



**Norges**

**Handelshøyskole**

*Norwegian School of Economics  
and Business Administration*

**PSYCHOLOGICAL DETERMINANTS OF  
HOUSEHOLD SAVING BEHAVIOUR**

**ELLEN KATRINE NYHUS**

**A dissertation submitted for the degree of dr. oecon.**





# PSYCHOLOGICAL DETERMINANTS OF HOUSEHOLD SAVING BEHAVIOUR

**ELLEN KATRINE NYHUS**

**MARCH, 2002**

**A dissertation submitted to the Department of Strategy and Management at the Norwegian School of Economics and Business Administration in partial fulfilment of the requirements for the degree of Dr. Oecon.**

**ISBN 82-405-0073-0**

2002

02h003804

330.567.2

N98p

*To Thomas and Helene*



## ABSTRACT

This dissertation reports the results of a study that examined the impact of psychological variables on household saving and borrowing behaviour. Understanding saving behaviour is important for policy makers and financial institutions, but a comprehensive explanatory model that can explain individual differences in saving does not yet exist. The aim of this research has been to contribute towards the construction of such a model.

The study was designed to answer four research questions. The first research question examined psychological explanations for saving in the existing economic and economic psychological literature on household saving in order to determine the strength of their empirical support. Though previous reviews have identified several theories based on psychological ideas, they have not systematically evaluated the theories empirically. This is important because it establishes which theories should be subject to further investigations and which should be ignored. The reviews show that many of the psychological theories have been tested only once. In addition, many studies suffer from serious weaknesses with respect to the measurement of variables. It is therefore appropriate to say that psychological research on household saving is in its infancy and that the fundamental question - which role psychological variables play in household saving - is left unanswered. Consequently, the second research question concerned the contribution of psychological variables in explaining variation in household saving. This question was answered by conducting an empirical study using Dutch data collected for the CentER Saving Survey. The results of the empirical study demonstrate that psychological variables are well worth considering when trying to describe, explain, and predict saving and borrowing behaviour. In particular, time horizon and attitudes towards debt are found to be the most significantly associated with saving and borrow behaviour.

The third research question addressed the notion that psychological variables influence different types of saving. If this is the case, these relationships will not necessarily emerge when total saving is analysed in isolation. Several different measures of saving behaviour were therefore used. More specifically, a distinction was made between *discretionary* and *contractual saving* and between *flow* (saving during a year) and *stock* (wealth at a particular moment in time) measures of saving. *Discretionary saving* includes saving that is likely to be a result of discrete saving decisions in the accounting period. *Contractual saving*, as defined here, includes repayment of debt and mortgages, and results from previous borrowing decisions. The data in this thesis suggest that it is useful to distinguish between different types of saving and wealth when investigating the effects of psychological variables.

The fourth and final research question concerned the possibility that psychological variables may have more impact on saving behaviour among high-income households in comparison with low-income households. As suggested by Katona (1975), the substantial increase and spread of discretionary income among families in Western economies may increase the importance of variables other than income when explaining saving and spending decisions. This *discretionary income* means that there is income left to spend after necessities and habitual expenses are paid for, so that a choice between spending and saving can be made. It is reasonable that the increase in discretionary income alters the relative influence of

economic, situational and psychological variables on saving in favour of psychological variables. In order to test this assertion, estimates based on data from three different discretionary income groups were compared. The results did not support the hypothesis that the psychological variables were more important predictors for the saving behaviour of the richer than the poorer part of the sample. Rather, the results suggest that psychological variables are important for explaining saving behaviour at all income levels.

The thesis closes with a discussion of the strengths and weaknesses of the study, as well as the implications of the results.



## PREFACE

*Tiden är så kort och det är så mycket som måste göras, så för mig får gårdagens många misstag gärna ligga där o-ångrade, på det att jag med friskt mod kan sätta igång och göra nya! Och dom ska jag - det lovar jag dig - beredvilligt ångra nästa år, för jag tror jag får mera tid då.*

*Astrid Lindgren (1907 - 2002)*

During the many years I have worked on this thesis, I have often wished that I had proceeded differently. I might have chosen to study a less complex behaviour with a more easily-surveyed body of literature, or at least a topic covered in any of my PhD courses at NHH. I might have collected my own data so that it would be more accessible and easier to work with than was the CentER database in the beginning of this project. But today, looking back at the process, I do not regret these choices. These years have been exciting and rich both professionally and socially. Despite having studied saving behaviour for so long, I still find household economic behaviour interesting. My research has taken me to many exciting places, where I have been working together with skilful and motivating colleagues, and where I have made many friends.

I have worked on this thesis in three different places. First, I held a position as a grant holder at the Department of Marketing at NHH in Bergen. I would like to thank associate professor Ingeborg A. Kleppe for recruiting me as a research assistant for her project on the bank-client relationship. This led to my decision to study household economic behaviour. She and Professor Kjell Grønhaug also managed to fund my attendance at the 1991 IAREP/SASE conference in Stockholm. There, I first heard about the CentER for Economic Research at Tilburg University, Netherlands, and the project that would be so important for my further work: the VSB-CentER Savings Project, which was succeeded by the TMR-project on savings and pensions. That was also the first of many IAREP conferences I attended. Since then, I have participated at all but one IAREP conference. This has represented a yearly and vital source of inspiration and encouragement. For this, I am grateful to the members of the IAREP. I particularly want to thank Jack Knetch and Paul Webley for useful discussions and helpful comments on my work.

I have visited the CentER for Economic Research at Tilburg University several times, and each time I have been impressed and moved by their hospitality. I treasure every day I spent there. Thanks to the workshops and visiting researchers connected to the CentER Savings Project, I have met a large number of the authors in my reference list personally and heard them present their work. This has been a rich source of stimulation. My last visit lasted for two years. I accepted an offer as a Marie Curie Fellow and took my 16-month-old son with me to live in the Netherlands. It is not hard to do that when a team of helpers is waiting: Trea, Dietmar, Josette, Marjoleine, Martin, Eline, Arno and Marian lent me furniture and utensils, babysat when I had deadlines to meet, cooked dinners for us, took Thomas to kindergarten in

their car when the weather was bad and much more. I am very grateful for their help and friendship. And thank you Tom, for letting us go. Living apart for two years was hard for us all.

I would like to thank my dissertation committee members, Professors Kjell Grønhaug, Arie Kapteyn, and Karl-Erik Wärneryd for their insightful comments and suggestions, support and patience. Professor Kjell Grønhaug has been supervising my project since I was an undergraduate student and has been interested and supportive throughout. I asked Professor Karl-Erik Wärneryd to be my supervisor at the IAREP conference in Frankfurt in 1993, which he immediately agreed to. He has always encouraged me to continue my work and has provided very useful comments on drafts within a few days of their delivery. I am also grateful to Professor Arie Kapteyn for initialising the Saving Projects and for encouraging interdisciplinary research. I am glad that he always held the door open for me at CentER and the Savings Project workshops.

Writing a PhD thesis is a long and demanding process: not only for the person who is writing it. I'm grateful to my family, friends and colleagues who have supported me both morally and by offering their help. I would also like to thank all my colleagues at the Norwegian School of Economics and Business Administration, at CentER, and at Agder University College, for interesting discussions and assistance, and for many valuable memories. In particular, I would like to thank Trea Aldershof, Rob Alessie, Otto Andersen, Herman Camphuis, Bas Donkers, Jonas Gunnarsson, Stefan Hochguertel, Adriaan Hoogendoorn, Jochen Jungeilges and Maarten Ketelaars, for their comments and assistance.

I acknowledge economic support from The Norwegian School of Economics and Business Administration, the TMR grant project "Savings and Pensions" (ERB 4061 PL 95- 0274) and the European Community Marie Curie Fellowship (ERB FMBICT 961080), and the SIS-programme at Agder University College. I am also indebted to the three institutions for their hospitality and the use of their facilities.

I am grateful to Ian Hocking for his great effort in making this thesis readable. I am entirely responsible for any remaining mistakes and deficiencies.

Kristiansand, March 2002

Ellen Katrine Nyhus

## CONTENTS

ABSTRACT .....	I
PREFACE .....	III
CHAPTER 1 INTRODUCTION .....	1
1.1 PURPOSE OF STUDY .....	1
1.2 SIGNIFICANCE OF TOPIC .....	2
1.3 RESEARCH QUESTIONS.....	5
CHAPTER 2 THE PSYCHOLOGICAL FOUNDATIONS OF ECONOMIC THEORIES OF SAVING.....	9
2.1 INTRODUCTION.....	9
2.2 THE ECONOMIC APPROACH IN STUDIES OF SAVING .....	10
2.3 ECONOMIC THEORIES OF SAVING.....	11
2.3.1 Saving as a result of will-power and foresight.....	12
2.3.2 The income approach .....	27
2.3.3 Behavioural saving models.....	58
2.4 CONCLUSIONS.....	61
CHAPTER 3 THE PSYCHOLOGICAL APPROACH TO SAVING .....	67
3.1 INTRODUCTION.....	67
3.2 PSYCHOLOGICAL STUDIES OF SAVING .....	68
3.2.1 Definitions of saving.....	69
3.2.2 Approaches used in psychological studies of saving.....	70
3.2.3 Concepts used in studies of saving.....	70
3.3 WEAKNESSES OF PSYCHOLOGICAL RESEARCH .....	82
3.4 CONCLUSION.....	83
3.5 IMPORTANT PSYCHOLOGICAL CONCEPTS IN THE SAVING LITERATURE.....	83
CHAPTER 4 HYPOTHESES .....	87
4.1 INTRODUCTION.....	87
4.2 HYPOTHESES .....	89
4.2.1 Income.....	90
4.2.2 Education .....	90
4.2.3 Household composition .....	91
4.2.4 Time preference .....	92
4.2.5 Expectations .....	92
4.2.6 Time horizon.....	93
4.2.7 Economic uncertainty.....	93
4.2.8 Attitudes towards saving .....	94
4.2.9 Attitudes towards debt.....	94
4.2.10 Saving motives.....	95
4.2.11 Perceived position in reference groups.....	95
4.2.12 Personality structure.....	96
4.2.12 The importance of psychological variables for different income levels .....	98

CHAPTER 5 DATA COLLECTION AND QUESTIONNAIRES.....	99
5.1 INTRODUCTION.....	99
5.2 THE CENTER SAVINGS PROJECT.....	100
5.3 SAMPLE SELECTION.....	100
5.4 DATA COLLECTION TECHNIQUE.....	101
5.5 THE QUESTIONNAIRE AND KEY INFORMANTS.....	102
5.5.1 The questionnaire.....	102
5.5.2 Selection of informants.....	104
5.6 DESIGN OF THE STUDY.....	105
5.7 CONCLUSION.....	106
5.8 PREPARING THE WORKING DATA FILE.....	106
 CHAPTER 6 MEASUREMENT.....	 109
6.1 INTRODUCTION.....	109
6.2 HOUSEHOLD SAVINGS, SAVING AND THE SAVING RATIO.....	109
6.2.1 Questions about assets.....	111
6.2.2 Saving definitions.....	112
6.2.3 The saving measures vs. the subjective estimation of household saving.....	114
6.3 HOUSEHOLD INCOME.....	116
6.4 EDUCATION LEVEL.....	120
6.5 TIME PREFERENCE.....	121
6.6 EXPECTATIONS AND UNCERTAINTY.....	123
6.7 TIME HORIZON.....	124
6.8 ATTITUDES TOWARDS DEBT AND SAVING.....	125
6.9 SAVING MOTIVES.....	127
6.10 PERCEIVED POSITION IN REFERENCE GROUP.....	128
6.11 PERSONALITY DIMENSIONS.....	128
6.12 CONSTRUCTION OF HOUSEHOLD MEASURES.....	130
6.13 RELIABILITY.....	132
 CHAPTER 7 RESULTS.....	 135
7.1 INTRODUCTION.....	135
7.2 DESCRIPTION OF SAMPLE.....	135
7.3 PROCEDURES.....	136
7.3.1 Missing observations.....	136
7.3.2 Outliers.....	137
7.3.3 Procedures for the analyses.....	138
7.4 RESULTS.....	141
7.4.1 Contribution of psychological variables towards explaining variance in saving.....	141
7.4.3 Discretionary vs. contractual saving.....	162
7.4.4 Effects of psychological variables at different income levels.....	163
 CHAPTER 8 CONCLUSIONS.....	 165
8.1 INTRODUCTION.....	165
8.2 ANSWERS TO THE RESEARCH QUESTIONS.....	165
8.2.1 Research Question 1.....	165
8.2.2 Research Question 2.....	168
8.2.3 Research Question 3.....	169
8.2.4 Research Question 4.....	169
8.3 EVALUATION OF THE STUDY.....	170
8.4 IMPLICATIONS.....	172

---

REFERENCES .....	177
APPENDIX 1: SAMPLING TECHNIQUES FOR THE CSS .....	191
A1.1 The Representative Panel (RP) .....	191
A1.2 The High Income Panel (HIP) .....	194
A1.3 Evaluation of the applied methods .....	196
APPENDIX 2: THE DATA COLLECTION METHODS.....	201
A2.1 Computer Assisted Panel Research (CAPAR).....	201
APPENDIX 3: PARTS OF THE QUESTIONNAIRE .....	205
APPENDIX 4: THE ASSET COMPONENTS.....	221
APPENDIX 5: CONSTRUCTION OF THE HOUSEHOLD INCOME VARIABLE .....	229
APPENDIX 6: RESULTS .....	237

**LIST OF FIGURES**

Figure 2.1 Effects of exponential and hyperbolic discounting.....	21
Figure 2.2 The stripped-down life-cycle model: Income, consumption, saving and wealth as a function of age43	
Figure 6.1 Scree Plot - 16PA.....	130
Figure 5A-1 Plots of observed and EM and regression imputed values for (LN)HNTOT .....	236

