work (1954), where they argued that these assumptions that simplified the model could be greatly relaxed, and that complications of the algebra would not have significant affect on the conclusion.

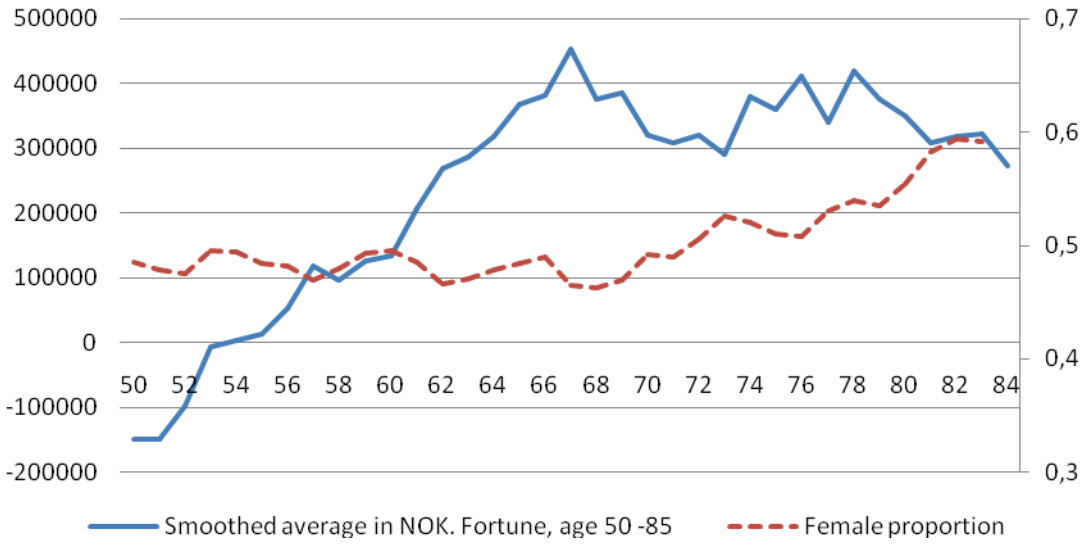
It might seem unlikely that people do not adjust their intended consumption level numerous times during a lifetime. In this paper, when referring to the LCH, I assume that a planned consumption level is set sometime during the early working years. This consumption can be set according to the growth rate people experience (and then anticipate), with the planned consumption then taking annual growth into account. Economic growth beyond the anticipated growth[2] will not increase consumption (and consequently be saved).

I will conduct a case study of pensioners' consumption in Norway. The present and future pensioner cohorts have experienced high economic growth during their working years. According to the LCH, this should have created a high level of net wealth amongst these

[1] Hyperbolic discounting is within the behavioral economics; people who plan savings, but wait too long before starting to do so. (Deaton, 2005)
[2] For salary development from 1962-2002; see Appendix A.

pensioners. As Graph 1 reveals, there is a high average of savings in Norway, which does not necessarily decrease during people's elderly years.

Graph 1: Average net wealth of persons aged 50-85, in NOK.



Data source: the 2003 Income and Savings Survey

Graph 1 shows in NOK (left axis) net wealth per person. The right axis shows the female proportion of the sample, where 0,5 is an even sample. There is no clear trend of decrease in personal wealth after retirement (officially at 67[3]).The proportion of females in the dataset increases after 80, as the average personal wealth decrease.

Aggregated bequest in Norway was 24 billion NOK in 2005.[4] 14 billion of this was real estate, which is not represented in Graph 1 or in most of this paper. 7 billion of the bequests were capital, and 1 billion were bonds. This shows that the majority of liquid assets of pensioners are dominated by low risk savings. This annual aggregated amount has almost doubled over the past ten years. Measuring pensioners' wealth from tax records is a sufficient method of evaluation, as stocks (which are sensitive to change) do not form a large portion of their savings. If a large portion of savings are in stocks, there is a risk associated with using tax records for measuring wealth, as they may reflect the last year's value of the stock exchange and not their saving pattern.

[3] Age 67 is the official retirement age today (2008), there are certain occupations with earlier retirement ages. This retirement age has changed over time, and not all cohorts in the sample will have experienced retirement age 67.
[4] From an unpublished working paper from Statistics Norway, http://www.ssb.no/arvund/

I will review previous research on the subject from Norway. Gulbrandsen and Langsether (1998) have concluded that there is little evidence for a life cycle savings pattern in Norway. I disagree with their assumptions and interpretation of the LCH, which is different from the approach of Modigliani and results in another outcome. Furthermore, I will analyze a dataset from the Norwegian Income and Savings Survey from 2003, to see whether the Norwegian pensioners follow a Modiglianian life cycle pattern. Finally I will present the risk of maintaining the Norwegian pension system with pensioners following the life cycle hypothesis.

Hypothesis:

The pensioners of Norway follow a saving and consumption pattern compatible with Modigliani's life cycle hypothesis.

To operationalize my hypothesis, I have created different research questions to be answered with different methodological approaches:

1. Do the pensioners of Norway follow a saving and consumption pattern compatible with Modigliani's life cycle hypothesis?

I will answer this question with *a qualitative approach*, based on a literature review of previous research on pensioners' savings and spending in Norway.

2. Is age a negative determinant of wealth? (implying dissaving of private wealth)
3. Is age a more important determinant of wealth in certain socio-economic classes but not others?
4. Are savings a determinant of early retirement (AFP[5])?

I will primarily answer these two questions with *a quantitative approach*. I will run a set of regressions based on a dataset collected by Statistics Norway, named the Income and Savings Survey, 2003.

Aim and Scope

Studying individual thrift and aggregated savings are important because this has traditionally been the source of supply for a nation's capital. With an attention to pension systems, this paper will hopefully be of interest to the decision makers of pension reform. If the Norwegian pension system is supporting bequests to a high extent, this could be problematic. The reason

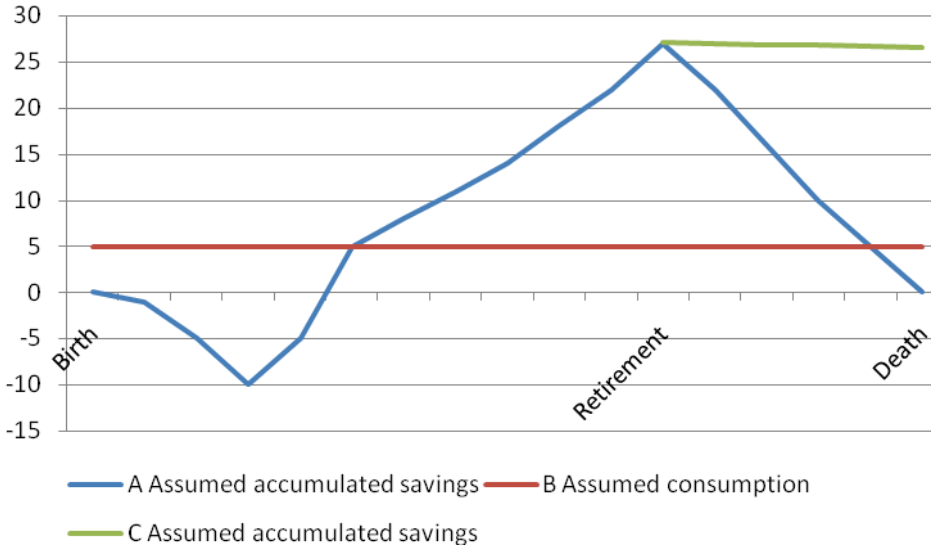
[5] See the Definition and Expressions section for further information about AFP.

for people to save reflects the incentive to retire, and as the proportion of elders in society increases, there may be incentive to increase the pension age. In Norway, an increased knowledge of the actual saving situation of pensioners could help ease the frequency of pension reform. Hopefully this will contribute to the creation of a stable context for people to calculate their own need for savings and increasing the nation's ability to predict its national reserves.

In this paper, I will explore the extent to which the pensioners of Norway save and use their pensions. Previous research has argued the absence of the LCH in Norway, based on the argument that pensioners continue to save after their retirement. I will revalidate previous research, to show how continuing to save money after retirement is not a contradiction to the LCH. With cohorts that have lived through a more or less constant economic growth; savings patterns can not be evidence of the presence of the LCH.

I will explore this via a case study[6] of Norwegian penioners. The first analysis will be a qualitative analysis of previous research to see to what extent the LCH is present. The second part will be an econometric analysis of the 2003 Income and Savings Survey. In this second part, I will examine how important age and socio-economic class is for savings, and whether age is more important for some socio-economic classes than others. In the last part of the paper I will argue the potential consequences of my findings.

Graph 2: The LCH. Savings development over the course of life:



[6] *Case study* might often be used for somewhat "narrower" studies. In this paper I do use a set of sources, including administrative data. Since I in this paper do no attempt to compare my focus age group with other ages, previous cohorts or other nations I have chosen to define this research paper as a case study.

As shown in Graph 2, the idea behind smoothed savings is represented by line B. To obtain line B (which is the main reason to save) one assumes a life cycle saving pattern represented by A. I will argue that for cohorts who have saved through high economic growth, line C will represent the savings pattern. It is important to keep in mind that the core of the LCH is represented in line B, and line A is the assumed saving pattern to obtain line B in an economy with no economic growth.

If a population follows a pattern closer to C than A during their elderly years, it is natural to ask why consumption does not increase, or to assume that they save for future bequest. If neither consumption increases, nor people save for bequest; it opens for the presence of a behavior compatible with the LCH.

Definitions and expressions

Wealth-income ratio refers to: annual income your wealth makes. Often measured at retirement age, to illustrate how many income-years your wealth is. For instance a wealth-income ratio of 5 means five times annual income, a given year. $Wr = \frac{w}{i}$

Savings ratio refers to: the proportion of income that is saved every year.

Life Expectancy (LE). Given that mortality risks are static, how many years can the average in a cohort assume to live.

Retirement span refers to: the length of retirement. LE - age of retirement = retirement span.

AFP pensioners are pensioners who retire earlier than retirement age, but will receive a lower pension. Retirement age in Norway is 67 years. Contractual pension agreements (AFP) allow early retirement from the age of 62. There will be no consequences on the amount of pension received after age 67. There will however be a lower pension from early retirement until age 67. This group where in 1999 approximately 25 000, and is assumed to increase to 50 000 in 2010 (Ministry of Finances, 2000).

Dissaving refers to: higher consumption than income. Negative savings, decumulation of wealth.

Myopic and *myopic critique of the LCH* [7]: Myopic refers to; short sighted saving individuals, people who are not concerned with how they would support themselves as pensioners. The myopic critique of LCH sets doubts as to the assumption embedded in the LCH that people plan for their retirement.

II. THEORETICAL BACKGROUND

The Life Cycle Saving Hypothesis (LCH)

Modigliani, with Richard Brumberg, presented his theory of LCH in two papers written during the 1950's. The aim was to prove, in the spirit of Irwin Fisher's article from 1930, that consumers allocated their resources rationally to create a utility maximizing consumption throughout their lifetime (Modigliani, 1985).

The LCH presents the idea of utility maximizing throughout one's lifetime. Consumption would be the maximized average consumption one could maintain throughout their lifetime. To do so, it is natural to assume that one would save during their working years to spend during their elderly years. If a person manages to save the amount they would like, there would not be a change in an individual's consumption pattern when they retire (besides work related expenses). Since people maximize over their own lifetime, the LCH is a contradiction to maximize income over several generations, as it removes the incentive of bequest. The contrary view, being Milton's later Permanent Income Hypothesis (PIH) argues that the utility function's timeline is infinite, and so inheritance becomes a natural consequence of the utility function.

Modigliani and Brumberg tested (with a few assumptions) their hypothesis on a dataset with different OECD countries. The assumptions were: (Modigliani, 1985, Economic Sciences, p: 154) *"(1) opportunities: income constant until retirement, zero thereafter; zero interest rate; and (2) preferences: constant consumption over life, no bequest."*

Their results were not in line with previous theories (paraphrased Modigliani, 1985, p: 154):

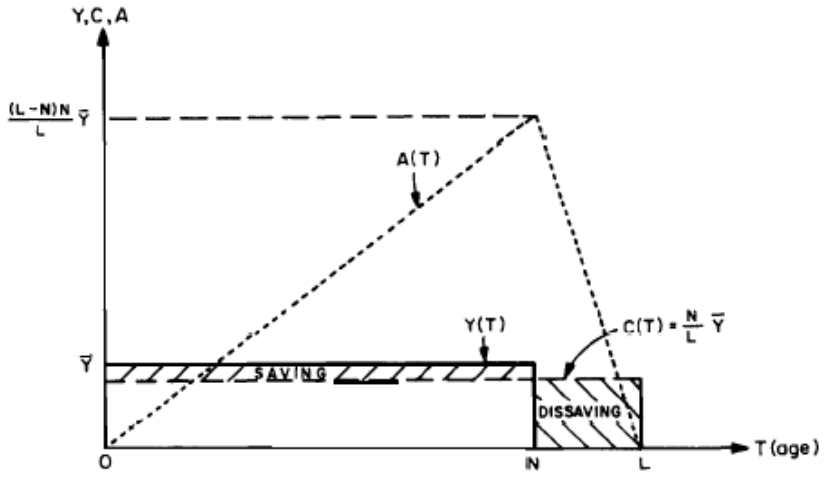
- Savings rates within countries are independent of income per capita.

[7] Myopic could also be used for describing people that have a higher focus on a short time horizon, but maintain some focus on a long time horizon. This allows people to be myopic to a certain degree, but not myopic or not. In this paper, 'myopic' refers to the absolute notion of 'myopic' or 'not myopic'.

- The national savings rate was not an attribute of its population, but rather the different savings ratios reflected different economic situations. They all had a similar behavioral life cycle pattern.[8]
- The higher the aggregated savings, the higher a country's long term economic growth has been. With zero economic growth, the closer to zero are aggregated savings.
- An economy can accumulate a substantial stock of wealth relative to savings, even if there is no bequest.
- The main parameter that controls the wealth-income ratio and saving rate for given growth is the prevailing length of retirement.

These findings show how important the *level* of growth is for national savings, and that it is not unique to populations, but that there exists a transnational behavioral pattern.

Graph 3: the LCH. Income, consumption, saving and wealth as a function of age.



Source: Modigliani, 1985 [9]

In Graph 3, one can see Modigliani's assumptions. For instance Y(T), which is income, continues over time and drops to 0 at retirement (N). C(T) is consumption, and is constant. The difference between Y and C generates annual savings, which accumulates the total aggregated savings A(T), often referred to as wealth. During retirement years (the difference

[8] Different savings ratios were not different cultural traits, such as different levels of thrift or carefulness. Savings ratios were a product of the given economic situation.
[9] Originally presented in; "Determinants of Private Saving with Special Reference to the Role of Social Security-Cross-country Tests" R. Hemming, ed., *The Determinants of National Saving and Wealth,* proceedings of a Conference held by the International Economic Association at Bergamo, Italy, June 9-14, 1980, The Macmillan Press Ltd, London, 1983.

between life expectancy (L) and retirement (N)), savings would be used to maintain constant consumption (C). The annual amount of dissaving needed is taken from accumulated savings A (T). Since all is known, and no risk exists, A(T) = 0 at L.

This also implies that, in a stable population (no changes between the proportions of age groups) without a change in level of economic growth, the aggregated savings ratio would be equal to zero. This is due to the fact that elders dissave the same amount that workers would save. Such populations would generate no extra aggregated savings. On the contrary, an aging population would decrease the aggregated savings; since more would dissave than save. Further, this means that with no growth in an economy, there is no extra wealth being created, and it is just "old wealth" being passed around. It is consistently found from when Modigliani started to today, that saving rates are higher where growth rates are higher (Deaton, 2005).

Modigliani (1985) shows with the model, that population growth and/or economic growth (due to productivity) would increase the national savings (aggregated savings). There would be more people at younger ages that are saving, than older people that are using savings. Increased growth in the economy would mean an increase in the income-savings ratio, if consumption were smoothed. Modigliani (1985) argues that most likely, since smoothing lifetime consumption is the prime motivation for savings; we would (if no official retirement age existed) retire when the amount of savings needed for smoothed lifetime consumption is reached.

An increase in aggregated savings would not be a permanent increase in the national savings. This is because the ones who would save faster than anticipated would try to limit this increase with earlier retirement (not increased consumption, but lower income / production). This also makes savings dependent on the rate of growth, not the level of growth. The wealth level of a nation would therefore be linked to the level of retirement span (Deaton, 2005).

Later in life, Modigliani repeatedly argued that these growth effects on savings (by then comprehended with the idea of hump savings), caused by increase in growth and population, were the most important predictor of national savings (Deaton, 2005). Modigliani (ibid.) argued that these effects where the essence of the life cycle hypothesis, to the point that the LCH *was* the Growth-to-Savings hypothesis (Deaton, 2005).

Modigliani's (1985) response to the myopic critique, that households are too myopic to maintain an LCH pattern, is simply that it holds too little empirical support. By this, he means that most households do manage to support their ongoing consumption as pensioners, and people do tend to rationalize their lifetime consumption.

Liquidity constraints, mainly occurring in the earlier phase of the life cycle, would undermine the possibility to fulfill a smooth consumption. A natural reaction would be to unwillingly postpone the consumption, which evidently would result in increase of savings (Modigliani, 1985).

With perfect information, there should be no bequest in the LCH [10], which empirically is obviously far from the truth. Unintended savings should be compensated with earlier retirement. Due to uncertainties with LE, price of consumption and risk regarding own savings, bequest will still occur to the leftovers. What is harder to explain with the LCH are cases of increased or maintained wealth-income ratio during the elderly years. Modigliani (1985) critiques a lot of research that accounts for pensions as income. Pensions are not income, but a benefit from previous taxation. Use of a pension is therefore a form of dissaving. In the PAYG pension systems there is asymmetry between savings and dissavings, but I still define pensions as dissavings. Furthermore, if received pensions are higher than preferred consumptions, this allows saving some of these savings (pensions). Since it is previous savings which will be saved, and not a part of income, this creates a savings-income ratio that in this case is somewhat an illusion.

Permanent Income Hypothesis (PIH)

The underlying idea of the PIH is that people's income should be conceptually separated in two: one current (permanent, planned and predictable) income, and one transitory (windfall / unplanned) income. People would smooth their consumption based on their permanent income. This means that the savings function increases with the higher proportion of transitory income, so the higher the transitory income, the higher the savings ratio (Modigliani, 1985). Higher transitory income would normally be found in higher paid jobs and higher socio-economic classes.

With the PIH, increased productivity would increase excepted permanent income in proportion to actual income. This would lead to increased consumption in proportion to

[10] As previously mentioned, this paper refers to the original LCH by Modigliani. Numerous research papers exist, which include bequest motives.

actual income, which would decrease savings possibilities (Storm, 2002). This means that savings would only occur if income is assumed to fall.