**LIST OF TABLES**

Table 2.1 Assumptions about changes in personal saving in good and bad times .....	31
Table 2.2 Motives for leaving bequests .....	50
Table 2.3 Overview of proposed relationships and their empirical support .....	64
Table 3.1 Purposes of saving.....	77
Table 4.1 Overview of expected relationships.....	98
Table 5.2 Overview of key informants of the households.....	105
Table 6.1 What respondents would include when calculating "own saving".....	110
Table 6.2 Whether alternative saving acts are perceived as saving.....	110
Table 6.3 Correlations between different saving measures .....	114
Table 6.4 Saving ratios (saving in percent of disposable income).....	115
Table 6.5 Statistics of trimmed sample .....	116
Table 6.6 Household disposable income.....	117
Table 6.7 Perception of economic situation across household income groups .....	118
Table 6.8 Perception of economic situation across levels of income pr. family member.....	119
Table 6.9 Definition of income groups .....	119
Table 6.10 Description of the three income groups .....	120
Table 6.11 Pattern Matrix for 9 time preference questions .....	122
Table 6.12 Most important planning horizon .....	124
Table 6.13 Four factor structures for attitudes towards saving.....	125
Table 6.14 Attitude factors.....	126
Table 6.15 Mean and median scores for importance of saving motives across gender and age groups .....	127
Table 6.16 Factor structure of the 16PA .....	129
Table 6.17 Answers about decision influence in financial decisions .....	132
Table 6.18 Consistency between answers given to selected questions in the first and third wave of data collection.....	133
Table 7.1 Missing values, means and estimated means .....	137
Table 7.2 Univariate statistics .....	139
Table 7.3 Overview of significant coefficients for financial wealth and discretionary saving.....	142
Table 7.4 Overview of significant coefficients for debt and contractual saving.....	143
Table 7.5 Overview of significant coefficients for debt and mortgages, and contractual saving.....	144
Table 7.6 Overview of significant coefficients for total wealth and total saving.....	145
Table 7.7 Correlation coefficients between psychological variables .....	151
Table 7.8 Comparison of expected relationship and findings.....	163
Table A1-1 Responses for different stages in the recruitment process.....	193
Table A1-2 Response rates for the RP and the HIP for the first wave of data collection .....	197
Table A4-1 Missing values pr. asset component.....	225
Table A4-2 Number of "don't know" answers at the individual level .....	227
Table A4-3 Number of "don't know" answers at the household level.....	227
Table A5-1 Estimation results of model (1) and (2) .....	235
Table A5-2 Descriptive statistics for income with and without imputed estimates of missing values.....	235
Table A6-1 OLS regressions: Financial wealth Dec. 1994, discretionary saving in 1994 and the discretionary saving ratio 1994 .....	237
Table A6-2 OLS regressions: Debt, December 1994, contractual saving in 1994 (mortg. excl.) and the contractual saving ratio in 1994 (mortg. excl.).....	238
Table A6-3 OLS regressions: Debt, December 1994, (Log)contractual saving in 1994 (mortg. incl.) and the contractual saving ratio in 1994 (mortg. incl.) .....	239
Table A6-4 OLS regressions: Total wealth, Dec. 1994, total saving in 1994 and the total saving ratio 1994....	240
Table A6-5 OLS regressions: Financial wealth, December 1994, of the three income groups.....	241
Table A6-6 OLS regressions: Debt and Mortgages, December 1994, of the three income groups.....	242
Table A6-7 OLS regression: Debt, December 1994, of the three income groups.....	243
Table A6-8 OLS regressions: Total wealth, December 1994, of the three income groups.....	244
Table A6-9 Logistic regressions: Fin. wealth vs. non-wealth, debt and mortg. vs. non-debt and mortg. and debt vs. non-debt.....	245

# Chapter 1

## Introduction

*One way to describe the current state of knowledge about savings is that a great deal is known at a theoretical level about saving determinants taken one at a time. Much less is known about the interactions of these determinants, and too little is known at the empirical level about the true causes of savings. As is often the case in economics, the theory seems to have advanced well beyond empirical research...In sum, the question of what determines saving is like a good jigsaw puzzle. It has a number of pieces. Some of the pieces have been found. Those that are available do not immediately fit together, but not all the combinations have yet been tried. The pieces that are missing are not necessarily in the bottom of the box and indeed may be mixed up with identical-looking pieces in some other jigsaw puzzle. While it is easiest to keep playing with the pieces at hand, the puzzle may never be solved without the tedious task of looking in the other boxes. While the outlines of the puzzle are getting clearer, the precise picture it displays remains well worth the search.*

*Kotlikoff (1989) pp 34-35*

### 1.1 PURPOSE OF STUDY

The purpose of this study is to investigate the extent to which psychological factors explain individual differences in household saving behaviour. Establishing the causes of saving has occupied scientists since Aristotle (384-322 BC), who considered whether accumulation of wealth was laudable or objectionable<sup>1</sup>. In the two past centuries especially, household saving has been subject to extensive theoretical and empirical research. This is due, in part, to its increasing importance for national economies. In spite of that, households' motivations for saving are still only partially understood. We know some variables that might be used as predictors for household saving, such as income and age, but the underlying psychological process governing the choice between saving and spending is an under-researched topic. In this study, we will explore some of the psychological variables that might be important for household saving in order to contribute towards a broader understanding of its complexities.

The study is motivated by an increasing concern for the standard of living of future elderly generations in many Western countries (e.g. Disney, 1996) and by the so-called "debt crisis" that appeared in many countries at the beginning of the 1990s, which was characterised by a large number of households with debt problems (Berthoud & Kempson, 1992). The deregulation of the credit markets in many European countries, in combination with the

---

<sup>1</sup> As cited in Wärmeryd, 1999

dismantling of public pension arrangements, makes it more important than ever that households distribute their income over time so that the frugalities future may be avoided. Simultaneously, the options available for making the consumption stream independent from the income stream are multiplying in number for most consumers. We therefore need a broader understanding of how households view their future and make saving and borrowing decisions. This knowledge is important for public policy, consumer policy, financial institutions and for the public at large.

This thesis reports results from a theoretical and empirical investigation of the impact of psychological factors on household saving. The variables in focus were chosen based on an extensive literature review of savings studies within the fields of microeconomics and economic psychology. More specifically, effects of income expectations, time horizon, economic uncertainty, degree of economic deprivation, saving motives, time preference, attitudes towards saving and borrowing and personality structure, were studied, along with the socio-economic variables traditionally used by economists. Many of these variables are frequently mentioned in the savings literature, but their impact on saving has seldom been subject to empirical testing. Here, these variables' effect on saving was tested by using data from a panel of 3000 Dutch households.

## 1.2 SIGNIFICANCE OF TOPIC

A study of possible determinants of household saving is both practically and theoretically important. Economists have long since addressed the challenge of predicting household saving, but lately they have reported problems in making good predictions based on the traditional saving models. This has led to calls for research on saving from new perspectives. A recent development is to enrich traditional theories with psychological constructs in order to reconcile the theories with the data and analyse the heterogeneity of savers (e.g. Aaron, 1999; Dynan, Skinner & Zeldes, 2000; Lusardi, 2000, Venti & Wise, 2000). The economic environments in which households are immersed have also changed dramatically during the past decades. It is of interest to financial institutions and public policy makers to know more about how people adapt to the changes.

### Practical interest

Household saving became increasingly important for western economies following the Second World War. While saving had been a privilege of the small and rich upper-class, who had a surplus after necessities were paid, the post-war economic improvement resulted in economies where the majority of the population has a variety of *postponable expenditures* (or discretionary income). Consumers in affluent post-industrial societies have substantial liquid assets that they can spend or save (Arndt, 1976; Katona, 1975). Their decisions affect the level of investments, intergenerational equity, productivity, inflation, cyclical movement, and long term economic growth. To understand and predict business cycles and growth, we must first understand household saving and consumption behaviour.

In past decades, researchers have reported a general decline in saving in the West (e.g. Maital & Maital, 1994; Modigliani, 1986). There are fears that savings ratios will continue to decrease and cause "burnout" problems in national economies, which will leave problems for future generations. The dominating model of saving - the life-cycle/permanent income hypothesis - does not offer many ideas about the encouragement of thrift and saving (Thaler,



1994; Wärneryd, 1989; 1999). The model is based on assumptions about utility maximisation, so that ideas about how to change peoples' motivations to save are limited to economic incentives. However, history shows that most policy measures taken in order to stimulate saving are inadequate and fail to produce the desired results<sup>2</sup> (Tucker, 1991; Wärneryd, 1989). It is therefore important to identify the most important reasons for saving so that these can be taken into account when designing saving programmes.

Moreover, understanding household financial decision-making is important for the design of social welfare and consumer policy. In many countries, consumption growth has been financed by borrowing. For some households, these mortgages and loans grew into problematic debt (see Dessart & Kuylen, 1986; Lea, 1998; Lea, Webley & Levine, 1993; Lunde & Poppe, 1991; Parker, 1988; Webley & Nyhus, 2001). Future generations of the elderly might also face a strained economic situation unless they save sufficiently for retirement (e.g. Diamond & Hausman, 1984; Lusardi, 2000, Venti & Wise, 2000). In order to prevent such situations, it is important to gain more knowledge about how people think about their future, how saving can be encouraged and if easy access to savings and to credit affects a person's saving behaviour.

Finally, household economic decisions about saving and spending are of interest to credit institutions, which should provide households with adequate financial services. Knowledge of the factors that can explain (i) debt problems and (ii) processes underlying decisions to borrow money is important for making decisions about granting loans and in the renegotiation of lending terms with consumers afflicted with problem debt (Canner & Luckett, 1991). Knowledge of how individuals prefer to allocate their income between different stages in their life cycle and how to assist them in fulfilling their economic goals is also important for the segmentation and development of financial products (see Gunnarsson, 1999).

### Theoretical interest

Despite extensive research on saving behaviour, a large part of household saving is still unexplained. The life-cycle model, which is the dominant framework for analysis of saving, does not provide adequate predictions about saving and consumption. This is the conclusion drawn from studies of household saving in the USA (Carroll & Summers, 1991; Courant, Gramlich & Laitner, 1986; Kotlikoff, 1989; Kotlikoff & Auerbach (1991); Kotlikoff & Summers, 1981; Shafer, Elmeskov & Tease, 1992), Italy (Ando, Guiso, Terlizzese & Dorsainvil, 1992; Guiso, Jappelli & Terlizzese, 1992b), and Japan (Ando et al., 1992). To some extent, empirical evidence is inconsistent with the life cycle model. The conventional saving theory is unable to predict and explain the general decrease in saving in most OECD-countries (Shafer et al., 1992). Consequently, some authors argue that, in reality, we do not have a theory of saving (Maital & Maital, 1994). Interdisciplinary research is therefore required. It must use the individual or household as the unit of analysis. Its focus should be on heterogeneity among savers rather than on homogeneity (Burtless, 1999; Attanasio, 1998; Maital & Maital, 1994).

Many studies of the psychological determinants of saving have been conducted within the field of economic psychology (e.g. Daniel, 1994; Furnham, 1985; Groenland & Nyhus, 1994; Gunnarsson, 1999; Julander, 1975; Katona, 1975; Lindqvist, 1981; Livingstone & Lunt, 1992; Lunt & Livingstone, 1991; Wahlund, 1991; Wärneryd, 1995; 1996a; 1996b). As will be shown in Chapter 3, economic psychological studies are scarce, and the results from these

---

<sup>2</sup> With the exception of the targeted retirement savings programmes in the US (Poterba, Venti & Wise, 1995).

studies are neither easily comparable nor conclusive. A comprehensive psychological model of saving has therefore not yet been developed. More research is necessary in order to accomplish this.

In addition, within the field of marketing and consumer behaviour, there are repeated calls for research on the longitudinal aspects of money allocation. Gredal (1966) and Arndt (1976) classified consumer behaviour into four comprehensive categories, in which budget allocation is the first category, laying the foundation for other consumer decisions such as choices among product categories and brands. Arndt (1976) argued that marketing researchers have focused too much on the consumer's choice of product categories and brands compared to strategic allocation decisions, such as saving. A similar critique was put forward by Ölander and Seipel (1970), Olshavsky and Granbois (1979) and Ferber (1973). In spite of this, consumer behaviour researchers have not responded, leaving consumer decisions on income allocation over the life span as an underdeveloped research stream for the discipline of consumer behaviour. Modern textbooks on marketing and consumer behaviour scarcely contain information on the choice between saving and spending, despite wealth and credit being acknowledged as important consumer resources (e.g. Arnould, Price & Zinkham, 2002; Engel, Blackwell & Miniard, 1993).

#### Contributions of the present study

In this study, the effect of selected psychological variables on household saving is tested. A study examining how psychological variables affect saving implies that assumptions underlying many economic models of saving are challenged. For example, the rate of time preference (degree of impatience) is frequently treated as a constant in economic models, often assumed to equal the real interest rate in the market. If we find that time preference for consumption varies between individuals and is associated with differences in saving, this means that time preference should be allowed to vary across households because it will influence the propensity to save. Another important assumption in economic models of saving is preference independence, which holds that an individual is unaffected by the consumption of other individuals. If variables capturing mechanisms of social comparison are found to affect saving, this indicates that the opposite is closer to reality: people are affected by other peoples' consumption. Therefore, saving models should rely on assumptions about preference interdependence.

Furthermore, this study represents an improved replication of some of the previous empirical studies examining the effects of psychological variables on household saving. Many psychological theories have been tested only once. Moreover, studies have suffered from serious shortcomings. Firstly, measurements of saving and income variables have been rather poor, consisting of simple self-report measures of previous saving and income. Secondly, when data are collected by surveys, both the dependent variables (being either past saving or intentions to save) and the explanatory variables are measured at the same point in time. This raises methodological concerns because assessment of the direction of causality is impossible. Thirdly, previous research has often failed to consider that psychological variables might affect different saving types in different ways. If, for example, a psychological variable influences two different types of saving in opposite directions, the effect of this variable might be neutralised when examining total saving. Fourthly, many previous studies have not dealt with the level of analyses in a proper way. That is, household saving should be studied at the household level, but, often, psychological studies have focussed on individuals without considering how the individual's interaction with other household members might influence their economic behaviour. The use of subjective data in the study of saving requires finding

an appropriate way of constructing a measure of subjective data at the household level. These methodological problems are not solved in the present study, but they have been met by improving the way saving and income are measured and by measuring the explanatory variables in the middle of the period in which saving is studied. Household saving is defined in various ways in order to explore whether the psychological variables influence different forms of saving in the same way. In addition, a new method is used for approaching the aggregation problem of subjective information to the household level.

### 1.3 RESEARCH QUESTIONS

The behaviour related to consumption, saving, and borrowing is complex and may be studied from many perspectives that focus on different actions involved in so-called “saving behaviour”. In this study, the focus is on the level of saving and wealth within a household. Related decisions like choice of supplier of financial services, portfolio choice, labour supply, and housing decisions might interact with both the ability and the willingness to save, but for the purpose of this study, these topics are disregarded.

Saving during a period of time is a product of several decisions of varying significance, such as whether to buy a cheap or expensive product, whether to spend now or later, and whether to borrow or save. Saving can be seen as a result of continuous intertemporal decisions, where outcomes (payments and consumption of goods) appear at different points in time. Some authors even posit that, in principle, the individual always finds himself in a saving decision situation, since resources such as income and wealth must be managed and distributed at every instant (Ölander & Seipel, 1970). When studying saving we have to assume that consumers have some awareness of their overall economic situation when they make buying or saving decisions. We must also assume that they make a judgement of the consequences of the decisions. Furthermore, we have to assume that certain personal characteristics, such as attitudes or expectations of the household’s future economic situation, will play a part in this judgement. Studies of saving can therefore be described as searching for regularities. They should identify the variables that have an effect across the majority of spending- and saving decisions. Only these variables will serve as useful determinants and predictors of saving over extended periods and have a potential for being useful for analyses at the aggregate level.

Saving has been studied by economists for centuries and by psychologists for a few decades. The economic theories of saving have rested on strong assumptions about how people make decisions and the factors that motivate them. These assumptions have been modified, but with little explicit testing of their adequacy. The first research question therefore concerns the more-or-less implicit psychological theories of saving and their empirical support. Though previous reviews have identified several theories that rest on psychological ideas (e.g. Wärneryd, 1999), they have not systematically evaluated the theories in light of any empirical results that may support or contradict them. This is important in order to establish which theories should be subject to further investigation and which should be ignored.

#### **Research Question 1:**

**Which of the psychological explanations for saving found in the existing economic and economic psychological literature are supported by empirical findings?**

This research question is addressed in Part II, which consists of three chapters (Chapters 2 - 4) presenting reviews of relevant parts of the saving literature and the hypotheses to be tested in the empirical part of the thesis. In Chapter 2, the foundations of the most important micro economic theories of household saving are reviewed and discussed in light of relevant empirical research within the fields of microeconomics, psychology and sociology. Chapter 3 is a review of empirical studies on saving where psychological variables have been applied. The reviews reveal which factors are considered the most important for saving behaviour. Some of them will be addressed in the empirical part of the dissertation.