The differences between the two models are not too apparent, and a convergent of them is commonly used today. The different time perspective, of finite or infinite saving horizon, is often determined by the practical issues concerning calculating the models, not the behavioral concept of bequest. I will, as mentioned, use the simplest models of the LCH, where the difference between them is maintained. Furthermore if a very wide and all inclusive hybrid model is used, it only allows you to see to what extent your model fits the empirical backing, with few potential alternative models.

Norway and its pensioners

The increasing amount of elders in Norway has for most of their working life experienced high economic growth, and a relatively well developed welfare system for those who could not directly benefit from the growth. There are ongoing negotiations for pension reform, seeking a consensus between the majority of parties and the majority of labor and employee's unions. The results of these negotiations are far from ready, though the first rounds and results shows there are no radical changes being made, and the transformation period will not be drastic [11]. The present ongoing Norwegian pension system started in 1969. The payouts of pensions are based on previous income, not wealth. Everyone however is entitled to a minimum pension regardless of previous income, or lack of income.

There was in 1999 approximately 1 million people who had their main income from a welfare arrangement; 631 000 received pensions. In 1999 the total expenses for pensions where 62 billion NOK, and it has increased since then. Approximately 1/3 of these received the minimum pension. Of the 631 000 pensioners, 270 000 received disability related pensions,[12] which can be obtain at a younger age than retirement pensions. (Norwegian Ministry of Finance, 2000).

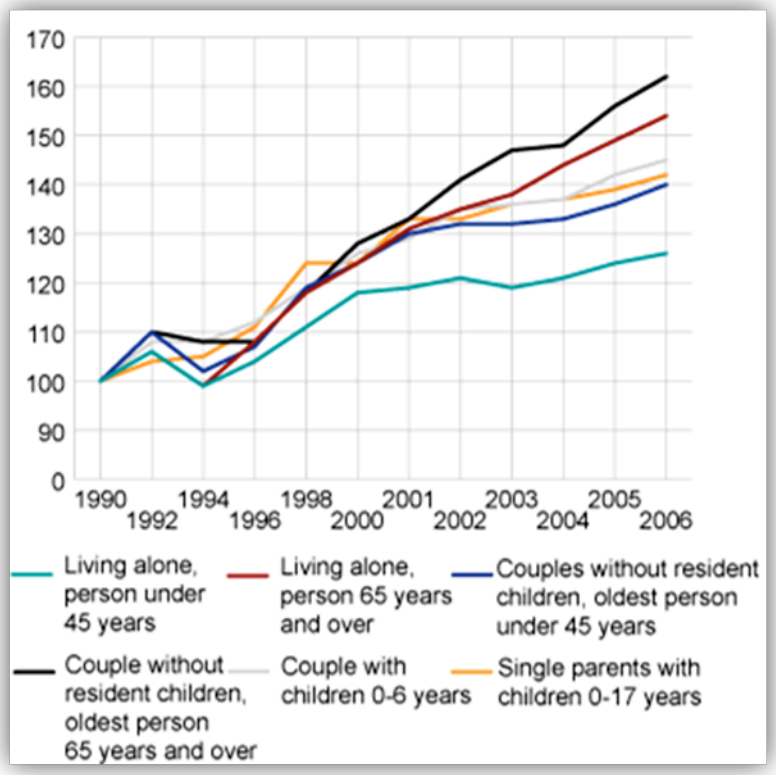
The real (average) pension age depends on what groups are included in the calculation, but the Ministry of Finance (2000) calculated it to be 58,9 if all who retire (including the receivers of disability pension) are included. If only the ones who retiree after age 50 are

[11] It is uncertain, but likely that there will be a closer relation between accumulated savings and payouts. However, the transformation period (cohorts which will not be affected) is likely to be rather large.
[12] Disability related pensions (uførepensjonister) can be received by people who in some way are disabled and is not assumed to return to the working force.

included, then the real age was 62,7. Both categories declined during the five years prior to 1995. (Norwegian Ministry of Finance, 2000).

The 45-66 age group controls the most capital in Norway, based on taxation data (Gulbrandsen and Langsether, 1998). In the age group from 67 to 79 years, more than 80 percent are debt free (Gulbrandsen and Langsether, 1998). It also shows that from ages 45-66 there are approximately 92 %, and 87% at age 67-70 who own their own housing, and for both age groups a third has a second house (Gulbrandsen and Langsether, 1998). Data on how much housing value they control is not possible to find, due to somewhat peculiar house taxation[13]. Still there is evidence that a lot of savings and buffers exist in housing amongst the elderly, which will be elaborated on later in the paper.

Graph 4: Development of after tax income for a selection of household types.



Graph 4: from Statistics Norway[14].

[13] Within taxation a certain amount of a house is considered to be personal savings. Wealth is (over a certain amount) taxed. Since housing values cannot be updated annually, they follow a set increase independent of real increase.
[14] Graph 4 is from Statistics Norway, and based on the income and savings survey. For more information see; http://www.ssb.no/emner/05/01/ifhus

Graph 4 shows how the two above 65 age groups have gained the highest income increase from 1990. This increase has become disproportionately higher than all other groups after the new millennium.

All indicators show that this generation has saved up all that they planned to and more so. According to theory, this should either increase their consumption, show some evidence that their savings are intended for bequest, or it is an unintended surplus of wealth.

III. METHOD

Numerous studies have been done in the field of elderly spending regarding their own savings. Weil (1994) reviews several of them and states: "Numerous studies examine the relationship between age and savings using either data at the household (micro) level or at the aggregated (macro) level. Their conclusions have differed substantially with regard to the question of whether the old dissave" (page 1 in: Weil, Daniel (1994)). Weil (ibid.) further shows how different approaches to the question might produce somewhat different results. The different results obtained with the similar theoretical approaches remind of the importance of clearly defined and transparent research.

Case study of Norwegian consumer patterns

Case studies could be considered to be a part of a wider multi-disciplinary operation (Hakim, 2000) often containing different types of data. I will perform a case study to get an in-dept view to test my thesis. The case here will refer to the combination of a phenomenon: the LCH, and the case of a defined population: the Norwegian pensioners. A challenge with studying a unique case is the lack of control or reference groups.

It is of course discussable to what degree this study can be generalized to show behavioural trends in general or for the Norwegian elders. However, the aim of this study is not to generalize, but to explore the actual case of interest under study. It is the somewhat unique economic development of the life cycle of the Norwegian pensioners that is the reason to do a case study[15], and not follow an approach that would more easily allow for generalizations. There might be certain generalizations possible regarding the extent to which populations strive to follow an LCH pattern. However, the consequences and opportunities to do so would be different due to every population's economy, and could hardly be generalized.

[15] Like most of the post-war western world, Norway has had a long economic growth. What makes these Norwegian cohorts unique is that during the oil crises when most of the west had to set their growth to test, it continued in Norway.

My case study in this thesis will be somewhat exploratory. Whilst knowing what the LCH is; I will have to explore how these patterns manifest.

Qualitative approach, an exploratory analysis of previous research

The previous research I am to analyze is based on a series of different methods, each containing their own strengths and weaknesses. This qualitative literature survey will also explore papers that use quantitative methods, and consequently contain quantitative related challenges. In the analysis of the text I will comment on weaknesses specific to the questions or methods used.

The most important general concern is related to the issue of research savings through surveys. Young people often exclude the pension tax that employers pay, and elders might include this as income (Deaton, 2005). Still it allows for people to express their own perception of how much they feel they have, and their own intensions for savings.

Quantitative approach

To determine the significant factors behind a pensioners' wealth, I will run a set of regressions on the Norwegian income and savings survey from 2003. The survey is done annually, but I will only use the 2003 results.

Tracing a tendency like consumption over time, poses some challenges with a cross sectional data set. One could not be sure whether the results one gets reflect an actual change or a change in behaviour between cohorts. An advantage of working with this dataset is that Halvorsen (2002*)* has previously proven low cohort differences in savings, in a longitudinal study.

Data: The income and wealth survey, 2003

The survey is a composition of both interviews, face to face and telephone, to reveal household information about how many people are living in each unit, and administrative data. The main source of income, savings and property data, is the personal tax return obtained from the Norwegian Directorate of Taxes. For more elaborated information about the survey, please see Statistics Norway [16].

[16] For elaborating information about the survey, see Statistics Norway: http://www.ssb.no/vis/emner/05/01/nos_inntektformue/nos_d310/main.html

Data

The dataset is a selection of the 2003 survey. I have excluded all under 50 years of age to focus on the close to, and post retirement population, which includes approximately 12000 persons. There is a decreasing respondent rate with increased age, so I will in the analyses not comment on the above age 85 population due to the few people in the sample here. As mentioned, the real estate figures are not reliable enough to further analyze. The variables I will use are based both on dummies, as gender and whether retired, and continuous variables as income and age.

The three presumably most important variables I will use are continues; fortune, age and savings. Besides these, the dataset and analysis contains a high amount of dummy variables which indicates different demographical classifications. For elaborated description see table E, in the appendix.