Some studies of the effect of psychological variables on household saving already exist and the "Index of consumer sentiment" has been found to have predictive power at the macro level (e.g. Katona, 1975). Despite this, we have limited knowledge about the role of psychological variables. Many of the psychological theories have been tested only once, and many studies suffer from serious weaknesses with respect to measurement of the variables of interest. It is therefore appropriate to say that psychological research on household saving is in its infancy and that the fundamental question - what role do psychological variables play in household saving? - is left unanswered. Consequently, it is necessary to start the empirical study of the psychological effects on saving with the following question:

**Research Question 2:**

**Do psychological variables contribute towards explaining variation in household saving?**

Studies of saving have been dominated by economists, who have made clear what should be considered *saving*. Formally, saving is defined as the difference between net worth at the end of the period and the net worth at the beginning of the period, which should equal the excess of income over consumption expenditure in the same period (Wärneryd, 1999). This may sound straightforward to measure and analyse, but it is not. When people save, they do it in various ways as putting money in a bank account, paying down mortgages, or investing in insurance, shares and mutual funds. When trying to investigate the effect of psychological variables on saving we should consider whether different forms of saving are likely to be affected by different underlying psychological mechanisms. For example, putting a sum of money towards a mortgage is economically equivalent to putting the same amount into a bank account. However, the two saving acts might reveal different preferences in delaying gratification or the ability to do so. People who save before buying are more able to delay gratification than those who prefer to buy first and pay afterwards. Katona (1975) also pointed out that these two types of saving differ with respect to when the decision to save is made. Putting money into a bank account involves a discrete decision to save made in the current accounting period. Katona (1975) labelled this discretionary saving. Putting money towards a mortgage is usually a result of previous decisions to save (or borrow), and is often determined by contractual agreements. Katona termed this *contractual saving*. It is not certain that the variables that influence discretionary saving also influence contractual saving or that contractual saving, in terms of paying down mortgages, is influenced by psychological variables at all.

In order to adequately explore the effects of psychological variables on saving, a distinction is made between discretionary and contractual saving. Discretionary saving includes saving that is likely to be a result of discrete saving decisions in the accounting period. Contractual saving, as defined here, includes repayment of debt and mortgages, and is a result of previous

borrowing decisions. The reason for distinguishing between these two types of saving is because it is likely that the direction of the effect of some of the psychological variables might be opposite for the two types of saving, as the underlying psychological processes governing them are so different. Contractual saving (as defined here) implies a preference for buying before paying, while discretionary saving implies preference for the opposite. Any effect of psychological variables that influence the two types of saving differently might be neutralised when studying total saving. The third research question that will be addressed is therefore:

**Research Question 3:**  
**Do psychological variables have different impacts on discretionary and repayment saving respectively?**

Numerous economic studies of saving show that household saving is largely determined by household income. It is a logical relationship as the income determines a household's ability to save. With the exception of dramatic increases in the value of real estate or financial assets, it is impossible to save more than one's income, while some of the income must be used for providing necessities like food and housing. However, income cannot explain all saving. As suggested by Katona (1975), the substantial increase and spread of discretionary income among families in Western economies increases the importance of variables other than income when explaining saving and spending decisions. It is reasonable to suggest that the increase in discretionary income tips the relative influence of economic, situational, and psychological variables on saving in favour of psychological variables. In order to test this assertion, estimates based on data from different income groups will be compared. The fourth research question addressed in this study is:

**Research Question 4:**  
**Do psychological variables have more impact on saving in high-income households than on saving in low-income households?**

The variables selected for the empirical study are outlined in Chapter 4. The expected sign and direction of the relationships are also indicated. The selection of independent variables is based on the literature review presented in Chapters 2 and 3. Several different ways of measuring saving are used as dependent variables. A distinction is made between discretionary, contractual and total saving and between stock and flow measures of saving.

Part III of the dissertation contains two chapters (Chapters 5-6), which report the preparations for the empirical part of the dissertation. Chapter 5 describes the procedures followed when sampling panel members and collecting data, the questionnaires, selection of key informants in the households, the design of the study and construction of the data file. Chapter 6 describes the instrumentation used.

Part IV of the dissertation contains two chapters (Chapters 7-8) in which the data analyses are reported and discussed. In Chapter 7, the data are described and the results of the estimation of the models are presented. The theoretical and practical implications of these results are discussed in Chapter 8.



.

# Chapter 2

## The psychological foundations of economic theories of saving

*Consider the problem of predicting the shots made by an expert billiard player. It seems not at all unreasonable that excellent predictions would be yielded by the hypothesis that the billiard player made his shots as if he knew the complicated mathematical formulas that would give the optimum directions of travel, could estimate accurately by eye the angles, etc., describing the location of the balls, could make lightning calculations from the formulas, and could then make the balls travel in the direction indicated by the formulas. Our confidence in this hypothesis is not based on the belief that billiard players, even expert ones, can or do go through the process described; it derives rather from the belief that, unless in some way or other they were capable of reaching essentially the same result, they would not in fact be expert billiard players.*

*Friedman (1953): Essays in Positive Economics, p 21.*

### 2.1 INTRODUCTION

In this chapter, economic models of saving and consumption will be reviewed. The focus is on the psychological foundations of the theories, which will be discussed in the light of results from relevant empirical studies within the fields of psychology, sociology, and anthropology. The review will facilitate identification of the psychological factors that may be fruitful for future research. As economists have conducted numerous and detailed studies of saving throughout the last two centuries, a complete review of these studies is beyond the scope of this thesis. Excellent reviews have also recently been written. King (1985) and Modigliani (1986) have reviewed research on saving within the life cycle perspective. Deaton (1992) gives an extensive review of microeconomic theories of saving. Browning and Lusardi (1996) provide an updated review on the most modern microeconomic theories of saving behaviour and results from empirical tests of these theories. Wärneryd (1989, 1999) has reviewed the psychological ideas underlying the different models of saving behaviour as well as psychological research on saving behaviour. The following review will also focus on the psychological theories found in the savings literature, but, in addition, we will investigate the extent to which psychological ideas receive empirical support.

As the number of studies of saving behaviour is high, it is difficult to find a suitable way to structure a review. Many possible schemes might have been used in order to facilitate the evaluation of the literature. After assessing several methods, a structure where the dominating economic theories of saving behaviour were used as a starting point for the discussion of empirical findings was chosen. The theories are presented chronologically so that the review also serves as a historical overview of the development of saving theories throughout the last century. The psychological ideas underlying the original theory are presented first, while empirical studies that relate to each theory are discussed successively. Differences between the economic models are also highlighted. Table 2.3 summarises the most important saving

models, the psychological hypotheses implicitly assumed, and the results from empirical studies, if any, of these hypotheses.

## 2.2 THE ECONOMIC APPROACH IN STUDIES OF SAVING

In general, economics is concerned with how an economy or individual chooses to allocate scarce resources among each other and over time. The purpose is often to make as good predictions about behaviour as possible, rather than finding the real explanation for why people act as they do. The development of theories is achieved by constructing a model of the behaviour under investigation based on a number of simplifying assumptions. Generally, it is assumed that agents - being firms, individuals or nations - will act rationally and maximise their utility or profits. The models often also rely on assumptions concerning the markets. Such assumptions may be perfect competition or perfect capital markets. Although the realism of the assumptions is questionable, the assumptions have proved useful in economic analyses (Wärneryd, 1999). Moreover, many economists are not greatly concerned with descriptively "realistic" assumptions, but sufficiently good approximating assumptions for a particular purpose (Friedman, 1953). For psychologists evaluating this work, it is important to note that economic models do not claim to predict behaviour of individuals. Instead, they often depend on the law of large numbers and predict average behaviour (at the macro level) or the behaviour of the famous Economic Man (at the micro level).

Much research on saving behaviour has been conducted at the aggregate level (nations). This stems from the need to explain aggregate fluctuations in savings and consumption in order to assist public policy making. There are strong links between saving, growth, competitiveness, welfare and business cycles. It is, therefore, important to understand how they influence each other and how they can be influenced through policy measures. Macro economic models of aggregate consumption and spending typically use variables like "money supply", "inflation", "consumption level", and "labour supply". These are variables meant to describe the results of human behaviour, yet they are abstract and imply the use of simplifying assumptions about how humans think and act. As observed by Browning and Lusardi (1996), the results of these studies do not provide us with a great deal of knowledge about the complex behaviour underlying saving behaviour. For this reason, they are not included in the present review.

Studies of saving at the aggregate level require some microeconomic theory. The modern (or neo-classical) microeconomic theories often rest on the assumption of rational behaviour. They are theories about the choices and actions of "Economic Man". The Economic Man is assumed to enjoy consumption and dislike work. Economic models are built on assumptions about his preferences. For example, his consumptive pleasure is assumed to be dependent on previous consumption, so that pleasure derived from a certain product declines the more of that thing he has already consumed. Thus, the third grilled chicken in a given week gives less pleasure than the second chicken, but more pleasure than the fourth one. Similarly, dislike of work is assumed to increase with each additional hour worked so that the 40<sup>th</sup> hour of work in a week is more displeasing than the 39<sup>th</sup>. Since Economic man is comparing pleasures and pains associated with each and every decision he makes in order to do what is best for himself (maximise total utility), he does not spend money on one more chicken if the same money spent on fish gives him more pleasure. He will work as long as the utility from consuming the goods and services he can purchase from the earnings from his last hour of work is higher than the disutility associated with working. In the same vein, he will not spend money on one



more chicken in this period if he expects the pleasure derived from consuming chicken in the future to be higher (for the same money adjusted for interest and inflation).

In general, saving decisions (or, more correctly, consumption decisions) are assumed to be made in the way described above. For each unit consumed, the decision maker will weigh the marginal utility derived from spending now with that of the future, and under the assumptions of a diminishing marginal utility from consumption, he will try to smooth consumption so that the utility from consumption is constant from one period to another. If he thinks the utility from one extra unit of consumption will give more utility if consumed in the future, the consumption will be postponed. Economists agree that this is how saving decisions are made. However, they disagree on the factors influencing this decision process and the factors that are most important. They also disagree about what consumers derive utility from and under which constraints the decisions are made. Some of these differences are illustrated in the review below.

### 2.3 ECONOMIC THEORIES OF SAVING

The review presented below is divided into the three parts<sup>3</sup>:

#### *i) Saving as a result of willpower and foresight*

The first part of the chapter deals with ideas about saving behaviour proposed by economists from the 19th century and the beginning of the 20th century (e.g. Böhm-Bawerk 1889/1959; Fisher, 1930). Despite the age of these theories, they are interesting since they are founded on advanced psychological thinking, which still receives attention<sup>4</sup>. In fact, we will see that Fisher (1930) discussed most of the ideas that underlie the more recent saving models. Important psychological concepts in these theories are “time preference”, “self control”, “short-sightedness”, and “ability to delay gratification”. Economic variables were assumed to have an indirect effect on saving, as they would work through time preference. The central idea is that individuals might be incapable of correctly evaluating their future needs and wants, so that the present is given too much weight. Individuals are also expected to differ with respect to how much they value the present compared to the future.

#### *ii) Saving as a result of ability to save – the income approach*

In the 1930s, a new era of saving theories began in which income was considered the dominating (and sometimes the only) determinant of saving. Keynes (1936) started the stream of income theories by proposing that saving was a linear function of present income, and he was followed by researchers who proposed alternative income definitions. Duesenberry (1949) proposed that past income and relative income would provide better predictors of saving, focusing on habit formation and preference interdependence. Friedman (1957) and Modigliani and Brumberg (1954) argued that future income or lifetime income would be the most important determinant when proposing the *Permanent income theory* and the *Life-cycle hypothesis* respectively. They argued that individuals are forward-looking and allocate their income evenly over the expected remaining lifetime. Although these theories appear to rely on ideas of economic stimuli being the only determinant of saving and consumption, this

<sup>3</sup> The borderlines between these three types of models are not as clear-cut as this division might suggest. However, from many other alternative ways of structuring this review, this was considered the best one.

<sup>4</sup> See, for example Thaler, (1997): Irving Fisher: Modern Behavioral Economist. (AEA Papers and Proceedings)

review shows that they also rely on psychological and sociological assumptions about the reasons for consuming and saving.

*iii) Saving as a result of self-controlling strategies and mental accounting*

Finally, a more behavioural version of the LCH is presented. The Behavioural Life Cycle Hypotheses (Shefrin & Thaler, 1988) is an attempt to integrate the LCH, multiple self models (Thaler & Shefrin, 1981), as well as psychological ideas about how we mentally handle money - "mental accounting" (Thaler, 1985). The model has been tested empirically to a limited extent, but some supporting results are presented here. The model can, to a degree, be viewed as an integration of ideas presented in i) and ii).

### 2.3.1 Saving as a result of will-power and foresight

#### *2.3.1.1 The theory of interest formation*

The first models of saving focused on the intertemporal choice between consuming now or later and factors that influence this choice. Although several economists in the 19<sup>th</sup> century had discussed similar ideas,<sup>5</sup> Böhm-Bawerk (1889/1959) and Fisher (1930) are considered the creators of the concept and theory of time preference. Writing at the turn of the 20<sup>th</sup> century, their initial research questions asked why interest rates exist and how they are formed. They tried to answer the question of why people want rewards for saving money by lending it to others and why they are willing to pay compensation in order to borrow money. When doing this, they used advanced psychological thinking that still receives attention from both economists and psychologists.

The core of their theories is the trade-off between spending and investing; it is of choosing between immediate enjoyment and possible larger deferred enjoyments. By focusing on this intertemporal dilemma, they point to a central problem of human life: giving up immediate pleasures in order to obtain long-term goals. They recognised that saving and investing are results of how people handle this intertemporal conflict.

Böhm-Bawerk (1889/1959) argued that the formation of interest rates was influenced by three factors:

- 1) Tendencies to value future goods lower than goods of the same quantity and quality available immediately. Böhm-Bawerk proposed that this tendency is caused by incapability to imagine the pleasures and pains we will feel in the future. Present wants and desires are given the highest weight.
- 2) Positive expectations towards the future. In general, people are optimistic and expect to be better off in the future. This optimism has a depressing effect on saving, since people might wish to spend some of the increased future income on unfulfilled present needs.
- 3) Goods existing in the present are economically superior to goods that exist in the future, because they can produce more goods or give income/utility in the interval between the present and the relevant future period. This is particularly true for goods that will outlast one's expected lifetime.

---

<sup>5</sup> See Loewenstein (1992) and Wärneryd (1999) about the writings of early economists such as Rae, Senior, Mills, and Jevons.

The size of the interest was supposed determined by the importance of these three factors. The more positive the expectations of the future economic situation, the more tempting it is to fulfil present needs and desires. The lower the ability to imagine future pleasures and pains, the more weight is given the present feelings.

Fisher (1930) developed and refined Böhm-Bawerk's theory of the interest rate formation and further formalised the analyses. He introduced the concept of time preference, which he explains as reflecting a person's impatience for consumption. In his model, time preference is an important determinant of saving. He formally defined the rate of time preference (also called the subjective discount factor or the rate of impatience<sup>6</sup>) as "the (percentage) excess of the present marginal want for one more unit of *present* goods over the *present* marginal want for one more unit of *future* goods" (page 62). The rate of time preference is a derivative of marginal desirability, i.e. the preference for present over future goods. With this definition, Fisher also stressed the importance of discounting, as it is the present want for future goods that is assumed to form the premises for decisions. Future events must be discounted into present values in order to be comparable to present events.

Fisher further argued that all preference resolves itself into a preference for early "enjoyment" income" over deferred enjoyment income. He argued that it is the stream of all future enjoyment income that plays the essential role. Enjoyment income was defined as a psychological entity (similar to what is called "utility" in contemporary texts), which could not be measured directly. Therefore, for practical purposes, Fisher proposed that "real income" was better to use, which is defined as those final physical events in the outer world (e.g. shelter, music, bread and butter) that give us our inner enjoyments. "Real income" could be measured by the prices we paid in order to obtain them (and would be denoted "expenditure" instead of "real income" by contemporary economists).

The underlying assumption for the theory of interest is that individuals, in general, have higher preferences for consumption today than for consumption tomorrow, which means that the rate of time discounting usually is positive. The strength of the time preference or the degree of impatience is assumed to be influenced by many factors. Factors that explain differences in individual time preference can be divided into income characteristics and personality factors.

Fisher (1930) proposed that three characteristics of the income were important. The first factor is the size of the expected income stream. The lower the income, the higher the time preference due to many unfulfilled needs. People have a minimal need for food and shelter, and those with low incomes have to spend it all on their basic needs, regardless of how much compensation they receive for saving. Those with higher incomes will have most of their basic needs covered, and might therefore be able and willing to save if they find the compensation offered for it satisfactory. The second factor is the expected time shape of the income. Expected decreases in income (for example, before the time of retirement) will reduce impatience. Expected increases in income will increase impatience, and people with low incomes will be more sensitive to changes in the time shape of income than those with high incomes. The third factor is the uncertainty related to the income stream. If future

---

<sup>6</sup> Fisher (1930) has been criticised for using time preference and impatience as synonyms. He defended this practice by arguing that the meaning of impatience is more self-evident than time preference, it is shorter, and it carries a presumption as to the *usual* direction of the time preference. Fisher did realise that time preference is sometimes negative (Fisher, 1930; page 67), for which Loewenstein (1987) and Loewenstein and Sicherman (1991) found empirical support.

income is uncertain, this will usually decrease the time preference and people will “lay up for a rainy day”. Fisher pointed out, however, that the effect of risk might be numerous, depending on the degree and range of application of risk for various periods of times and on expected lifetime.

Fisher (1930) suggested that the preference for immediate (as opposed to deferred) gratification was established early in life through the teaching of parents and through social pressure from the environment. Furthermore, Fisher related the rate of time preference to the following personal characteristics:

- 1) *Foresight*. The greater the foresight, the lower the impatience.
- 2) *Self-control*. Self-control reflects the willingness to resist temptations. The greater the self-control, the lower the impatience.
- 3) *Habits*. The influence of habits may be in either direction. Someone who is used to spending will continue to spend although the income declines. Likewise, someone who is used to providing for the future will do so also when the income increases. Hence, two persons with the same income might differ in their impatience due to a difference in habits.
- 4) *Expectations of life*. Fisher regarded the chance of death as the most important rational factor tending to increase impatience. Anything that tends to prolong human life will tend to reduce impatience.
- 5) *Thoughts for relatives*. The stronger the bequest motive, the lower the impatience. In addition, Fisher argued that the increase of offspring (number of children) lowers impatience.
- 6) *Need to follow the whims of fashion*. The more independent of “Mrs Grundy and the high-powered salesman of devices that are useless or harmful, or which commit the purchaser beyond his income prospects”, the lower the impatience.

These income and personality factors would interact, so that time preference could vary among people with the same income and income characteristics. The same individual may, over her life cycle, move from one extreme of impatience to the other. Such an alteration may be caused by a change in the personality factors or by variation in the income factors. Therefore, Fisher also attempted to explain within-subject variation in time preference at different times. He described the following typical life cycle profile for a man’s rate of time preference: As a child, he will be impatient because children in general lack foresight and self-control. As a young man, he will also have a high degree of impatience, because he expects large increases in income. When he has settled down and has a family, the impatience will decrease, because he will be forced to think more about meeting future needs. In the “empty-nest”-stage, the impatience will increase due to a shorter expected remaining lifetime. With this Fisher indirectly suggested that stage in the life cycle is an important determinant for time preferences and economic behaviour. He also suggested that the most common behaviour will be to try to transform a given income into a uniform one; i.e. most people will try to smooth their real income stream. As will be shown in the next section, these ideas are similar to those that underlie the Life-cycle model.

Fisher’s theory of time preference included factors that will explain differences between *and* within individuals, but these individual differences are seldom included in economic models of intertemporal choice. This is because Fisher (1930) suggested that individual differences in time preference would be harmonised in the capital market. In fact, at the macro level, Fisher (1930) argued that the real interest rate reflects the aggregate time preference of all

individuals in the society. People that are impatient to spend (have a high rate of time preference) will borrow money from those less impatient (have a lower rate of time preference). He also assumed decreasing marginal utility from consumption. For each extra unit the impatient people could consume, the lower the marginal utility for extra consumption and the less compensation they would be willing to pay in order to consume even more. He illustrated that by using the following demand schedule (page 97):

For each successive one hundred dollars added to his present income, assuming that income was stable and certain, a certain prospective borrower is willing to pay out of next year's income, as follows:

- For the first \$100, \$120, with an impatience rate of 20%.
- For the second \$100, \$115, with an impatience rate of 15%.
- For the third \$100, \$110, with an impatience rate of 10%.
- For the fourth \$100, \$106, with an impatience rate of 6%.
- For the fifth \$100, \$105, with an impatience rate of 5%.
- For the sixth \$100, \$104, with an impatience rate of 4%.

Likewise, the less patient people consume, the higher the marginal utility for extra foregone consumption and the more compensation they will demand in order to give up further consumption. Consequently, in a perfect capital market with no liquidity constraints, the process of lending and borrowing will continue until the compensation offered and the compensation demanded for extra units of consumption are equal. That is, it will continue until every person in the society has the same rate of impatience. This process of harmonising rates of time preference describes the formation of the interest rate in a society. On the macro level, the aggregate degree of impatience of all individuals determines the rate of interest. On the individual level, the relationship is opposite. For individuals (each having a negligible influence on the market interest rate) the interest rate will be fixed, and it is their individual rate of impatience that varies and determines their tendency to lend or borrow. A person is assumed to harmonise one's rate of time preference with the market interest rate. Therefore, the real interest rate in the market is used as a proxy for time preference.

Fisher (1930) also formulated his theory in mathematical terms. In this part of his book, little of the psychological insight displayed in the first part of the book is incorporated. The assumptions about the formation of the market interest rate as described above are taken for granted, so that the economic models of intertemporal choice rely on the assumption of the individual rate of time preference being equal to the market real interest rate. Thus, intertemporal choices can be described by using the apparatus of indifference curves (or "Fisher-curves"). Numerous economic models have adopted this assumption, without reflecting on its inappropriateness when describing behaviour in imperfect capital markets or questioning the assumption about individuals harmonising their rate of time preference with the market interest rate.

Fisher's theory of interest (as formulated in the stylised version in mathematics) formed the basis for the Discounted Utility Model (the DU model), which was formally developed by Samuelson (1937), Koopmans (1960), Lancaster (1963) and Fishburn and Rubinstein (1982). This model, built on strict axioms concerning preferences and utility functions, describes how rational individuals with rational preferences will distribute consumption between the present and the future. Although even the inventors of the DU model realised it lacked mundane realism (see Loewenstein, 1992), the model has been the most powerful tool for analysing

intertemporal decisions (including saving decisions). In the past decades, empirical research has found that this is a poor descriptive model of intertemporal choice, and focus has especially been on determinants of time preference and individual differences. This research will be reviewed below.

### 2.3.1.2 Some empirical findings

In the following paragraphs, some empirical tests of parts of Fisher's theory are presented. In particular, the focus is on empirical studies of time preference and some implications of the findings. The section starts with a review of studies that imply tests of the propositions of Fisher (1930) and proceeds with a review of other results from empirical studies of time preference and intertemporal choice. Here, we are concerned with the impact of the length of the delay periods on time preference. The results suggest that we might observe time-inconsistent behaviour, which means that people will have difficulties in following their own plans. These findings further suggest that self-control and willpower are important variables to include in models of intertemporal choice. Finally, the few studies that focus on the relationship between time preference and behaviour are reviewed.

#### Tests of Fisher's theory

The most applied argument from Fisher's theory of interest is that individuals will harmonise their rate of time preference by lending and borrowing in the capital market (assuming a perfect capital market). This hypothesis is not supported by empirical investigations either in studies using hypothetical choice situations or when observing real-world behaviour. In general, the time preference rates found in empirical studies exceed market interest rates. For example, Hausman (1979) found subjective discount rates ranging between 5.1% and 89.0%, when deriving the rates used in actual purchases of air-conditioners (the mean discount rate was 26.5%). Gately (1980) reported discount rates between 45% and 300% in a similar study of refrigerator purchases. Houston (1983) found a mean discount rate of 22.5% in an experimental study of choice of an "untried energy-saving durable good". Thaler (1981) found median discount rates as high as 345%, while Benzion, Rapoport and Yagil (1989) found mean discount rates as high as 59.8% among university students responding to hypothetical choice situations<sup>7</sup>. Samwick (1998) estimated time preference rates from wealth data and found a median annual rate of time preference equal to 7.63. One quarter of the time preference rates was below 2.93% and another quarter above 14.66%. 14.17% of the sample had estimated rates of time preference above 20%<sup>8</sup>.

The discount rates found in these studies have not only been high, they have also varied between individuals. These differences can be attributed to a non-perfect capital market, which was an important underlying assumption in Fisher's argument. However, they may also indicate that people do not seek to harmonise their subjective discount rates with the real interest rate in the market and that, consequently, factors other than their time preference might play an important role in intertemporal choices.

Fisher also proposed several factors that might influence time preference: the size of current income and expected development and uncertainty related to future income, upbringing,

---

<sup>7</sup> The mean discount rates in these studies varied with the characteristics of the questions used to measure them. The mean rate given here is from the question with the lowest amount and the shortest time period.

<sup>8</sup> Samwick (1998) also found the rate of time preference of 5.32% of the sample to be lower than -15%. He attributes all findings of negative rates to a strong bequest motive or inheritance. Inclusion of inheritance (or initial wealth) gives higher estimates of the rate of time preference.

personality factors and stage in life cycle. Empirical studies of these factors are addressed in the following paragraphs.

A few studies indicate that the time preference is related to the size of the income. Lawrance (1991) and Hausman (1979) reported evidence for a negative relationship between income and the discount rates. Low-income families use on average higher discount rates than high-income families. A weakness of their studies is that they did not measure the discount rates directly, but estimated them from consumption equations (Lawrance, 1991) or investment decisions (Hausman, 1979). Additionally, other factors than those controlled for might therefore have played a role<sup>9</sup>. Donkers and van Soest (1999) and Houston (1983) did not find a relationship between income and the discount rate when using a more direct measure of the rate of time preference, while Nyhus (1997) reported an unexpected significant positive relationship between the discount rate and income. Antonides (1988) and Nyhus (1997), on the other hand, found that a variable called "financial position" co-varied negatively with the discount rate thus indicating that time preference might be influenced by the fulfilment of needs.

Only one empirical study has so far addressed the effects of expectations and uncertainty on time preference. Antonides (1988) found that non-savers with an optimistic view of the future had higher discount factors than pessimistic ones, but these findings were not statistically significant. Expectations and uncertainty have, instead, been found to effect saving directly. Income uncertainty has a depressing effect on consumption in favour of saving (Browning & Lusardi, 1996; Carroll, 1997) while optimism concerning future economic situations tends to increase spending at the cost of saving (Katona, 1975). Webley and Nyhus (2001) found that people with debt problems had more optimistic expectations about their income than others. Expectations and uncertainty might work through time preference as Fisher proposed, but few empirical investigations have been conducted to study this further.

Fisher's proposal that upbringing might have an important effect receives some support. Mischel (1961) found in a study of Trinidadian children that father absence is closely associated with children's preference for immediate rewards. He attributed this finding to the children's trust that the promised delayed reward indeed will be forthcoming and argues that the trust is absent or weak in households without fathers. Other evidence that suggests that parental modelling is important is that children from the Trinidadian Negro subculture, in which immediate self-reward was the prevailing gratification pattern, displayed a greater preference for immediate rewards than children of Trinidadian Indians, who more often exhibited self-denying delayed-gratification behaviour (Mischel, 1958). The same conclusions were reached in a more controlled laboratory setting in which children were exposed to live and symbolic models (through written behavioural descriptions). Children exposed to models that showed preferences for delayed rewards, changed their delay-of-gratification behaviour in favour of delay-reward, whilst the children who were exposed to a model showing immediate-reward preferences altered their behaviour in favour of immediate-reward (Bandura & Mischel, 1965). These results were later successfully replicated by Stumphauer (1972), using a sample of young prison inmates. Some evidence also suggests that delay of gratification behaviour is stable over time. Mischel, Shoda & Rodriguez (1992) carried out experiments on a group of four-year-olds' ability to delay gratification and compared the results with the children's achievements more than ten years later. They found that children

---

<sup>9</sup> For example, Carroll (1997) and Deaton (1992) criticise Lawrance (1991) for not taking into account that more highly educated people have a faster labour income growth than the less educated.

who could defer gratification longer than others when they were four years old, were later described as being more successful in school and coping better with frustration and stress than those who were not able to wait. Combining the findings from these studies, Mischel et al. (1992) argue:

“...an early family environment in which self-imposed delay is encouraged and modeled also may nurture other types of behavior that facilitate the acquisition of social and cognitive skills, study habits, or attitudes that may be associated with obtaining higher scores on the SAT<sup>10</sup> and more positive ratings by parents.” (page 158)

Similar conclusions were reached by Maital and Maital (1977). They studied children’s ability to delay gratification and concluded that socio-economic factors have an important influence on delay-of-gratification behaviour. Their evidence suggests that time preference patterns are firmly established for life by adolescence. They further argue that differences in time preference among individuals play an important role in determining both the distribution of income at a particular point in time and the transmission of economic inequality from one generation to another<sup>11</sup>. However, it is still not clear if, and to what extent, the ability to delay gratification is relevant for saving behaviour. The studies mentioned above do not directly imply that the *time preference* of the children varied, rather that it might be that they have learned more techniques for self-control.

A more recent study by Bernheim, Garrett and Maki (2001) suggested that it is the teaching of self-controlling techniques that is important (also for macro behaviour). They studied the effect of consumer education policies. In particular, they studied household financial decision-making courses in high school and their influence on subsequent asset accumulation in adulthood. The courses covered topics such as budgeting, credit management, balancing chequebooks and compound interest. The study resembled a natural experiment. Some states never adopted the educational programmes, while others adopted them at different times, making it possible to compare subsequent saving across states and over time. Analysing those young enough to have been exposed to the education, they found that asset accumulation was higher in the states that had adopted the educational programme than in those that did not. Moreover, Bernheim et al. (2001) found that people who, as children, had been encouraged to save using a bank account, saved more than others in their adult life. Similarly, those who characterised their parents as having saved more than average saved more than others. The effect of the educational programme was largest for those who characterised their parents as saving less than average, indicating a substitution effect between teaching by parents and teaching in school. Finally, Bernheim et al. (2001) mentioned the positive effect of retirement education on saving found in a different study, which indicates that economic education has positive effects at all ages, not only in childhood.