The most used variables and their characteristics, represented as a summary for all the pensioners:

Variable	Obs	Mean	Std. Dev.	Min	Max
savings	3693	322428.7	1200577	-2008146	4.07e+07
age	3693	75.55213	7.301939	62	101
income2	3688	162986	224867.5	102	8253019
education	3667	3.100627	1.409758	0	8
single	3693	.0463038	.2101707	0	1
couple	3693	.6566477	.4748922	0	1
prev_couple	3693	.2970485	.4570199	0	1
trans_age	3693	.2350393	.4240808	0	1
core_age	3693	.4717032	.4992663	0	1
old_age	3693	.2575142	.4373242	0	1
gender	3693	.5264013	.4993701	0	1

Summary of the non-pensioners variables in the sample:

Variable	Obs	Mean	Std. Dev.	Min	Max
savings	8612	49242.11	2218899	-7.43e+07	8.19e+07
age	8612	56.57466	4.764565	50	93
income2	8485	241403.9	893520	1	7.61e+07
education	8507	3.799224	1.616292	0	8
single	8612	.0529494	.2239454	0	1
couple	8612	.7823967	.4126402	0	1
prev_couple	8612	.164654	.3708895	0	1
trans_age	8612	.2625406	.4400404	0	1
core_age	8612	.0012773	.0357184	0	1
old_age	8612	.0020901	.0456725	0	1
gender	8612	.4867627	.4998538	0	1

Challenges and modifications with the dataset

Data on real estate is, as mentioned, not a part of the dataset. This is unfortunate since real estate values cannot be assumed as equal for the individuals, or proportional to savings. This creates a bias in my sample, since real estate will assumedly be sold down as age increase. As previously mentioned few stop owning their homes after retirement, and some more sell or give away their second homes. Even though most pensioners own their own home, this does not mean that they do not change into a cheaper home, which would increase the savings in the dataset (without actually increasing the savings, only transferring it from real estate value to monetary). Unfortunate as it is, I would have to assume that the real estate savings increases with savings, not necessarily proportional but the higher the savings (savings variable) the higher I assume real estate would have been.

Income can, due to taxation, be listed as negative, since the tax can be higher than income. I have cleared the income variable (they have no value) of the 75 individuals with negative income. Due to negative savings, I will not be able to log or square the savings variable. It is hard to imagine a linear development being the true development of savings from 50 to 80. To minimize the potential impact of this, I will actively use dummy variables to determine different age groups.

I will not be able to determine when people in the dataset retired, and how long they have been retired. I will therefore look at the demographic differences between the retired and not retired population. The age span of this group is limited to 62-66, due to very low frequencies of pensioners outside this age group (only 40 non-retirees are older than 67). It is relatively rare to work after the official retirement age.

When accounting for social status (married etc.) with dummies, couples will be removed from the regression. This is because it is the biggest of the three determining variables for this, and therefore the most common civil status alternative for the ones who enter retirement. More information about the variables, see Appendix table E.

Dissaving during older ages is in the core of this paper. One potential weakness is that there are (obviously) no dead people in the dataset. If peoples savings were to decline towards zero at death, then people will be removed from the dataset as they are getting close to their target. And the ones who are in the dataset are the ones who plan to live on. This would escalate as

part of the institutional population is not a part of the dataset[17], who potentially represent the last years before death.

The models to detect LCH pattern

Savings (the variable savings) represent a potential consumption. I assume low cohort differences[18], and that a decline in savings will represent dissaving. Therefore savings decline should be the most significant determent of LCH presence. Hence, age should be the most important variable to determine savings. If it is not age, I will search what other variables are significant to explain savings. Since the relation between age and savings could be assumed not to be linear, I will see ages' effect within age intervals.

To see if there is a "class" difference in the sample, I will look at the educational differences, to see whether savings decline further with age in the low educational sample. The separation between low and high education is at high school; where the highly educated is the population who has finished high school as the minimum education, and low education the ones who finished secondary school as maximum education.

I will also attempt to find the differences between the retired and not retired populations, within the same age. I will see to what extent the decision of retiring early can be explained with financial and demographical variables. Since there are extremely few who work after official retirement age (67), I will look at the age who maintains the AFP (early retirement) sample (62-66). To find an indicator of whether people retire when they have saved up an intended amount; I will search to what extent savings determine early retirement or not.

IV. QUALITATIVE ANALYSIS

Previous findings from Norway – is the LCH present?

Exploring the AFP pensioners

Modigliani (1985) argues that if pensioners would be able to determine their own retirement age, they would have adapted to it and retired when their accumulated savings would be sufficient to maintain consumption throughout their life expectancy. Grambo and Myklebø (2008) show in their survey that 1/3 of the AFP(early retired) pensioners consider themselves

[17] The sample does not contain the long term institutionalized population.
[18] Will be mentioned later in the paper; Halvorsen (2002) finds little cohort differences concerning saving behavior.

to have better health than the rest of their cohort and about half considered their health to be somewhat equal. The AFP pensioners retire early, even though it means a loss of income in the future, not maximizing their current (here meaning infinite, which would mean a dynastic concept) potential to earn. This does not however mean that they do not try to maximize their utility, since they will receive more spare time. As they do then focus on their own utility (including leisure time), and do not maximize their income, this is a behavioral pattern compatible with the LCH, and contradicting the PIH.

There is a significant correlation between income and retirement age, where the higher the income and education the fewer retired early (with AFP) (Grambo and Myklebø, 2008). The exception was the above 700 000 NOK income group, which retired earlier than anybody else (Grambo and Myklebø, 2008). This shows (excluding the very high income group and assuming that the groups have saved up in proportion to their income) that either high income earners have a higher or longer intended consumption (due to higher LE), or they do act with an infinite (dynastic) saving horizon. *If* the intensions are the latter, it would disprove the LCH.

Grambo and Myklebø (2008) revealed that the higher the benefit pensioners in Norway are entitled to, the more skeptical pensioners were towards pension reforms. As the system is based on previous income, the high benefiters would be the high income population. This is rational since the high receivers have the most to lose in a pension reform.

At the same time, it could be assumed that the high income group is overrepresented amongst the parties which want to decrease the pension system (amongst the right oriented parties). A distrust buffer fund would be nothing more than saving for the future they would prefer to happen.

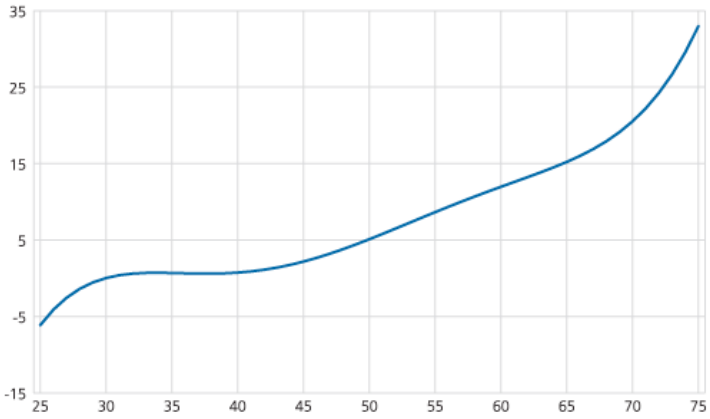
The higher income groups would be dominating the top of life expectancy scale. The more years savings are meant to last, the higher would the insecurity concerning the real value of the savings be. In addition, the higher life expectancy, the more years you are potentially exposed to unpredicted expenses. These insecurities would clearly be overrepresented in the high income pensioners, creating an incentive for them to build up higher wealth before retirement. This would potentially explain why the high income AFP pensioners prefer to work a little longer.

AFP does not allow for (at present time) working part-time whilst receiving AFP. Still, half the people in one survey reported that they would work part-time in addition to AFP if it were allowed (Grambo and Myklebø, 2008). This is hard to combine with LCH, as they are willing to work if they would have a higher income, but (since they are retired) need not do so. They are therefore willing to work more either to increase bequest or future consumption.

Exploring a longitudinal study

Halvorsen (2002) investigated with a longitudinal model to what extent savings ratio are age and / or cohort dependent. Halvorsen (2002) tested the potential cohort effect in this dataset, but only found evidence for small cohort differences. She suggests that potential cohort differences might not be (as previous research has suggested) patience and prudence in consumption, but differences in production growth (Halvorsen, 2002). When production growth (which increases real wages) results in increased savings, this is a strong indicator of the LCH, and not PIH pattern.

Graph 5: Savings ratio in Norway, sorted after main person in households age. Data from 1975 – 1994



X = age

Y = % of annual income that people save

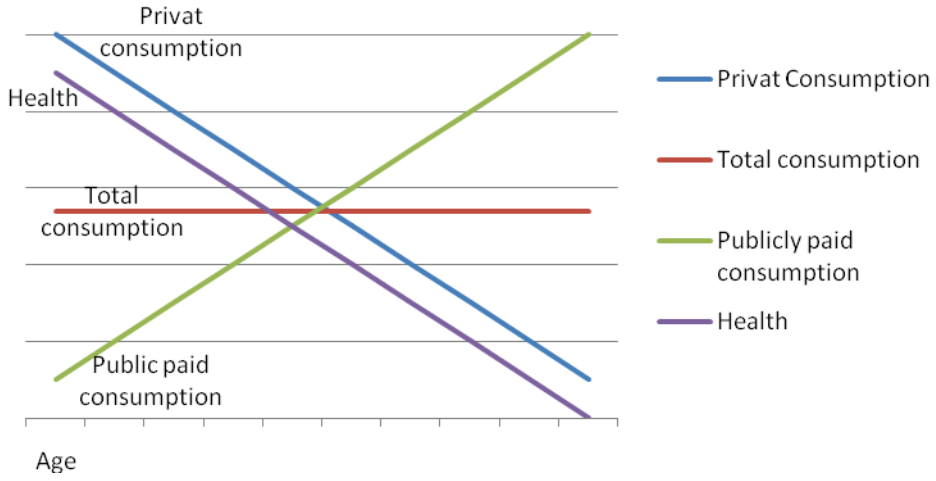
(The institutionalized population is not included)

Halvorsen, 2003

Graph 5 shows the development of the savings ratio by age. Halvorsen (2002) did this for different cohorts, but all cohorts showed similar patterns. Graph 5 is an average one representing the trend.

The increase from age 45 to 65 could be potentially the post-nest saving period[19], a period with high savings potential. This would be expected. The escalation after this, all the way up to 33% of income being saved at 75, would be a decrease of privately paid consumption. This decrease might be somewhat explained by medical factors, that one has not the health to maintain consumption. Still, the increase of the savings ratio shows that the older you get the higher proportion of your income you save, an assumable contradiction to the LCH. This does not include the increased consumption paid through public health services. Instead of actually being a decline in consumption, it is actually a shift from privately paid[20] to publicly paid consumption. This is illustrated in graph 6, where private consumption declines with health, which increases public paid consumption. The total consumption can maintain stable (or increase).

Graph 6: A schematic illustration of constant consumption.



Graph 6 illustrates how private consumption is being replaced by public consumption when health declines. Total consumptions however do not have to decrease, even if private does.

Halvorsen (2003) finds clear tendencies that all income groups save a high proportion, which leaves us with either an altruistic motive to bequest or the outcome that all groups have gained an unintended wealth and maintained a stable consumption (not increased consumption). Most will end up with their intended minimum savings due to risk minimizing.

[19] Post-nest saving period; the period after children have become financially independent, so there is no or little expenses on own children (drop in expenses), but before retirement (before drop in income). It is a period with high saving potential for people.
[20] The privately paid consumption would be financed to a large extend by pensions, which is publicly paid. But the actually consumption would be dine by the pensioners' privately and not directly paid by the public

However, if they are exposed to the same positive economic growth then all groups will have over-saved.

Graph 5 shows that the wealth income ratio increases with old age, implying a decreased private consumption. Consumption is most likely increasing, but it is consumption of health and medical services which are being paid or subsidized by taxes. This is in fact dissaving of previous paid taxes; still the result is that privately paid consumption declines. Assuming that income remains stable after a certain point in life, when a pension forms the dominant source of income, either (i) consumption has decreased or (ii) the real value of savings must have increased. If it is (ii), does sale of the home occur before death? As Halverson (2003) explains, homes would be both misunderstood and under represented in this dataset. Most pensioners own there own apartment, and as table 1 show, the proportion that do so decreases some with age. The decrease of homeowners is rather modest and most elders still own their own house. The decline in second houses is more powerful, and would free capital.

Table 1, portion of homeowner in three selected age intervals:

Proportion which:	55-66	67-79	80+
1. ..own their own house	92	87	71
2. ..own a second home	34	26	13

Source: Gulbrandsen and Langsether (1998). Original numbers from Statistics Norway [21]

An increased wealth income-ratio in the later part of retirement years (which would imply a decrease of consumption) could expose a tendency that the poorer population cannot maintain themselves and move in with relatives (Modigliani, 1985). This pattern of pensioners moving in with relatives is highly uncommon in Norway, but pensioners moving to institutions is common, which gives similar effect. This would create a bias making the lower samples disappear from household data as their savings are about to run out. Furthermore, the institutionalized population is not a part of the sample. This creates a bias as people leave the sample for institutions before death.

[21] Original numbers from Statistics Norway; Ukens Statistikk 17/97 Inntekts-, og formue -statistikk for husholdninger 1995. NOVA / Norsk Gallup Survey 1995

Exploring pensioners' own response to why they save

There are numerous concerns about conducting research on savings through the survey technique. Still, to get an idea of *why* people save, it is a very valuable method. Gulbrandsen and Langsether (1998) analyze a survey they conducted at NOVA (Norwegian Institute for Social Research) in 1995. The survey considers how much elders plan to use their savings. Unfortunately, it does not contain any indicator of to what degree these elders have accumulated wealth intentionally or if it is higher than they planned (all age groups are included in the survey). The results however indicate that over half of the elders (age 55+) plan on using "some" or no savings, predominantly selecting the "use some" alternative (Gulbrandsen and Langsether, 1998). From this, it is quite clear that the elders intend not to use all their savings, however the notion of savings in this context excludes pension money (rather comprising of self-saved money).

Gulbrandsen and Langsether (1998) address an issue that would show the impact of pension systems on the LCH. They focus on the extent to which the pensioners can actually save during elderly ages. Since they do not have any true income (assuming that pensions are dissaving of previous savings), this is theoretically impossible. Without income one cannot save, and strictly trying to follow the LCH, this is de facto how much of previous savings one intends to save. I will in parts of this paper assume pensions to be income, on the basis that it is methodically impossible in the Norwegian case to separate them[22].

Returning to the question addressing to what extent elders must spend from their accumulated saving, or whether they can continue to save: Gulbrandsen and Langsether (1998) show that most elders either do not spend their savings, or save some more. They assume, based on previous research on similar samples, that elderly underestimate or do not account for their housing as savings, and this would represent the substantial capital assets of the group. Some of the people in Group 1 might consider payments to loans as consumption and not saving.

[22] There would be possible from tax record data to separate the pension from the government. Though, private savings will always be listed as income.

Table 3, how people evaluate their own financial situation:

Proportion which:	55-66	67-79	80+
3. ..consider financial situation is not good enough	3	3	1
4. ..must use from their savings	5	9	10
5. ..just manage	32	44	47
6. ..can save;	60	44	43
- ..save some	50	40	34
- ..save much	10	4	9
7. Sum of does not have to use savings (3 +4)	**92**	**88**	**89**
Numbers asked:	*387*	*356*	*71*

Source: INAS / Norsk Gallups survey 1995, from Gulbrandsen and Langsether, 1998.

As Table 3 shows, around 90% of the elders in the survey do not have to use their savings. In the survey it was asked why people saved, and even though about half of these said that they saved for unpredictable events, 25% said they saved in order to ease the burden for their children (Gulbrandsen and Langsether, 1998). If we look at the elders who answer that they save for their children, they probably would not have understood the question as relating to their intention when they first started saving money, but as representing their present motive for saving. If they have a smooth consumption, and receive more pension than needed to maintain this, they are saving. This saving is not due to consumption reduction or working more, but is the residual from an income (pension) higher than consumption. This leads to a passive saving for children, and answering that they save for bequest is merely a reflection of the realization that bequest will occur. Most elders still save for their personal future, and consequently bequest is not the prime motivation.

Table 4, Answers to question: "How important is it to leave savings as inheritance?"

Proportion which finds it:	55-66	67-79	80+
1. Very important	13	14	16
2. Of some importance	36	39	37
3. Less important	30	24	28
4. Not important at all	18	19	17
5. Not answered / unknown	3	3	3
6. Sum of people who find it important (1+2)	**49**	**53**	**53**
Numbers asked:	*387*	*356*	*71*

Source: INAS / Norsk Gallups survey 1995, from Gulbrandsen and Langsether, 1998.

What can initially seem as a contradiction in the survey responses, is that only 25% of the elders say they save for their children, but a far higher proportion say that it is important to leave a bequest behind (Gulbrandsen and Langsether, 1998).These are not mutually exclusive however, as one might save for unpredictable expenses assuming/ hoping it has a low chance of occurrence, and then transfer post mortem.

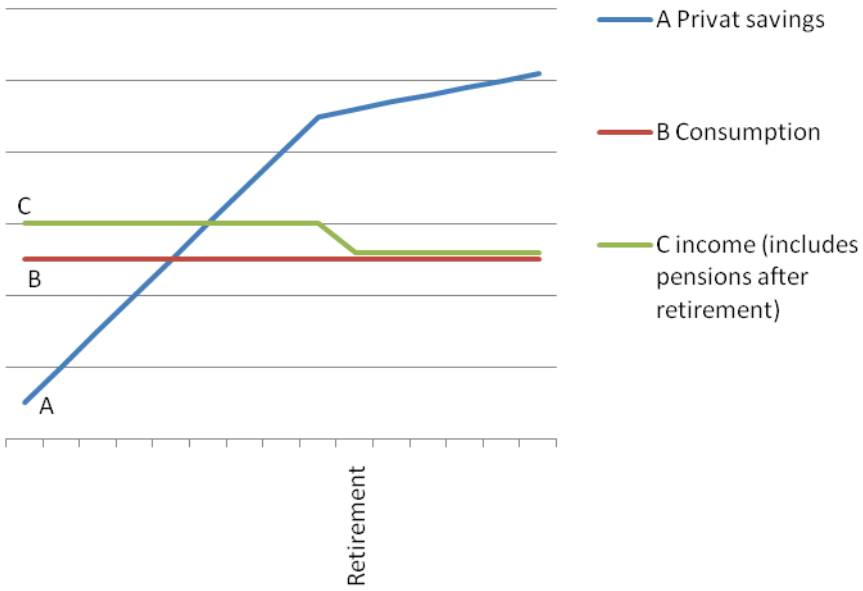
Conclusion, from previous research

Norwegian pensioners continue saving after retirement, which Gulbrandsen and Langsether (1998) argue disproves the LCH pattern in Norway. I disagree with their interpretation of the LCH, and consequently this leaves an opening for the possibility that pensioners may save but not contradict the hypothesis. The core of the LCH is that people try to smooth their consumption, and in order to do so, it is common to assume that people save during their working years to spend during retirement. Spending savings during older age is a means to create a smooth consumption. Spending these savings (dissaving) is however not the goal, it is the mean.