---

<sup>10</sup> The Scholastic Aptitude Test, which is a measure of cognitive academic competencies and school-related achievements.

<sup>11</sup> Similar arguments were put forward by Strotz (1956). He assumed that most of us are born with hyperbolic discount functions, but that these are modified through parental and social teaching. He divided consumers into three groups: a) “The thrifty”: These people were trained so effectively that the original discount function has been substituted with a log-linear one. Self-control is not necessary for them, as inconsistency problems do not occur. b) “The Precommitters”: These are people who have been taught to plan and behave consistently, but without having their tastes altered. They will need to use precommitment in order to stick to their original plans. c) “The spendthrifts”: These are people who, because of a lack of training or insight, have never learned to behave consistently and for whom the intertemporal tussle remains unsolved. Strotz argues that we find these among the lower-income classes.



Only a few studies have addressed the notion that degree of foresight (or time horizon) is relevant for time preference. Rather, this relationship has been regarded as indisputable. By definition, consumption beyond the time horizon is given the value of zero and is not discounted. The time horizon can then be elicited by identifying the discount rate used. For example, Landsberger (1971) found discount rates between 17% and 45% and concludes that people's horizon is between 2-6 years. Alternatively, the discount rate can be inferred from the time horizon people use. For example, Lusardi (1998) used a self-reported planning horizon as an index for time preference. Samwick (1998) compared his estimates of time preference rates with the respondents' self-reported most important planning horizon with respect to saving and spending decisions, in order to validate his time preference estimates. He found that average values of time preference rates decline steadily with the planning horizons that ranged from "the next few months" (average rate = 10.43%) to "ten years or more" (average rate = 5.91%).

Finally, no studies have addressed the relationships between time preference and personality factors and stage in life cycle. Fisher's propositions regarding these variables still lack empirical validation. Instead, other authors have proposed and tested alternative determinants of time preference. The next paragraph will report findings from some of these studies.

### Empirical studies of time preference

Empirical studies of time preference suggest that Fisher (1930) assumed too much consistency. He did not put forward the notion that individuals differ in their time preference as well as argue that individuals' time preference might change when one of the factors determining time preference changed. For example, he suggested that the rate of time preference could change as an individual proceeds through their life. Nevertheless, it seems that he expected a person at a certain point in time to use the time preference consistently across all intertemporal choice situations. The results from the empirical studies reported below show that this is not the case. In fact, decision-specific factors seem to be the most important determinants of time preference.

Findings from several studies suggest that individuals react very differently to receipts than to payments and to speed-ups as opposed to delays (Benzion et al, 1989; Loewenstein, 1988; Nyhus, 1997; Shelley, 1993). These results have been attributed to shifts in reference points. Loewenstein (1988) and Shelley (1993) argued that the effects of outcome sign (receipt vs. payment) and question framing (delays vs. expeditions) should be combined when the results are interpreted. They defined delay of rewards and speed-ups of payments as "immediate losses" because these situations involve a worsening of the present well-being. Likewise, speed-ups of rewards and delays of payments were defined as "immediate gains", because these situations involve an improvement of the present well-being. They argued that the present state is used as a reference point. The sign of the change for the present situation determines whether a situation is considered a gain or a loss. This theory has much in common with prospect theory (Kahneman & Tversky, 1979), which proposes that the value function for losses is steeper than that for gains. It also holds that outcomes are evaluated in terms of deviations from reference points instead of absolute values. However, the intertemporal reference point model also suffers from the same weakness as the Prospect Theory: our knowledge about which reference point a consumer uses and how it is formed or chosen by the consumer is very limited. In situations outside the laboratory where the researcher cannot manipulate the reference point we know little about whether a particular outcome is perceived as a gain or a loss.

Furthermore, on average, people also use higher discount rates for low amounts than for high amounts (Abdul-Muhmin, Nyhus & Rönqvist, 1993; Benzion et al., 1989; Thaler, 1981; Shelley, 1993), and on average, they use higher discount rates for decisions involving short delay periods in contrast to long ones (Benzion et al., 1989; Shelley 1993; Thaler, 1981). In addition, these findings suggest that characteristics of the alternatives involved in the intertemporal decision are important for the discount rate used.

Abdul-Muhmin et al. (1993) and Nyhus (1997) found that people do not only change their discount rate from one situation to another, they also change their place in the frequency distribution of responses. Abdul-Muhmin et al. (1993) presented a sample of employees at the Norwegian School of Economics and Business Administration with four different questions that had been used in previous investigations<sup>12</sup> to measure time preference. They found that the inter-item-correlations were surprisingly low (the highest was .32). Between two of the items, the correlation was negative ( $r = -.13$ ). Nyhus (1997) investigated the consistency in answers to twelve time preference questions using responses from a Dutch sample of 4000 individuals. She found that, in general, correlations between answers to different time preference questions were low, but they were high for questions involving the same framing (i.e. high between items involving delaying receipts of money and between items that involved delaying payments). This suggests that it is not only the size of the of discount rates used for different situations that changes but people also change their relative position in the distribution of responses when the situations are framed differently. A person that appears to be the most impatient in one situation might be the most patient in another.

Furthermore, empirical studies of time preference also show that people seem to hold different discount rates for different goods. These discount rates are affected by factors that are decision-specific. For example, Landsberger (1971) found in his study that the average discount rate for canned fruit was 27% while, for fresh fruit, it was 9.5%<sup>13</sup>. Houston (1983) found that household square footage and number of household members were important determinants of the level of discount rate used in investment decisions of energy-saving devices (though he could not test whether these variables captured effects of income level). Nyhus (1997) found that decision-specific factors (the size, sign and direction of money flow) explained much more of the variation in subjective discount rates than socio-economic variables did.

Finally, one of the most important findings, the implications of which will be discussed at length in the rest of this and the next section, is that an individual's rate of time preference tends to change as a function of time (being high for the present and immediate future and lower for periods in the future). The findings suggest that instead of discounting future events with a constant discount rate (which can be illustrated by exponential curves), individuals use higher discount rates for the near future than for the remote future (which can be illustrated by hyperbolic curves). This discount function has been called Herrnstein's matching law (Ainslie, 1992). The curves found in experimental designs differ in their specific forms, but they share this common hyperbolic characteristic. Thaler (1981) described the phenomena with the following example: Most people prefer two apples in one year and one day to one

<sup>12</sup> Being investigations by Lea et al. (1987), Thaler (1981) and Webley (1992). The fourth question was constructed by Abdul-Muhmin et al. (1993).

<sup>13</sup> These results suggest that the measure is problematic. It is reasonable to question results that show higher impatience for canned fruits (that are available the whole year) than for fresh fruits (which are available only in specific seasons).

apple in one year. But, when asked to choose between one apple today and two apples tomorrow, most people will want an apple today. This means that their discount rate for the future apples is much lower than for the apple available in the present or near future. This implies a change in tastes over time and time-inconsistent behaviour.

Figure 2.1a (source: Ainslie, 1992) illustrates an individual's preferences and behaviour under stable time preferences. At  $T_0$  the individual prefers alternative B, which is larger but is available at a later point in time than alternative A. The graphs illustrate the present value assigned to the two alternatives after discounting it to the present value. As  $T_n$  approaches, alternative B is still considered superior because the decision maker uses the same discount rate when evaluating the alternatives. The preference curves are exponential and proportional to each other. They never cross. The decision-maker waits for alternative B, which is available at  $T_{n+1}$ . Figure 2.1b shows the preferences and behaviour under hyperbolic discounting. At  $T_0$ , the individual prefers alternative B to A. However, as the time of availability for A approaches, the decision-maker starts using a higher discount rate, which causes a shift of preferences. When the two alternatives are discounted with a much higher rate, the alternative closest in time has the highest present value. The change in discount rates produces more curved preference curves and the curves cross. Alternative A is chosen, in spite of the preference for alternative B when choosing from a more remote temporal distance.

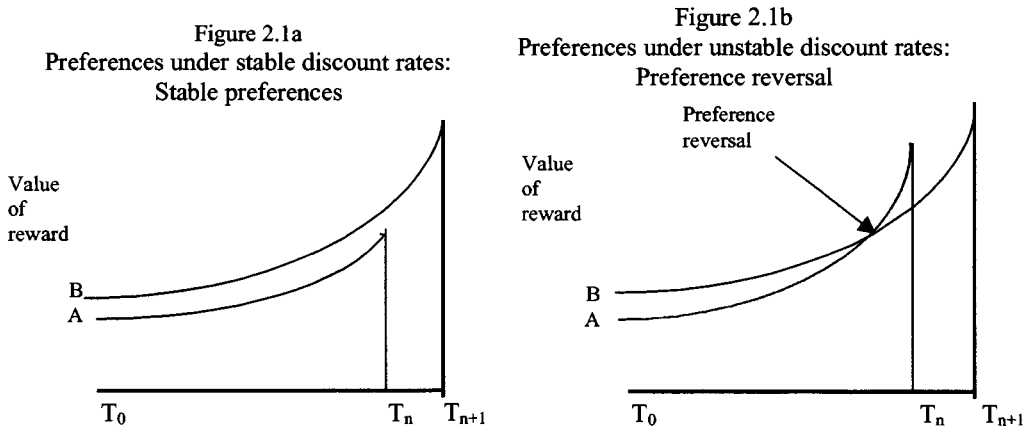


Figure 2.1  
Effects of exponential and hyperbolic discounting

Ainslie (1975) reviewed numerous studies of this kind of inconsistent behaviour, which he denotes "impulsivity". Impulsive behaviour has been found among birds, animals, children and adults. Preferences for two goods available at two different points in time are better described by hyperbolic curves than by exponential ones. The effects of overvaluation of the present were theoretically outlined by Strotz as far back as 1956. He showed that if the time preference changes as a function of time, the result is dynamically inconsistent behaviour. A conflict will occur between today's preferences and tomorrow's preferences. People do things they would not have done if they had made the decision to act from a remote perspective; they will not follow their own plans.

Two other explanations for the seemingly dynamic inconsistent behaviour have been put forward. Loewenstein (1996) argued that the economic theory of intertemporal choice is misspecified because it does not include 'visceral' factors (or "passions"). He points to the weakness of the theory of changing discount rates, which fails to explain why inconsistent behaviour is only induced in some situations and not in others. He attributed "inconsistent behaviour" to the role of visceral factors, which he described as important dimensions of human reality such as hunger, thirst, mood, emotion, drive, desire, physical pain etc. The traditional Economic Man has no passions in the sense of yearning or craving, and for this reason every deviation from deliberative and stable preferences are left unexplained by the economic models. They are interpreted as a change in tastes and irrational time-inconsistency. Loewenstein's (1996) point was that if the role of visceral factors<sup>14</sup> is included in models of choice over time, impulsive behaviour will not be viewed as an irrational shift in preferences. The preferences remain stable, but other factors that interact with them in determining behaviour must be taken into account.

Hoch and Loewenstein (1991) and Loewenstein (1996) claimed that visceral factors can explain why some types of behaviour are associated with impulsive behaviour and others are not. Hoch and Loewenstein (1991) argued that shifts in reference points are important for impulsive behaviour. Reference points might change because of physical and temporal proximity that makes not consuming painful. Or it might change through unfavourable social comparisons with peers or others. They defined consumer self-control as a struggle between the two psychological forces "desire" and "will-power". In their model, self-controlling strategies were divided into two classes: attempts to directly reduce desire and willpower tactics that seek to overcome desire. Loewenstein (1996), on the other hand, argued that impulsive behaviour is not so much caused by the immediate availability of the events, goods, or outcomes, as by the immediacy and level of intensity of visceral factors. At high levels of intensity, passions gain complete control, and perceptions of self-interest become unable to influence behaviour. As the level of intensity increases, an individual will focus his attention and effort on the present and on himself as opposed to other points in time and other persons. Loewenstein (1996) further argued that passions are more systematic in their effects than previously supposed, so that it is possible to model the interaction between interests and passions.

---

<sup>14</sup> Loewenstein (1996) mentioned three important differences between preferences and visceral factors:

- 1) Visceral factors change more rapidly than preferences because they are correlated with external circumstances such as stimulation and deprivation. Consequently, it is more difficult to defend oneself against them.
- 2) Visceral factors draw on different neuropsychological mechanisms than preferences. Neurological research has found that the core of the brain (the limbic system) uses chemical regulation to control body functions, and different configurations of these chemicals are experienced as hunger, thirst, sleepiness, elation, depression, etc. The role of this part of the brain is also critical in the regulation of behaviour. Preferences, on the other hand, consist of information stored in memory concerning the relative desirability of different goods and activities.
- 3) We have a limited ability to imagine hunger, pain, anger, or other passions when we are not experiencing them. Human memory is not suited to storing information about visceral sensations. For example, we can recognise pain when we re-experience it, but we cannot recall pain at will by re-experiencing it in our imagination. Often, we might regret and feel ashamed about behaviour induced by visceral factors, since we cannot remember the intensity of the pain, hunger, or arousal in later periods. Similarly, it will be difficult to consider the visceral sensations when planning future behaviour.

Empirical studies support some of the aspects of Loewenstein's (1996) theory. Studies on compulsive buying or addictive consumption<sup>15</sup> show that some people have debt problems due to compulsive buying (Faber & O'Guinn, 1988). Some buying might also be a result of tempting situations (immediacy of goods). Research in pre-purchase processes suggests that there are substantial differences among consumers in the amount of pre-purchase deliberation (e.g. Rogers & Shoemaker, 1971). According to the review of household pre-purchase decision making by Olshavsky and Granbois (1979), 20 – 25% of durable goods and clothing purchases appear to be "impulsive". Up to 50% of supermarket purchases and 33% of transactions in variety stores and drugstores are "impulsive purchases" in the sense that shoppers do not state intentions to buy these items in store entrance interviews. Research by Grønhaug, Kleppe and Haukedal (1987) suggested that even purchases of houses are achieved without much pre-purchase planning. Indirect support for the role of visceral factors are also provided by the fact that marketers for decades have investigated how to stimulate impulsive buying by manipulating the atmosphere, smell, structure, and display of products in shopping centres and supermarkets.

An alternative perspective on inconsistent behaviour is to model an Economic Man with two selves similar to Freud's theory of the Ego and the Id (Schelling, 1978; Thaler & Shefrin, 1981). This framework does not attribute observed time inconsistent behaviour to changing tastes, but to a short-sighted self gaining more control of behaviour than a more long-sighted self. Thaler and Shefrin (1981) modelled the internal conflicts between short-term and long-term preferences (e.g. eating vs. losing weight) as a principal-agent problem. They argued that there is a constant conflict between "the planner" (the self that maximises long-term utility) and "the doer" (the myopic self that maximises only present utility). Ainslie (1992) advocated a similar perspective under the label *picoeconomics*. He modelled the intrapersonal struggle as a repeated prisoner's dilemma and argued that the two (or more selves) are continuously bargaining.

### Time preferences and behaviour

Fisher (1930) argued that time preference was the most important determinant of saving as it captured interaction effects of socio-economic and personality factors. Only a few empirical studies have focused on the effect of time preference on (saving) behaviour, and the results, so far, are ambiguous. Antonides (1988) found differences in the discount factors between people that saved and people that did not save (Antonides, 1988: 96). The average monthly discount factor of the savers was 1.4% while it was 2.6% for the non-savers. Ritzema (1992) found that time preference was significantly related to the likelihood of financial problems and total debt. Webley and Nyhus (2001) found that people with debt problems had higher time preferences (measured by delayed payment scenarios) than those with mild or nonexistent debt problems. Donkers and van Soest (1999) found a negative relationship between time preference and the probability of owning a house, while they found a positive relationship with the probability of holding risky assets. Daniel (1994), on the other hand, using the same data, did not find a significant relationship between time preference and five different measures of saving behaviour.