The consumption the pensioners have, are dissaving even though the dissaving are not their privately accumulated savings. For instance, if 90% of their pensions are spent then they are dissaving these 90% *and* "saving" 10%. The 10% saving will then be transferred from government to private control, but all together they dissave. In Norway, pensioners can maintain their intended consumption and still save. These results might therefore strengthen the potential existence of the LCH, since pensioners do not change their consumption to adapt to their potential to dissave further (consuming at least all pensions). The unique economic exposure of these cohorts could have created an unintended level of

wealth. This would make their savings not intentional, but the surplus after they have consumed their intended consumption. There are no apparent reasons for them to not increase consumption in older ages: they would have a stable income, personally saved wealth and a lot of time on their hands. The fact that they do keep on saving can be an indicator that they reflect the LCH and potentially maintain a stable consumption.

Graph 7: illustrating pensions as income, with pensions higher than preferred consumption:



Graph 7 illustrates this case where income drops after retirement (when pension becomes main income). This is in fact dissaving, but represented as income to illustrate its effect on private savings. Consumption is lower than income during working age, so private savings accumulate. If the income drop from working age to pensioner is higher than the preference level of consumption, private savings continues after retirement. This illustrates a case which is, because private savings increases and pensions are considered income, often presented as evidence that the LCH pattern is *not* present. This is however not correct, since consumption is smooth and there is a dissaving (pensions) which is presented as income. Regardless of the potential presence of the LCH, it does increase the pensioners' private wealth.

90% of the pensioners do not have to use their savings to maintain their desired consumption, and about 50% save money from their income[23] (Gulbrandsen and Langsether, 1998). Clearly the pensioners are able to maintain their desired consumption. 50% think bequest is of some importance or very important (with the majority "of some importance"). The majority of the sample regard saving for bequest to be "of some importance" or "less important", neither emphasizing nor excluding

[23] In Gulbrandsen and Langsether (1998) income includes pensions. Pensions are actually savings, the return of previous taxes. This means strictly following the theory; saving of pensions is saving a part of your saving, meaning you are not actually not saving you are merely using less of your savings. This is transferring savings from governmental control to your own control.

bequest. It seems then that the majority has a somewhat agnostic relation towards bequest, and they keep on saving.

To conclude on the Norwegian research I have reviewed, it is clear that the pensioners *can* maintain a smooth consumption. Modigliani (1985) argued that most people were not myopic[24], which is true for most of the samples in this reviewed research. It is also evident that most pensioners do not have to use their own savings, and actually continue saving after retirement. There is a small cohort difference due to higher productivity increase in certain cohorts (Halvorsen, 2002). These differences however have resulted in higher savings and not increased consumption.

The alternative of the LCH, where savings is intended for the savers benefits, would be where savings is intended for someone else, assumedly for children. Then how come not more people transfer money at an earlier stage? This would both free children from liquidity constrains, and free the transaction from bequest related taxes. To transfer money inter vivo maximizes the family's utility obviously better than post mortem transactions.

V. THE QUANTITATIVE ANALYSIS

In this section I will analyze my dataset to find patterns confirming or contradicting the presence of the LCH. I will see whether people spend their private savings during retirement, and whether there is a difference pattern in different stages of retirement (age intervals). Furthermore I will see if the age specific determinants dominate within the higher educated than with the lower educated. This is an attempt to see if one socio economic class is more likely to act closer to a LCH pattern than other. In the last part of this analysis I will see if savings a determinant of early retirement (AFP), to see if people potentially retire when they have savings that allows them a smooth consumption.

I will use OLS regressions, and my core formula looks as follows:

$Savings = x + \beta + \varepsilon$ = *Savings (dependent) = x + y (gender, income, education, etc) + epsilon*

The tables (regression 1,2…etc.) show what variables, that have been included in every regression, and the introduction prior to each regression explains the sample it contains, and why.

[24] *Myopic* here refers to the fact that they do not have to use their own savings to any large extent.

Regression 1: Aging effect on private savings:

The sample in this overview initial regression starts from age 50, where there are still many years until retirement and assumedly dissaving.

```
------------------------------------------------------------------------------
     savings |      Coef.   Std. Err.      t    P>|t|
-------------+----------------------------------------
         age |   26654.59   3254.275     8.19   0.000 | Number of obs =   12059
      gender |   142445.3    30188.9     4.72   0.000 | F(  9, 12049) =  616.62
     income2 |   1.431477   .0195699    73.15   0.000 | Prob > F      =  0.0000
 prev_couple |  -187915.9   38365.88    -4.90   0.000 | R-squared     =  0.3153
      single |     173513      67694     2.56   0.010 | Adj R-squared =  0.3148
total_reti~d |  -52524.05   62271.72    -0.84   0.399
   education |   3361.707   9720.905     0.35   0.729
     old_age |  -206172.2   73858.13    -2.79   0.005
   trans_age |     106191   36552.79     2.91   0.004
       _cons |   -1887753   190573.9    -9.91   0.000
------------------------------------------------------
```

Age, income, if person is single or previously cohabitated, if person is 60-69 and gender are the significant variables. Besides previous couple variable, all these have positive coefficients, which imply that savings will increase with age, income, being male and not married. The age exception is old age (80-89) which holds a negative exception, implying lower wealth after 80[25]. Surprisingly education is insignificant.

To detect dissaving as a function of age, I divided the sample into two age intervals; 60-69 and 70-79.

Regression 2: Transitional age (60-69):

```
------------------------------------------------------------------------------
     savings |      Coef.   Std. Err.      t    P>|t|
-------------+----------------------------------------
         age |   65531.38   15434.31     4.25   0.000 | Number of obs =    3053
     income2 |   4.913685   .0874792    56.17   0.000 | F(  7,  3045) =  458.61
   education |    -104122   20148.78    -5.17   0.000 | Prob > F      =  0.0000
total_reti~d |    -150225    94562.8    -1.59   0.112 | R-squared     =  0.5132
      single |   267777.1   168736.5     1.59   0.113 | Adj R-squared =  0.5121
 prev_couple |  -207411.5   84878.67    -2.44   0.015
      gender |   385562.1    63967.5     6.03   0.000
       _cons |   -4696094   976620.8    -4.81   0.000
------------------------------------------------------
```

Age is still positive, as most of this sample is still working (868 retired in the sample 3053). Education is significant, and has a negative coefficient. This shows that the higher education, everything equal the higher education, the lower wealth. This could be a result of loans being in the savings variable, but there is no variable for real estate. If income is removed from the regression (see table A, in appendix) education becomes positive. Still, all other variables

[25] A small sample, only 969 people in the sample is in this group, and the numbers decline over age (with the largest cohort at 81 years of age)

equal, education gives a lower savings, potentially showing a relative low payoff of education for these Norwegian cohorts[26].

Regression 3: Core age (70-79):

In this age, 70-79, (close to) all are retired. Most of the spouses would also be retired.

savings	Coef.	Std. Err.	t	P>|t|		
age	**7232.793**	**5703.624**	**1.27**	**0.205**	Number of obs =	1731
income2	6.259767	.1110838	56.35	0.000	F(6, 1724) =	555.92
education	-56702.21	12010.2	-4.72	0.000	Prob > F =	0.0000
single	163268.1	77078.68	2.12	0.034	R-squared =	0.6593
prev_couple	-203209	39077.62	-5.20	0.000	Adj R-squared =	0.6581
gender	247139.6	34348.26	7.20	0.000		
_cons	-1121016	425219	-2.64	0.008		

The core age regressions holds similar patterns, with a somewhat higher R^2. The age variable is insignificant, so no conclusions can be made regarding the effect of aging on savings in this age interval. The single and being female has decreased compared to regression 2. The negative education coefficient is notably lower than in regression 2.

For the old age sample (80-89) the sample is very small. The coefficients, including age, hold a low significance (see table B in the appendix).

By using education as a socio economical determinant, the regressions will show different behavioral traits of two groups; finished high school, and finished secondary school. To break up the sample in educational level in different age intervals is not fruitful, since it would lead to too small samples. To show the differences between pre retirement age (assumable saving) and retirement (assumable dissaving) the set is divided into retired and not retired.

Regression 4: Working and finished high school (and higher):

savings	Coef.	Std. Err.	t	P>|t|		
age	**57630.02**	**10732.85**	**5.37**	**0.000**	Number of obs =	2393
gender	232404.9	101014.7	2.30	0.021	F(5, 2387) =	394.19
income2	1.337557	.0302894	44.16	0.000	Prob > F =	0.0000
prev_couple	-172762.4	142899.3	-1.21	0.227	R-squared =	0.4523
single	75247.32	232896.7	0.32	0.747	Adj R-squared =	0.4511
_cons	-3606054	606605.3	-5.94	0.000		

[26] A regression without the income variable, but otherwise identical would give the education coefficient a large positive value.

Regression 5: Working and finished secondary school (as highest obtained education):

savings	Coef.	Std. Err.	t	P>|t|		
age	**37055.04**	**4954.391**	**7.48**	**0.000**	Number of obs =	4798
gender	346713.6	49343.78	7.03	0.000	F(5, 4792) =	90.09
income2	2.918177	.145718	20.03	0.000	Prob > F =	0.0000
prev_couple	-189351.4	62444.3	-3.03	0.002	R-squared =	0.0859
single	316426.9	104485.1	3.03	0.002	Adj R-squared =	0.0850
_cons	-2808351	290404.7	-9.67	0.000		

During the above 50 years of age working population; Income having a higher coefficient amongst the low level educated, which *might* be a sign of higher saving probability amongst high educated. There is however a large difference in the R square, which is severely smaller amongst the low educated, accounting for only 9 %, versus 45% with the high level educated. The focus variable, age, show a large difference 57630 vs. 37055, implying that every year increases savings 57 000 for the high educated and 37 000 for the low educated.

To see how this effects the retired population, I have generated the previous regression, only including the retired population.

Regression 6: Pensioners and finished high school (and higher):

savings	Coef.	Std. Err.	t	P>|t|		
age	**25909.97**	**10470.36**	**2.47**	**0.014**	Number of obs =	545
gender	121872	157094.2	0.78	0.438	F(5, 539) =	68.35
income2	3.184683	.1739833	18.30	0.000	Prob > F =	0.0000
prev_couple	-170736.8	214734.5	-0.80	0.427	R-squared =	0.3880
single	162655.6	363963.2	0.45	0.655	Adj R-squared =	0.3823
_cons	-2097342	770719.5	-2.72	0.007		

Regression 7: Pensioner and finished secondary school (as highest obtained education):

savings	Coef.	Std. Err.	t	P>|t|		
age	**9924.272**	**1331.612**	**7.45**	**0.000**	Number of obs =	2818
gender	18446.61	19923.98	0.93	0.355	F(5, 2812) =	250.36
income2	2.923364	.0856961	34.11	0.000	Prob > F =	0.0000
prev_couple	-93323.48	21677.61	-4.31	0.000	R-squared =	0.3080
single	139398.3	43094.76	3.23	0.001	Adj R-squared =	0.3068
_cons	-900179.2	102598	-8.77	0.000		

Here we see the effect on dissaving of age between educational classes. Whilst in the pre retired, the age coefficient showed an annual increase of 57 000 for the high educated and 37 000 for the low educated, it is in the retired population changed to respectively 25 000 and 10 000. The high educated group' age coefficient change from 154 % of the low level, to 250% of the low level.

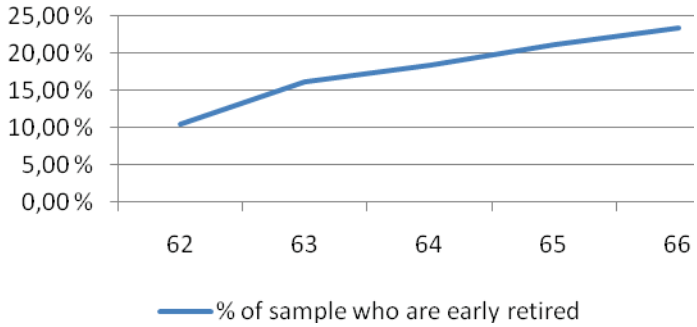
To see what determines early retirement, I have used a logistic regression. If people retire when a certain amount of personal savings are reached; this should show a positive savings variable.

Regression 8: What determines early retirement:

```
------------------------------------------------------------------------------
Logistic regression; age 62 - 66    Number of obs   =       1599
                                    LR chi2(7)      =      56.91
                                    Prob > chi2     =     0.0000
Log likelihood = -724.05692         Pseudo R2       =     0.0378
------------------------------------------------------------
         afp |      Coef.   Std. Err.      z    P>|z|
-------------+----------------------------------------------
      gender |  -.0450566   .1406387    -0.32   0.749
         age |   .2404676   .0481907     4.99   0.000
     savings |  -8.14e-08   8.36e-08    -0.97   0.330
   education |   .1579529   .0400589     3.94   0.000
      single |  -.0493184   .3604928    -0.14   0.891
 prev_couple |  -.7327163   .2228436    -3.29   0.001
     income2 |   1.85e-07   3.27e-07     0.57   0.571
       _cons |   -17.3898   3.108028    -5.60   0.000
------------------------------------------------------------
```

For the logistic regression of what determines the early retirement, both savings and income is insignificant. Previous couples (divorced etc.) which from the previous regressions has shown a lower chance of wealth, has here a lower chance of early retirement. This can be the need of compensating for wealth loss connected to separation of a previous cohabitation period. A positive age coefficient means that early retirement does not occur at first possible time (62), but is initiated at later age.

Graph 8: % who retire early, from age 62 – 66



This could be further validated by looking Graph 8 which shows how the accumulation of AFP pensioners over time, age 62-66, the closer to retirement the more people choose to retire early.

Conclusion, from the regressions

Age maintains a positive coefficient. The exception being in regression one, the all age regression, where the old age dummy is negative. However, regressing with just the old age sample the age coefficient becomes positive. The age coefficient decreases with different age intervals, but still all others equal older age increases private savings. This means that increasing age is an indicator of increasing personal savings.

It is well known (or assumed) that education does increase wealth, but more importantly the well educated population increases wealth with age to a larger extent than the lower educated. This would cause the well educated, not only to have a higher savings when retirement starts, but they would dissave a lower proportion of their private savings.

For all regressions, a similar result is maintained for the civil status variables. Compared to the couples, previous couples hold a negative coefficient. The singles holds a positive coefficient, possibly due to lower expenses of children (which would be severely underrepresented in this group). Further, this contradicts bequest being the main reason for savings, if this group is assumed to have significantly fewer children. The gender difference is lower amongst the high education groups. Income is naturally the most determent indicator of personal wealth, and lower amongst the high educated than low educated.

The regression strengthens the previous research from the last qualitative section, showing the potential accumulation of capital amongst the pensioners.

VI. DISCUSSION OF HYPOTHESIS

The quantitative and qualitative analyses show similar patterns. Most pensioners can maintain a preferred consumption, since they continue to save after retirement. There is nothing in these findings that leads towards disproving the LCH presence in Norway. However, even though there are indicators that the LCH is present, there is not sufficient evidence for this conclusion based on the data in the analyses.

The consequences of today's saving pattern

Pension systems are normally divided in two categories, pay as you go systems (PAYG) and funded systems. In PAYG systems, the working population is taxed so the pensioners receive

benefits. PAYG systems have two vulnerabilities: sensitivity to negative economic trends and certain demographic changes. Both would create a higher tax burden on the working population or force a decrease in pensions. In funded systems, everybody would pay into a personal account that you could access at retirement. This results in lower consumption and higher investments (from pension funds) than with PAYG systems[27]. In the PAYG model, capital is transferred between generations and not over time, and consumption is not delayed. The price to pay is the risk of increased taxes during negative growth (both in demographic and economic terms).

The Norwegian pension system is a PAYG system. This means a certain risk is taken to not decrease consumption[28]. As shown in this paper, most elders do not spend all their savings and continue to save. These savings will evidently end as bequest. This undermines the intention of the PAYG system to risk burdens in times of demographic and economic hardship in order to foster higher consumption. The risk is still there, but the savings ratio of elders is accumulating money on the costs of consumption. This means that the working population is being taxed, so the pensioners can accumulate wealth. This means the Norwegian PAYG system carries a negative attribute of the funded system (low consumption) without the benefit of the funded systems' stability.

As pensioners continue to save their pensions, bequests will increase. Bequests are not then the leftovers of pre-pension savings, but being financed by the working population. Bequests will then be given to the working age population, with the delay of pensioners' life expectancy. It is somewhat absurd that the workers are taxed so capital (delayed with pensioners LE) will be redistributed amongst the same workers. Without having analyzed the field of bequest in this paper, I have assumed that the tax burden is more equally spread amongst the socio economic classes of the tax payers than the receivers of bequest. Since pensions in Norway are based on previous income, yet financed by all socio economic classes, the children of high earners will receive a disproportionately high amount back (in the form of bequest) from the taxes they pay. This shows that pensioners with a smoothed consumption who receive more in pension than their consumption, increases the differences amongst the taxed generation. Representing socio economic class; education, showed from regression 4-7 the high educated are more likely to increase their savings with age. The

[27] This only accounts for the period it takes to build up a full funded system. When the funded system is complete, there would be no theoretical difference concerning consumption.
[28] The risk here, is maintaining a vulnerability to economic and certain demographic changes. See previous paragraph for more elaborated information.

longer LE of higher socio economic classes will contribute to strengthen this mechanism; where pensions will be saved for bequest, disproportional high in the high socio economic classes.

Previous arrangements in the Norwegian welfare system have been important in affecting the accumulated capital of elders. Interest subsidies from 1950-1990 are one crucial factor (Gulbrandsen and Langsether, 1998). Housing aid (including interest subsidies) and decentralization may have made the real estate market artificially low, and consequently contributed to the high amount of savings. Now, years later, these policies contribute to increased bequest; which is to a large extent spent on housing. These previous policies aided generations' entrance into the housing market and allowed a higher proportion of cohorts to own property. Now, the cost of housing has been pushed higher by bequest capital, which pressures a proportion of new cohorts out of the market or to lower margins.

In the near and coming future, the dependency ratio will increase, as there will be proportionally more elders compared with workers. In Statistics Norway's middle alternative prognosis, the ratio of elders on younger will slowly decrease until 2010, then it will rise until 2040. The rise will be both in the total elder son younger, and the amount of age 80+ of elders. Unless there would be a behavioral break with the new pensioner cohort, and they would consume more than the present pensioner cohort, the previous situation will continue to escalate. As the proportion of elders increase, so will the burden of taxpayers and evidently increased taxpayers' based bequest.