The lack of conclusive results concerning the relationship between time preference and behaviour might be that time preference is not the only factor that influences intertemporal

---

<sup>15</sup> Scherhorn (1990) defined addictive behaviour as behaviour that runs out of control because of an overpowering but initially welcome desire, while compulsive behaviour stems from an unwilling pressure that the person experiences as alien to himself.

choices. For example, Julander (1975), studying the effect of book-keeping on saving, reported that both an index intended to measure lack of impulse control and an index intended to measure ability to delay gratification correlated with some of his saving measurements. A person, governed by the matching law or visceral sensations, will have problems with rational planning due to the tendency to form temporary preferences. Nevertheless, most people manage their financial affairs satisfactorily to the extent that they avoid debt problems, they usually get up in the morning, they do their duties at school and work, and they resist most consumption temptations exposed in shopping centres and supermarkets. Not all situations involving intra-personal conflicts of interest produce time inconsistent behaviour. Mechanisms other than impatience and temptation must be playing an important role. In some way, people must be able to follow their long-term plans by committing themselves to them. The applied techniques have been called self-controlling strategies or impulse control (Ainslie, 1992), or as Schelling (1978) put it: "...tricks we play on ourselves to make us do the things we ought to do or to keep us from the things we ought to forswear" (page 290).

Concepts such as self-control and thrift have been linked to saving at least since Adam Smith included a chapter on self-command in the *Theory of Moral Sentiments*<sup>16</sup>. The theories that incorporate the role of self-control implicitly recognise that refraining from pleasure can be difficult. Within this perspective, behaviour is not only a result of the experienced intensity of the temptations, but also of the ability to execute self-control in situations where there is a conflict between short-term and long-term goals. Self-control may be defined as those efforts on the part of the individual made to avoid or resist behaving inconsistently, or may be defined as a deliberate choice to accept pain in order to gain something (Schelling, 1984). When Strotz (1956), Elster (1979), and Ainslie (1992; 1993) discussed the problem of non-exponential discounting and intertemporal inconsistency, they used the story from Homer's *Odyssey* about Ulysses and the Sirens as an example of how inconsistent behaviour can be avoided<sup>17</sup>. The story neatly demonstrates two main techniques for controlling impulses and resisting temptations: 1) prior commitment and 2) avoiding exposure. Ulysses precommitted himself by allowing himself to be tied to the mast so that any desired change in the ship's direction could not be executed by him. He controlled his crew by preventing their exposure to the harmful Siren song. In Loewenstein's (1996) terms, Ulysses used techniques to overcome impulses to act upon visceral sensations. By controlling himself, he acted in accordance with his more stable preferences.

Strotz (1956) suggested that future actions might be controlled by precommitment and the strategies of consistent planning. Using strategies of consistent planning means that an individual should choose the best of the plans that the individual believes it is possible to follow. Similar techniques have been proposed by Ainslie (1992; 1993) who argues that the process underlying impulse control can be modelled as a repetitive, intertemporal prisoner's dilemma. He argues that one choice will set precedents for later ones. Since a person wants to act rationally in her future choices, she might act rationally in the present choice too, since she believes that it will serve as an example of future behaviour. "If she makes an impulsive

---

<sup>16</sup> See Loewenstein, 1992; Wärneryd, 1989; 1999.

<sup>17</sup> Ulysses, preparing for a sea voyage, was warned that he would be tempted by the beautiful and irresistible song of the Sirens, which would lure him to steer his ship onto rocks near where the sirens sang. In other words, he was warned about the possibility that he would act dynamically inconsistent. Still, wishing to sail his ship past the Sirens and finishing his voyage, Ulysses prepared himself: he had his men tie him to the ship's mast before he came within earshot of the Sirens so that he could not yield to the temptation. He plugged the ears of his crew so that they would not hear the song and be tempted to steer the ship towards the Sirens and the rocks. This way, Ulysses managed to both enjoy the Sirens' song and to finish his journey.

choice, she will have little reason to believe she will not go on doing so, and if she controls her impulse, she has evidence that she may go on doing that" (Ainslie, 1992; page 336). According to Ainslie's framework, self-control is most likely to be observed for choices that will be repeated (that are one in a series of similar choices). Elster (1979) proposed many ways of precommitting oneself by invoking social mechanisms. By making (side-) bets with others, people make the exaggerate the negative aspects of failing to achieve their long-term goals. Another self-controlling strategy is to punish oneself when one behaves myopically. Thaler and Shefrin (1981) compared intra-personal conflicts with the conflicts described in principal-agent theories. Following the suggestions about how principals might control agents, they suggest that one's future actions can be controlled by altering incentives (monitoring available resources) or altering rules (by establishing self-imposed rules of thumb, habits, and routine). In this way, it will be in the short-sighted self's interest to behave in accordance with the long-sighted self's preferences.

Both Katona (1975) and Bernheim (1995) reported that people say they save less than planned or that they would like to save more, which give some indication of self-control problems with respect to saving and spending. Some empirical evidence suggests that self-controlling strategies can be found in economic management. Examples of such strategies are fixed saving arrangements, deliberate overpayment of income tax, participation in Christmas Clubs<sup>18</sup>, and even instalment buying, since this produces a stream of obligations to pay (Caplovitz, 1963). Other research suggests that people use mental budgets, so that a moment of weakness that leads to an impulsive purchase is compensated by decreased expenditure on other things (Heath & Soll, 1996). Self-controlling techniques and methods used to accommodate deviations in original plans might be more important for saving than time preference. The extent and role of self-controlling strategies in economic affairs have yet not been subject to much empirical testing. For example, methods for monitoring one's own time preferences by avoiding exposure have received very little attention from researchers. Such techniques could be not going to shopping malls or avoiding mail and telephone marketing. Webley and Nyhus (2001) found that people experiencing debt problems used the technique of not going shopping more often than others. Other techniques could involve choice of friends and neighbourhood, as exposure to other peoples' possessions can give rise to desires for the same lifestyle and products (Duesenberry, 1949; Schor, 1998). The delay of gratification experiments carried out on children support the idea that avoiding exposure enhances ability to delay gratification. The children participating in the experiments tried to wait for the delayed, preferred rewards by avoiding thinking about the immediate available awards. They distracted themselves by singing, playing games, and even by sleeping. Distraction from the available rewards was found to be an important factor in waiting behaviour (Mischel & Ebbesen, 1970).

### 2.2.1.3 Summary

The framework reviewed above clearly shows that saving has been long associated with conflicts of interest. It does not matter whether the conflict is caused by a higher rate of time preference for immediate events or caused by a dominance of temporary visceral sensations. Saving is about deferring pleasure from present to the future. Due to budget constraints, most

---

<sup>18</sup> Christmas clubs are organisations that help saving for the extra expenditures many have before Christmas (e.g. presents). Money is paid (sometimes regularly) by members into an account, no interest is earned on the accumulated assets and the account cannot be drawn on until a specified date (e.g. December 1<sup>st</sup>). Since saving in a regular interest-bearing savings account is a better alternative, it must be the labelling of the account according to what the money is meant to be used for as well as the inability to withdraw the money before the set date that are the attractive characteristics.

of us are forced to set priorities about consumption over time, thereby deciding the timing of pleasure. The empirical findings suggest that the intensity and frequency of such conflicts might vary. Individuals differ in their valuation of present pleasure and the decision situation itself might influence this. Moreover, there are individual differences in how people handle the intertemporal conflicts, as some individuals are better in exercising self-control than others.

Empirical findings suggest that time preference varies systematically across different decision situations. Time preference is not a personality trait but varies over time and situations; it can be manipulated. The framing of the decision situation has a significant effect on the rate of time preference applied. Time preference might be a more complex concept than has been previously assumed because it has multiple underlying dimensions. The results are unclear with respect to individual differences. Firstly, people change their rank in the frequency distribution of time preference rates from one situation to another (Nyhus, 1997). Secondly, apart from the decision characteristics, we know little about the factors that influence time preference. The socio-economic factors used hitherto have explained only a few percent of the variance in rates of time preference (e.g. Daniel, 1994; Donkers & van Soest, 1999; Nyhus, 1997). It is still a challenge to find a good way of measuring time preference due to its dependence on the characteristics of the questions used. The limited understanding of the formation of time preference and its effect on behaviour makes it an important area for future empirical investigations.

Furthermore, we know little about how self-control and time preferences interact. It is also unclear how their effect on behaviour can be modelled. Self-controlling techniques that involve precommitment might moderate the relationship between time preference and behaviour. The stronger the self-control, the weaker the relationship between time preference and behaviour. Another possible model could be to regard self-control as a determinant of time preference, as proposed by Fisher (1930). Since time preference can be manipulated, it might be that people control themselves by avoiding situations that produce high time preference. Avoiding exposure to tempting situations might prevent high time preference.

The degree to which people tend to behave in the same manner across the majority of their saving and consumption decisions is still an unexplored field of research. Although it is likely that saving decisions involve some conflict of interest, we do not know how this affects overall saving. More effort should be directed towards investigating if and how the outcome of one consumption- or saving-decision influences the next. Rather than the notion that some individuals are continuously self-controlled or continuously impulsive, it might be true that giving in to a temptation in one situation makes the individual adjust other expenditures so that the total consumption budget is kept constant (as the findings by Heath & Soll, 1996, indicate). Although the ideas from Fisher's or Loewenstein's theory represent plausible explanations for the psychological processes underlying saving and consumption decisions, it is not clear what the effect on the amount of saving will be over a period of, for example, a year.

Several authors have pointed to the role of upbringing and economic well-being when discussing the formation of time preference. Both Fisher (1930) and Strotz (1956) expected the time preference and behaviour of the poor to differ from that of the rich. On average, they expected the poor to give into temptations and fail to delay gratification. Maital and Maital (1977) suggested that the children of the poor will copy this behaviour. Poor people are likely to be tempted more often than the rich due to more unfulfilled needs and more frequent



exposure to people that are richer. At the same time, they have not learned how to deal with temptations. These issues should be studied further as they have important policy implications. So far, only a few studies have addressed the formation and persistence of delayed gratification behaviour, which is surprising since many authors cite “childhood” as important for saving behaviour.

This section has shown that economic theory is rich with psychological thinking and ideas. It uses psychological mechanisms as underlying arguments. However, the empirical validity of the assumptions is still weak. As the “old” psychological assumptions have been proven unrealistic, new psychological assumptions are used as the basis for new and more psychologically-enriched economic theories. These new psychological assumptions also lack empirical validation and much research effort is needed in order to establish whether the new theories are any better than the old ones.

### 2.3.2 The income approach

The dominant independent variable in most economic analysis of saving behaviour is income. Income determines a household’s ability to save. The positive relationship found between the two entities in most studies is not surprising. Several theories in which income is the most important determinant of saving and consumption have therefore been proposed. There have been many debates about whether it is past, present, future, or relative income that has an effect; or, more correctly, which psychological mechanism best describes the typical saving- or consumption decision. Duesenberry (1949) proposed that social comparison and ‘keeping up appearances’ were important considerations, which implies a focus on past income and income level relative to the income of the groups used for comparison. Keynes (1936) argued that psychological traits and saving motives would change very slowly in a population and argued that current income is the important income measure. Modigliani and Brumberg (1954) argued that people are forward looking and try to distribute current assets and remaining lifetime income evenly over the remaining lifetime. In the following section, these most significant income theories and their psychological foundations are discussed.

#### 2.3.2.1. The absolute income hypothesis

Just as Fisher (1930) did in the “Theory of interest”, Keynes (1936) extensively discussed his ideas about psychological factors’ impact on saving in his “General theory”. He referred to both reasons for saving and to personality traits he considered important for economic behaviour. Keynes defined propensity to consume as the functional relationship between a given level of income in terms of wage-units and the expenditure on consumption out of that level of income. Two chapters in the “General theory” concerned the objective and subjective factors Keynes thought would influence the propensity to consume on the individual or household level. He listed six objective factors (but without specifying the direction of the relationship between the factors and the propensity to consume):

- 1) *Income*. Changes in the wage units could change propensity to consume.
- 2) *A change in the difference between income and net income*. This simply concerns the tax rate, as it is net income that determines how much someone can spend. Keynes noted that he did not regard this factor to be practically important as he expected it to be relatively stable over time.
- 3) *Windfall changes in capital values*.

- 4) *The rate of time discounting*<sup>19</sup>. Keynes criticised his predecessors for believing that an increase in the rate of interest would lower consumption. Keynes argued that the effect of such changes would be ambiguous since a rise in the interest rate could both strengthen and weaken the motives for saving. He also argued that saving and spending would be insensitive to changes in the interest rate. Increases or decreases in the interest rate were more likely to have long-term effect on the subjective factors.
- 5) *Changes in fiscal policy*.
- 6) *Changes in expectations of the relationship between the present and future level of income*. Keynes regarded this factor to be important on the individual level, while he expected it would cancel out on the aggregate level.

Of these six objective factors, Keynes argued that changes in income and windfall gain or losses to be the most important determinant of the propensity to consume. He argued that the function of the propensity to consume would be stable, particularly for short periods, so that at the aggregate level, consumption could be predicted by aggregate income. He used a much-cited argument to support it:

The fundamental psychological law, upon which we are entitled to depend with great confidence both *a priori* from our knowledge of human nature and from the detailed facts of experience, is that men are disposed, as a rule and on the average, to increase their consumption as their income increases, but not as much as the increase in their income. That is to say, if  $C_w$  is the amount of consumption and  $Y_w$  is income (both measured in wage-units)  $\Delta C_w$  has the same sign as  $\Delta Y_w$  but is smaller in amount, i.e.  $dC_w/dY_w$  is positive and less than unity. (page 96)

The subjective factors that would influence a community's propensity to consume he described as the "psychological propensities and habits of the individuals composing it and the principles on which the income is divided between them (which may suffer modification as output is increased)" (page 91). These factors primarily concern individual differences in reasons for saving and consumption. Moreover, he indirectly proposed a hierarchy of motives, arguing that primary needs of a man and his family must be satisfied before motives for accumulation will be strong. A consequence is that the propensity to consume will decrease with the level of income. He defined eight different motives for refraining from consumption (although he noted that he expected that there would be more) that would influence the marginal propensity to save<sup>20</sup>:

- 1) *Precaution*, which implies building up a reserve against unforeseen contingencies;
- 2) *Foresight*, which includes providing for anticipated future divergence between the income and the needs of the individual or family (e.g. retirement, education of children or other expected decreases in income or increases in expenditures);

---

<sup>19</sup> Keynes (1936) argued that this rate did not equal the rate of interest as it also includes subjective perceptions of risk (for example, survival considerations and confiscatory taxation). However, he used the rate of interest as an approximation.

<sup>20</sup> Browning and Lusardi (1996) renamed some of these saving motives as 1) the precautionary motive, 2) the life-cycle motive, 3) the intertemporal substitution motive and 7) the bequest motive. They also note that since 1936, only one motive has been added to the list of possible saving motives: the downpayment motive, which concerns accumulation of deposits to buy houses, cars and other durables.

- 3) *Calculation*, which refers to the wish to earn interest and appreciation, because he or she prefers a larger real consumption at a later date than smaller immediate consumption;
- 4) *Improvement*, which means to enjoy a gradually improving standard of living over time;
- 5) *Independence*, which refers to the need to feel independent and to have the power to do things;
- 6) *Enterprise*, which means to have freedom to invest money if and when it is favourable;
- 7) *Pride*, which concerns leaving money to heirs; and
- 8) *Avarice*, which concerns satisfying pure miserliness because of dislike of acts of expenditure as such. (p. 108).

Keynes also defined motives for consumption that would have the opposite effect on the propensity to consume. He labelled these motives enjoyment, short-sightedness, generosity, miscalculation, ostentation, and extravagance. The strength of the motives was expected to vary according to the type of organisation of the economic society, according to habits, present hopes and past experiences, according to the scale and techniques of capital equipment, and according to the prevailing distribution of wealth and the established standards of life. In addition, using consumption habits as explanation, Keynes proposed that people would react quicker to an increase in income than to a decrease. He proposed that race, education, convention, religion and current morals determined the habits.

Keynes argued that the distribution and effect of subjective factors would change very slowly over time in a population along with most of the objective factors. On the aggregate level, they would have little impact on the propensity to consume. He concluded:

“Thus, after all, the actual rates of aggregate saving and spending do not depend on Precaution, Foresight, Calculation, Improvement, Independence, Enterprise, Pride or Avarice. Virtue and vice play no part. It all depends on how far the rate of interest is favourable to investment, after taking account of the marginal efficiency of capital.”  
(Pages 111-112)

For this reason, Keynes did not further elaborate on the psychological processes he thought were underlying saving behaviour. Just as Fisher (1930) had argued that the inclusion of psychological factors was unnecessary in aggregate models of saving, Keynes (1936) argued that the subjective factors and most of the objective factors would change very slowly and that the propensity to consume could be regarded as a constant. Relying on this argument, Keynes proposed the simplest model of saving: “the absolute income hypotheses”. He claimed that the current absolute income was the only variable necessary to include in models of household saving. Formally, the model is expressed as:

$$S = (1-b) * I$$

where  $S$  represents annual saving,  $b$  represents all the subjective factors and the propensity to consume, and  $I$  represents the only objective factor assumed to be important: current annual income. The predictions based on this theory for a person with a marginal propensity to save of 0.1 are: if the income goes up with \$1000, saving will increase with \$100 and consumption with \$900, while if income goes down by \$1000, saving will decrease with \$100 and consumption with \$900.

### 2.3.2.2 Empirical findings

Keynes' absolute income hypotheses received much criticism from macro and micro economists, psychologists, and sociologists. Although it would be desirable that peoples' saving could be predicted from income changes solely, it does not require sophisticated studies of saving behaviour to conclude that such a theory is far from realistic<sup>21</sup>. In most countries, time series data show that the aggregate propensity to save increase over time with income, not only at the individual level as Keynes (1936) had assumed. For example, Brown (1952) using Canadian panel data found that the absolute income hypothesis is the model with the worst performance when testing a set of alternative models. In addition, cross-sectional studies show that the saving ratio is higher with higher incomes. Schumpeter (1954) described the psychological law as follows: "Keynes's well-known psychological law about the propensity to consume...is a statement of statistically observable fact which Keynes raised to the rank of an assumption. Nothing is gained, except a spurious dignity, by calling it a psychological law" (pages 1059-1060). In the same spirit, Modigliani and Brumberg (1954) referring to the psychological law wrote that "...the consumption function has undoubtedly yielded some of the highest correlations as well as some of the most embarrassing forecasts in the history of economics" (page 388).

As these citations show, the main criticism of Keynes' theory concerned the assumption that the subjective and most of the objective factors are not important at the aggregate level. Katona (1975) was the first to show that consumer expectation or sentiment does not 'average out' in a population and he showed that consumer sentiment is not stable over time. As people receive the same economic news and the same economic stimuli, people tend to share expectations about the future. The majority might be either optimistic or pessimistic and these sentiments are liable to rapid change.

Thus, Katona (1975), along with the other authors, criticised the absolute income hypotheses of Keynes (1936) for being too simplistic with respect to predicting saving. The theory would not apply in affluent societies in which households earned more than what was needed for satisfying bare necessities. He argued that two aspects needed to be added to the theory: the effect of willingness to save and separate analyses of different types of saving. Keynes' theory states that saving would decrease in times of recession due to decrease in income and the ability to save. In Katona's framework, people will feel an increased need for saving when they are *expecting* a recession. The willingness to save may work in the opposite direction from the ability to save. According to Katona (1975), the net effect of the ability and the willingness to save will be different for different types of saving, as illustrated in Table 2.1.

Katona (1975) noted that the scheme displayed in Table 2.1 does not answer whether we save more during a period of upswing or downswing. For example, the effect of income changes might neutralise the effect of the other factors. He also notes that in addition to the factors mentioned in the table, inflation and interest rates might affect saving. Nevertheless, when we know the circumstances prevailing at a given time, it is possible to derive definite answers from the scheme.

---

<sup>21</sup> It should be noted that recent studies show that consumption tracks current income rather closely (Deaton; 1992; Carroll & Summers, 1991). This finding has not been attributed to subjective factors being stable or 'averaging out', but they have been explained by referring to subjective factors such as precautionary motives, demographics, impatience and uncertainty.

Table 2.1  
Assumptions about changes in personal saving in good and bad times

Factor	During a recession	During an upswing
1. Instalment buying	Net saving grows because it is not reduced by extensive credit incurrence	Net saving declines because it is reduced by extensive credit incurrence
2. Unusual cash expenditures	Net saving grows because it is not reduced by extensive withdrawals from bank accounts	Net saving declines because it is reduced by extensive withdrawals from bank accounts
3. Frequency and size of income increases	Net saving declines because income increases less frequently and less substantially	Net saving grows because income increases frequently and substantially
4. Strength of saving motives	Net saving grows because people are strongly motivated to save	Net saving declines because people are less strongly motivated to save

(Source: G. Katona, 1975: page 240)

Keynes' psychological thinking has not been subject to the same criticism as his assumptions of (i) stability and (ii) all effects averaging out on the aggregate level. His list of saving motives has been much cited and subjected to empirical testing. For example, the surveys conducted by the Survey Research Center at the University of Michigan (Katona, 1975) have confirmed the validity of some of the motives mentioned by Keynes, while other motives were found to be less important. In particular, people stress the precautionary saving motive, saving for retirement, and saving for providing for children's needs when they are asked about their saving motives. The studies also reveal that few consumers mentioned saving for the purpose of earning additional income or to bequeath money to their heirs.

In two different Swedish studies on saving behaviour (Lindqvist, 1980; Lindqvist, Julander & Fjæstad, 1978), the buffer motive was mentioned most frequently (by 29% and 46% respectively), 15% and 28% of the two samples respectively saved in order to buy goods. In the first study, 19% of the sample said that both these motives were important (this option was not possible in the second study, which explains much of the difference in percentages). Only 3% in each sample said that bequest was the most important motive for saving. Respondents were not asked whether earning interest or retirement saving were important motives in these studies.

Lindqvist (1981) suggested a hierarchy of four saving motives, which he called: cash management (meeting short-run financial needs), buffer saving (for unforeseen contingencies), goal saving (for durables, house, holidays etc.), and wealth management saving. The hierarchy is a mixture of saving motives and portfolio management motives. Wahlund and Wärmeryd (1987) used this hierarchy to investigate the effect of a Swedish tax-reform and found some support for the idea that people with different saving motives reacted differently to economic stimuli. Those with a cash-management motive reacted differently than those with other motives. Knowing more about people's saving motives might be useful in segmenting the population so that different models can be applied appropriately.

In modern models of saving, many of the motives on Keynes' list of reasons for saving have been incorporated (Browning & Lusardi, 1996). The precautionary motive is regarded by some researchers as one of the most important for saving (e.g. Carroll, 1997) and several studies support this assertion. The role of the bequest motive is still much debated. The reason for the assumption by economists that there is a bequest motive is that people tend to hold wealth when they die (e.g. Bernheim, 1986). The bequest motive is either assumed to be

altruistic or strategic (e.g. an elderly person might hold wealth so that their family will visit and help them). Other explanations of wealth holding include uncertainty about the date of death (so the bequest is accidental), the illiquidity of wealth (e.g. a house), decreased consumption possibilities due to the deterioration of health, as well as to sticking to old saving and consumption habits. It is difficult to differentiate between these alternative assumptions, and so far, no one has presented conclusive evidence for any assumption. It might be the case that they are all partly true, as different people are likely to think differently about these matters.

Keynes' idea that people prefer improvement over time has received some empirical support. Loewenstein and Sicherman (1991) presented different wage profiles to eighty museum visitors in Chicago. The majority of respondents preferred the alternative that implied increasing wages in spite of a lower net value than the other alternatives. The workers could have chosen an alternative with a decreasing wage profile, which had a higher net value than the one with increasing profile, and saved so that their consumption profile would still be rising. Since they still preferred the wage profile also to be increasing, this indicates that people find saving difficult. Loewenstein and Prelec (1991) presented respondents with alternative sequences for restaurant visits. In this study, respondents showed a preference for the sequence that involved an improvement in quality of the restaurant over time. The same results were found in a similar study with sequences of visits to "an old irritating aunt" and "a former, nice work associate". The results show that people have a clear preference for improvement over time, and factors like savouring over future positive events and dread about future negative events seem to play an important part in choices among sequences of events. People seem to consider the utility derived from savouring and the disutility caused by dread when evaluating alternatives. Moreover, these findings suggest that delay of gratification behaviour depends on whether the decision-maker perceives her choice as a part of a sequence or as a single event. The improvement motive should be studied further as it is inconsistent with the notions of people consistently preferring immediate consumption.

The other psychological ideas of Keynes have not yet been tested. Like Fisher, Keynes proposed that habits would be important for saving behaviour. Apart from some studies that show that past consumption can be used as a predictor of present consumption, this relationship has not been explored. The effect of generosity on saving is also still lacks empirical exploration. Keynes' notions that the effects of hopes, extravagance, ostentation, distribution of wealth and established standards of life will influence the propensity to consume have not been tested explicitly, but they might be related to the theories about social comparison processes, which is the subject of the next section.

### 2.3.2.3 Summary

Keynes' theory of saving and consumption was based on a comprehensive psychological discussion about people's motives for saving and consumption, the role of expectations and effects of habits. But, just as Fisher (1930) used the assumption of people harmonising their rate of time preference with the market interest rate as a reason for discarding the psychological ideas from further analyses, Keynes (1936) formulated a psychological law. He assumed that all psychological factors would be relatively stable over time and that any effects of them would be neutralised at the aggregate level. Consequently, psychological thinking disappeared from discussions and economists relied even more on mathematical theorising than before. The emphasis Fisher and Keynes put on the psychological foundations of their theories was not reflected in the work of their successors. Nevertheless, recent

empirical research shows that Keynes' ideas about individuals' motives for saving are supported; they seem to have a role to play at the macro level. Interestingly, as pointed out by Browning and Lusardi (1996), most of the motives from Keynes' list have been incorporated in the life cycle-models of saving. We will turn to these models later. First, we will consider a competing model that incorporates social comparison considerations.

#### 2.3.2.4 *The relative income hypothesis*

The first attempt to define an alternative consumption function to that of Keynes came in the formulation of a model that included notions of habit formation and social comparison (Brady & Friedman, 1947; Duesenberry, 1949; Modigliani, 1949). It implied that past income and relative income were better predictors of saving. In this section, Duesenberry's theory of how and why social comparison and habits would influence economic behaviour is described. His theory is the most elaborate with respect to the discussion of its psychological foundation.

Duesenberry (1949) challenged the Keynesian consumption function and criticised the assumptions of independent preferences. He also criticised the notion that consumption relations were reversible in time. For him, it would be more correct to focus on relative income (interdependent preferences) and past income (habit formation). Duesenberry (1949) thereby separated the propensity to save from the absolute level of income, relating it more directly to social factors such as the relative position of the consumer in the income distribution of the group he or she used for comparison. He argued that consumption expenditures are strongly influenced by comparisons with other persons' consumption ("the demonstration effect") and that the utility index is a function of relative, rather than absolute, consumption expenditure.

Duesenberry built on theories similar to those put forward by Veblen (1899/1967), in which the symbolic meaning of consumption are highlighted. Veblen argued that consumption expenditure among the rich was important to communicate social status. Low-income households would imitate the consumption of people in the high-income classes, so that consumption patterns would spread through society from the rich to the poor. Duesenberry's theory is similar with respect to stressing the role of social comparison. His theory, in contrast, is built on the belief that people are comparing themselves to people they meet on a regular basis - neighbours, rather than a rich upper class - when they determine their consumption level. Consumption patterns would therefore spread through groups in society that share commonalities (e.g. neighbours or work colleagues).

The framework rests on the belief that people do not want a certain good for the sake of it. They want goods that serve different purposes. Within a society, there will often be a collective perception of how needs can best be satisfied based both on objective differences between products and on the prestige of the goods. This agreement about which product is the best is most coherent within groups of people of the same age, social class, and from the same geographical area. A person is more likely to compare himself with people he meets on a regularly basis and whose products he is regularly exposed to. Exposure to these people's consumption and possessions might influence his motivation and aspiration for similar consumption and purchases. The more often a person is exposed to certain goods, the higher the motivation for buying similar goods will be. The underlying mechanism that connects consumption decisions is not rational planning but learning and habits.

Duesenberry's theory has some interesting implications, which highlight its differences from the absolute income hypothesis of Keynes. First, a consumer who experiences changing

incomes will, at first, consume the same as before because it takes time to establish new consumption patterns<sup>22</sup>. When a high-income family suffers an income loss, they continue living in the same neighbourhood and they retain the contact with others of the same economic status. Moreover, people defend their status through consumption. Saving will be a result of how high the person's income is relative to the people he wants to equal. Since status is often a result of past consumption, consumption in the present period will be correlated with past consumption. Duesenberry proposed that the past peak income of a consumer would be a good predictor for present consumption. By substituting relative income with the highest peak income, he elegantly avoided the problem of defining the group(s) used for the social comparison.

The second implication of interdependent preferences is that the level of consumption might change at times of stable income. For example, we might increase our consumption despite a stable income if we are often exposed to better goods than the goods one possesses in the present (or with "the frequency with which he has to make an unfavourable comparison between the quality of the goods he uses with those used by others" [Duesenberry, page 31]). A habitual consumption pattern can therefore change without changes in prices or income. Factors such as a switching to a different comparative reference, being exposed to marketing campaigns or hearing news about high consumption among other groups might play a role in this process.

The theory of Duesenberry has, to a certain extent, been downplayed in the economic literature - if not, omitted altogether. However, some theoretical work on static models of the effects of social status seeking has been conducted (e.g. Cole, Mailath & Postelwaite, 1992; Gaertner, 1974; Pollak, 1976). The assumption of interdependent preferences has also been studied theoretically in a dynamic framework (e.g. Futagami & Shibata, 1998). In this work, the goal has been to mathematically derive the effects interdependent preferences have on capital accumulation, wealth distribution and growth. These new models and their implications have not yet been tested empirically. The next section reviews some empirical studies from different fields that address the importance of social comparison on consumption.