With increased elders and LE, the health expenses related to elders will increase. This will increase consumption that will be paid by the working generations. The dissaving will then be paid on two levels through health care and through pensions. The need for the two can be assumed to be highly correlated; when the need for health care is high then the need for private consumption would be low due to lack of health to consume non-medical (public paid) consumption. When the need for health care is null, then the potential to consume the pension would be high. Pensions will be paid in both cases, regardless of the ability to spend it. So the increased private savings is not lower consumption, it is lower consumption paid by pensions. As savings ratio increases, consumption is actually also increasing.

An alternative explanation; converging infinite saving scoop with smooth consumption

There is a question that few academics even attempt to answer and it is why more people do not transfer more money inter vivo? Even though this has been increasing in Norway, most transfers are still post mortem. This could be seen as an indicator that families do not try and maximize their utilities as a dynastical / cross generational matter, since they would have access to accumulated capital and have children with liquidity constrains and loans at the same time. The assumed way of maximizing the family would be to transfer money inter vivo to children, liberating them from loans and liquidity constrains. The idea of consumption smoothing *and* maximizing families' utilities can be combined. By holding back wealth as long as possible (inheritance being the longest possible time) one keeps children in liquidity constrain and assumes they will adapt a lower consumption. Inter vivo transfers will be dominated by marginal needs and event gifts, which is shown to be the prime reason for inter vivo transfers (Bhaumik, 2006). The families utility maximizing will then not be controlled by spread income, but to maintain liquidity constrains to create a low intended smoothed consumption amongst the children. The families total capital potential loss of surplus would be considered to be lower than gain of force-adapting children to a lower consumption. This does however make a families maximized utility almost equal to a family's maximized savings.

VII. CONCLUSION

Pensioners spend their private savings in rather modest ways, and in many cases continue to save after retirement. The pensions received are close to, or higher, than preferred consumption. The tax financed pensions which are not spent are accumulated as retirement's savings, which evidently will end as bequest. This mechanism seems to be higher within the higher socio economic classes, represented by high education in this research paper.

The presence of LCH is far from proven in this paper, but certain indicators reveal a potential presence. Firstly, private consumption does not increase during elderly years sufficiently to start dissaving of privately saved wealth, which could be explained by intentions of smooth consumption.

Secondly, the main reason for pensioners to save is for personal use, not bequest. Still, the preferred consumption seems to be not high enough to require use of private savings. This wealth seems to be unintended and not truly needed, and therefore assumedly unintended.

This could also be explained within the LCH that the economic growth these pensioners have had during there working years, has been higher than predicted. Since their intended consumption did not take into account such high growth they would have saved a higher proportion of their income than planned, accumulating savings higher than intended.

Thirdly, the decrease of private consumption does not represent total consumption, on the contrary. The decreased private consumption in elderly years implies increased public consumption. Even though savings increase with age and private consumption decreases; this does not mean that the real consumption decrease.

Fourthly, there are numerous uncertainties regarding accumulating savings, maintaining or increasing their real value, to maintain a set consumption until an uncertain end. There are also uncertainties regarding the pension systems effect on the saving pattern. The transparency of pension systems are lower than if everyone saved for themselves, if then savings of pensions occur this might show that the forced saving are higher than what the population would have had to save themselves. From the time the LCH was created until now, the expected retirement span has exploded. This does not affect the potential significance of the thesis, but it does drastically increase the uncertainties with saving, and individuals' ability to calculate their retirement need of savings.

The LCH cannot be disproven in this case. Even though it could explain the behavior of the Norwegian pensioners' savings pattern, it has yet to be proven here. It might seem that Deaton (2005) was right when he argued that the LCH has been dead for years, to be awakened, potentially moving from being a positivistic view to a normative one.

VIII. SOURCES

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IX. APPENDIX

Table A

Source	SS	df	MS		
Model	1.7506e+14	6	2.9177e+13	Number of obs	3096
Residual	1.8281e+16	3089	5.9180e+12	F(6, 3089)	4.93
Total	1.8456e+16	3095	5.9631e+12	Prob > F	0.0000
				R-squared	0.0095
				Adj R-squared	0.0076
				Root MSE	2.4e+06

savings	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
age	79258.94	21790.08	3.64	0.000	36534.43	121983.4
education	83719.99	28075.52	2.98	0.003	28671.42	138768.6
total_reti~d	-277536.9	133679.5	-2.08	0.038	-539646.5	-15427.24
single	86311.94	238576.4	0.36	0.718	-381472.4	554096.3
prev_couple	-215874.2	120022.4	-1.80	0.072	-451206	19457.53
gender	-144326.6	89324.01	-1.62	0.106	-319467.1	30813.84
_cons	-4907598	1379082	-3.56	0.000	-7611609	-2203588

Table B

Source	SS	df	MS		
Model	1.6835e+14	6	2.8059e+13	Number of obs	953
Residual	1.7437e+14	946	1.8432e+11	F(6, 946)	152.22
Total	3.4272e+14	952	3.6000e+11	Prob > F	0.0000
				R-squared	0.4912
				Adj R-squared	0.4880
				Root MSE	4.3e+05

savings	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
age	344.5418	5077.58	0.07	0.946	-9620.08	10309.16
education	-42408.53	11886.35	-3.57	0.000	-65735.2	-19081.87
income2	4.791005	.1672055	28.65	0.000	4.462868	5.119141
single	191514.5	64388.94	2.97	0.003	65152.83	317876.2
prev_couple	-116553.1	33499.07	-3.48	0.001	-182294.2	-50812.03
gender	22986.48	33104.28	0.69	0.488	-41979.84	87952.8
_cons	-234966.7	425534.3	-0.55	0.581	-1070067	600133.6

Table C

utdanningens nivå	Freq.	Percent	Cum.
0	49	0.40	0.40
ingen utdanning og førskoleutdanning	33	0.27	0.67
barneskoleutdanning	3,250	26.70	27.37
ungdomskoleutdanning	4,370	35.90	63.27
videregående, grunnutdanning	1,632	13.41	76.67
videregående, avsluttende utdanning	239	1.96	78.63
universitets- og høyskoleutdanning, lav	1,949	16.01	94.64
universitets- og høyskoleutdanning, høy	586	4.81	99.46
forskerutdanning	66	0.54	100.00
Total	12,174	100.00	

Table D, from: Hansen and Skoglund (2003):

Tabell 3. Lønn per normalårsverk, nominelt og reelt. Gjennomsnitt for alle næringer

År	Lønn per normalårsverk i tusen kr	Årlig nominell lønnsvekst i prosent	Årlig prisvekst i prosent[1]	Reallønns-vekst i prosent
1962	17,3			
1963	18,4	6,2	3,0	3,1
1964	19,8	7,4	4,7	2,4
1965	21,3	7,7	4,2	3,4
1966	23,1	8,5	3,4	5,0
1967	25,1	8,8	4,6	4,0
1968	26,9	7,2	3,1	3,9
1969	28,7	6,5	3,5	2,9
1970	30,9	7,7	9,7	-1,9
1971	34,8	12,5	6,3	5,8
1972	38,1	9,5	6,8	2,5
1973	42,0	10,4	7,3	2,9
1974	47,7	13,5	9,5	3,6
1975	56,0	17,5	11,1	5,7
1976	63,7	13,6	8,5	4,7
1977	70,2	10,2	8,6	1,5
1978	76,3	8,8	7,9	0,8
1979	79,0	3,5	5,2	-1,7
1980	86,7	9,8	9,4	0,4
1981	97,0	11,9	12,9	-0,9
1982	108,1	11,4	11,1	0,3
1983	117,9	9,0	8,4	0,5
1984	126,8	7,6	6,3	1,1
1985	136,4	7,5	5,9	1,6
1986	148,8	9,1	6,7	2,2
1987	161,7	8,7	7,8	0,9
1988	171,3	5,9	6,1	-0,1
1989	178,8	4,3	4,8	-0,5
1990	187,3	4,8	4,7	0,1
1991	196,9	5,1	3,8	1,3
1992	204,6	3,9	2,5	1,4
1993	211,6	3,4	2,4	1,0
1994	218,2	3,1	1,2	1,8
1995	225,5	3,3	2,4	0,9
1996	235,4	4,4	1,4	3,0
1997	246,8	4,8	2,3	2,4
1998	263,0	6,6	2,5	4,0
1999	277,0	5,3	2,0	3,2
2000	289,6	4,5	3,0	1,5
2001*	304,0	5,0	2,4	2,5
2002*	320,4	5,4	0,7	4,6

[1] Nasjonalregnskapets prisindeks for konsum i husholdninger og ideelle organisasjoner. Før 1970: nasjonalregnskapets ureviderte prisindeks for privat konsum.

Table E: The central variables

Gender	Gender
Age	50 and up. Annual
afp_age	Dummy for 62-66 years of age.
trans_age	Dummy for 60-69 years of age. The dominating transactional age to retirement
core_age	Dummy for 70-79 years of age. The dominating years of retirement.
old_age	Dummy for 80-89 years of age.
savings	Total amount of private wealth
ansett27	"retirement-reduction". The amount of tax relives on the basis of being pensioner
education	level of education, See appendix; table C for intervals
afp	Dummy for receivers of AFP
retired	Dummy for retired, not AFP
total_retired	AFP+ retired
single	Dummy for not married

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couple        Dummy for married, partner
prev_couple   Dummy for widow, divorced, separated
income2       Income variable, without the negative income individuals
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