### 2.3.2.5 Empirical findings

Social scientists such as anthropologists (e.g. Douglas & Isherwood, 1996), marketers (e.g. Coleman, 1983) and social psychologists (e.g. Baxter, 1988; Crosby, 1976) have long recognised that consumer behaviour cannot be fully understood unless consideration is given to the effects of interpersonal influence. Nevertheless, empirical research on how the comparison process influences behaviour is scarce. This might be due to the methodological challenges associated with this type of research. Studies have been carried out in order to identify reference groups<sup>23</sup> and their functions (e.g. normative vs. comparative, positive vs. negative) and the relationship between the individual and the reference group (whether the individual is a member or aspires to become a member) (Baxter, 1988). Results from this research clearly highlight the problem of identifying the relevant reference group for the behaviour in question. First, different persons have different reference groups. It is not yet

---

<sup>22</sup> As pointed out previously, Keynes did suggest that there would be a lag in the reaction to income changes because of habits. However, he discarded this idea when formulating his model of saving and consumption.

<sup>23</sup> The term "reference group" was coined by Hyman (1942). He noted that there is a disadvantage to this term: the reference group does not need to be a group. It can also be a single person or even an abstract idea (like oneself in the future).



clear how the reference groups are selected, although some evidence suggests that the choice depends on factors such as relevance, perceived importance, salience, and similarity (Baxter, 1988). Second, the same person might have different reference groups for different types of consumption and behaviour. In addition, the degree of influence exercised by these groups might vary (e.g. Bearden & Etzel, 1982). Third, if we use the household as the unit of analyses, we might find that different household members have different reference groups. Alternatively, they might share the reference group, but the influence of the group on the different household members might vary. Hence, the problem of identifying the significant reference group and its effect on the behaviour of the comparer is difficult to assess. Testing the logic of the theory without running the risk of being tautological might therefore prove difficult. As pointed out by Martin (1981), social comparison processes are often a post hoc explanation for observed facts, and not something that has been tested explicitly. The inferential statements about comparisons can easily become tautological. For example, "X is satisfied because he's comparing himself to Y, who is worse off; this is the comparison being made because if X were comparing himself to Z, he would be discontent, because Z is much more prosperous than X" (Martin, 1981, page 75).

Below, the results from some studies on effects of reference groups are reported. They are divided into three groups: 1) studies that focus on the relationship between social comparison and satisfaction with income and standard of living, 2) studies in which social comparison is used as an interpretation of observed behaviour (without explicitly considering the social comparison process) and 3) studies that relate social comparison to behaviour.

#### The relationship between social comparison and satisfaction

In a large-scale social-psychological study of American soldiers during the Second World War, several findings supported the notion of social comparison being important for satisfaction. Stouffer, Suchman, Devinney, Star and Williams (1949) reported numerous instances where those who had the same, or more, of a valued outcome were less satisfied than those who were objectively in a worse or the same position. They attributed this to a feeling they denoted "relative deprivation". Relative deprivation is defined as a feeling of discontent based on the belief that one is getting less than one deserves. It is labelled "relative" because a person feels deprived relative to some comparative referent (Martin, 1981). Runciman (1966) defined it as follows: A is relatively deprived of X when (i) he does not have X, (ii) he sees some other person or persons, which may include himself at some previous or expected time, as having X (whether or not this is or will be in fact the case), (iii) he wants X, and (iv) he sees it as feasible that he should have X. He also notes that relative deprivation might vary in magnitude, frequency and degree. Crosby (1976) adds to Runciman's list of conditions that relative deprivation will only occur if A does not blame himself for his failure to possess X.

Stouffer et al. (1949) studied the resentment about compulsory induction into the armed forces and found that it was higher among those who were married compared to those who were not. They explain this using the married men's standard of comparison. If the married men compared themselves to their unmarried colleagues, they would feel they had sacrificed more than them, since they had to leave their family behind in addition to making the sacrifices equal for both married and unmarried drafted for induction. If they compared themselves to other civilian married men, they would feel that they had been called on for sacrifices which the civilians escaped altogether. Moreover, Stouffer et al. found that preference for being stationed either in the North or the South could be related to relative status considerations:

“Relative to most Negro civilians whom he saw in Southern towns, the Negro soldier had a position of comparative wealth and dignity. His income is high, at least by general Southern standards...Consider, on the other hand, the Northern Negro stationed in the North. The differential in income and status between soldier and civilian was not the same as that in the South. The industrial earning power of one’s Northern Negro civilian acquaintances was at an all-time high very often far exceeding that of the Negro soldier” (Stouffer et al, 1949, page 563).

Runciman (1966) conducted a well-known survey of economic inequalities in twentieth-century England to investigate the possible effects of the inequalities in 1962. His conception was that people’s attitudes, aspirations and grievances largely depend on the frame of reference within which they are conceived. He found that reference group was an important variable in explaining feelings of relative deprivation with respect to income. He also found that non-manual workers with a high or mid-range level of income reported higher levels of relative deprivation than did manual workers at the same income levels. Runciman maintains that these differences in the level of relative deprivation are due to the use of different reference groups. Manual workers tended to choose other manual workers (who, on average, had a low income) as reference group, while the non-manual workers would more often choose other non-manual workers (who, on average, had a higher income) as their reference group.

Kapteyn (1977) developed an economic theory of preference formation which incorporates interdependence and habit formation. The essence of his theory is that individuals evaluate their own income level by comparing it to income levels in their social reference group, taking factors such as family composition into account. Past income is also assumed to influence this evaluation. Social reference groups are assumed to be individuals with identical social characteristics (age, education and job type<sup>24</sup>), and it is assumed that the more alike a social group is to the individual, the more weight is given to that group. Using this framework, Kapteyn argues that individual utility functions are identical to the perceived consumption distribution.

Parts of this theory formed the basis for a study by Kapteyn and van Herwaarden (1980) in which they analysed individual welfare functions of income (allowing for interdependence). The income functions were measured by asking the respondents to state which income they would consider to be very good, good, sufficient, insufficient, bad, and very bad. The six responses were translated into a scale called the Individual Welfare Function of income. They found that models including interdependence gave different results and different consequences for policy conclusions regarding the desirability of income redistribution. In the presence of interdependence, equal income distribution is not optimal, while it would be optimal in the absence of interdependence.

In a study designed to investigate the relationship between reference groups and subjective definitions of poverty, Alessie, Kapteyn and Melenberg (1997) attempted to overcome the problems associated with identifying the relevant social reference group by asking the

---

<sup>24</sup> Kapteyn relied on Festinger’s (1954) theory of social comparison, which states that, in the absence of objective criteria, people will compare themselves to others who are similar. This contention was supported by evidence from Martin (1981) who reported that occupation, income, age, education, and – for blue-collar and clerical workers only – seniority and productivity are the most relevant dimensions when people choose comparative referents.

respondents directly. They used two measures of subjective evaluations of minimum income levels. The first measure was a direct question about what the respondent considered to be the “absolute minimal income with less they could not make ends meet” (also called the subjective poverty line). The other measure was based on questions about what the respondents would consider a very bad, bad, insufficient, sufficient, good and very good income respectively. The income of the reference group was elicited by asking the respondents about the average age, family composition, income, education, and job type of the people they meet frequently, like friends, neighbours, acquaintances or colleagues. Three indicators for the income of the reference group were used: 1) average income in reference group as perceived by the respondent 2) average income among people in the same age- and education-group as the respondent and 3) average income among people in the age- and education-group reported as being average in the respondent’s reference group. Indicators for the average family composition of the reference group were measured using similar indicators. They found that, controlling for family composition, both habit formation (measured by previous perceptions of what it takes to make ends meet and what constitutes a good or bad income) as well as the income level of the reference group did affect the individual’s perception of what constitutes a good or bad income and his notion about what it takes to manage. The respondent’s perception of what it takes to make ends meet shifted proportionally with one’s own income and the mean income in one’s reference group.

A recent study indicated that people prefer being ‘better off than others’ to being ‘better off in absolute values but worse off than others’. Solnick and Hemenway (1998) asked respondents to choose between a world where they have more of a good than others and one where everyone’s endowment of the good is higher, but where the respondent has less than others. Approximately 50 percent of their respondents preferred the scenarios in which they had half the real purchasing power, as long as their relative income position was high. The majority also preferred themselves and their children to be relatively more attractive and intelligent, instead of absolutely better, but relatively worse in these respects than others. Unfortunately, the study did not allow respondents to choose a world in which people were equal in order to test whether people would prefer conformity to superiority.

#### Studies attributing observed behaviour to social comparison processes

In many studies, the social comparison process itself has not been studied. Instead, it has been used as a way of explaining observed facts. For example, Brady and Friedman (1947) used family budget data and showed that the proportion of income a household would save was more related to the income of the family relative to mean income than to the absolute income of the family. These findings inspired Modigliani (1949) and Duesenberry (1949) to modify the consumption function. Duesenberry analysed cross-section data from the US and found that blacks and whites in America at the same income level showed different saving patterns. At each income level, a black would save more than a white. Duesenberry argued that the reason for this was that, on the average, whites earned more than blacks. A white would therefore be placed lower in the income distribution among whites than a black with the same income would be in the income distribution among blacks. In other words, a white had a lower *relative income* than a black with the same absolute income. The white would feel worse off than the black, and the result would be that the white would use a larger portion of his income for consumption in an effort to keep up with other whites. The black would not need to spend the same amount of money in order to keep up with his reference group. The less discrepancy between actual and desired consumption, the less pressure to consume the individual will feel.

Tobin (1951) explained the finding that blacks save more than whites differently. He argued "that Negroes had, on the whole, smaller financial resources other than income. Consequently, Negroes were unable to dissave as frequently or as much as whites" (page 144). In his view, the paradox could be explained by adding assets to the consumption function of Keynes (1936). Studies by Tobin (1951) and Galenson (1972) supported this view: blacks do not save more; whites merely deplete their assets more. Galenson reported that this finding was robust across several definitions of savings and income. Similarly, Tucker (1991) reported that in the 1980s, almost one third of all black families had no net worth, and in every income group, black families saved far less than other Americans. He argued that in a nation of consumers, blacks were the best spenders. Attanasio (1998), on the other hand, reported that the saving rates of households headed by a black are systematically higher, for any interval of income, than those of households headed by a non-black. Hence, the empirical basis of Duesenberry's theory is highly controversial.

Brown (1952) used Canadian panel data to study the effects of habit persistence and found that consumption expenditure lags behind income changes. Comparing the performance of different consumption models, he concluded that the full reaction of consumers to changes in income emerges gradually, thus supporting Duesenberry's theory of defending status through consumption. He did, however, find better fit for a model using past *consumption* as an independent variable, rather than past income as Duesenberry (1949) suggested. He also found that the effect of past income declined continuously over time, rather than discontinuously as in Duesenberry's model.

### Social comparison and behaviour

So far, the reviewed studies have shown that social comparisons have an effect on how people evaluate their own situation and how they feel about it. There are also some empirical observations that are difficult to explain without relying on an underlying process of social comparison. Below, some studies that have focussed more specifically on behavioural effects of social comparisons are reported.

Chao and Schor (1998) found strong evidence for conspicuous consumption in a study of women's purchases of make-up. Women spent more money on make-up that would be displayed in public (for example lipstick) than on make-up which is more common to use at home in the bathroom (for example facial cleansers). Similarly, Bearden and Etzel (1982) found that reference groups were particularly important for luxury goods and goods that would be consumed in public. Reference groups were less likely to influence purchases on necessities or goods that would be consumed in private. Both studies show that social comparison mechanisms might influence both the type and brand of goods we buy.

Alessie and Kapteyn (1991) used a two-wave panel of consumer expenditures in the Netherlands to study the effects of habit formation and interdependence on expenditures for different product categories. They used social group as a proxy for the reference group and defined social group as people who share the following three characteristics: education of head of household (5 levels), age (5 categories), type of job (5 categories). Using the 66 groups that were represented in their sample of 1579 households, they tested the performance of a micro-model of consumption including habit formation and interdependent preference with one that did not include these factors. They studied the effect on six expenditure categories: 1) food, 2) housing, 3) clothes and footwear, 4) medical care, 5) education and

entertainment and 6) transportation and “other”. Expenditures on durable goods were excluded from their analyses in order to avoid problems with disentangling investment motives from other motives. Habit formation appeared to be most important for education and entertainment, clothes and footwear and medical care, while it is unimportant for expenditures on food. They also ranked the expenditure groups according to their conspicuousness: medical care<sup>25</sup>, education and entertainment, clothes and footwear, transportation (and ‘other’), housing and food. They concluded from this that food, housing, and medical care can be regarded as necessities. Further, they found that the model including habit formation and interdependent preference was superior to models not including these factors. They therefore concluded that collecting information on reference groups should have a high priority in the future.

Kapteyn, van de Geer, van de Stadt and Wansbeek (1997) carried out a similar study and used a linear expenditure system to explain interdependent preferences based on a consumer expenditure survey. They assumed that the correlation between mean consumption level of a social group and the total reference weight assigned to it is positive if the individual belongs to a group with a consumption level above the population average. If the group’s average consumption is below the population average, the correlation between the two will be negative. This means that if someone has a high consumption level he assigns, on average, more weight to others who also have a high consumption level, while someone with a low level of consumption assigns more weight to others with a low consumption. Hence, it was assumed that there is strong interdependence between relatively similar groups. The sample of 2813 households was divided into 75 different social groups defined by education of head of the household (3 categories), age of head of household (5 categories), and type of job (5 types). 56 of these groups were represented in the sample. Alessie et al (1997) defined seven expenditure categories: 1) food, 2) housing, 3) clothing, 4) medical care, 5) education and entertainment, 6) transportation and 7) other expenditures. In addition, this study included a ranking of conspicuousness of the expenditure categories, the order being: housing, medical care, education and entertainment, clothing, transportation and food. They compared one model (including their definition of interdependence) with one that assumed independence. They concluded that housing, education and entertainment, and clothing are the categories most affected by interdependent preferences. The extent to which the aggregate consumption of a good responds to changes in total expenditures depends not only on the good’s marginal budget share but also on its conspicuousness. Use of models not taking this into account, will produce predictions of effects of increase in total expenditures on expenditures on conspicuous products that are too low, while the predictions will be too high for products that are not conspicuous.

In a recent study, using data from the CentER savings survey, Kapteyn (2000) found that the incomes in one’s reference group have an unambiguously negative effect on savings. In this study, he exploited the subjective information in the data set: Respondents were asked about the average total net income per year of the “households of their acquaintances”, which Kapteyn (2000) assumed represent the reference group of the respondents. He found that reported reference group incomes tend to be lower than the respondents’ own household incomes. Not surprisingly, he also found a strong positive relationship between own household income and reference group income as well as between own family size and

---

<sup>25</sup> They attributed this finding (that medical care is highly conspicuous) to an artefact caused by the fact that wage-earners below a certain income level is compulsory insured in a health-fund with premium payments proportional to income.

reported family size of the respondents' reference group. A correlation between own age and age in the reference group was also strong. Although the measures of saving used in this study were rather rough, the result was convincing. Across several modelling strategies and model specifications, own household income and reference group income were always significant predictors of household saving.

Schor (1998) estimated a savings function including variables intended to capture the impact of interpersonal comparisons on savings behaviour and compared it to a model that did not contain such variables. One model contained socio-economic variables such as income, age, sex, occupation and education level, while the other model also included a comparative variable capturing the respondents' perception of how well they are off compared to their reference group. Using a sample of middle- and upper-middle class people from the US, she found the comparison variable to improve the performance of the model and that it had great impact on the expected saving. Those who thought they had a worse financial situation compared to their reference group, reported lower expected savings<sup>26</sup>. Interestingly, she also found a negative relationship between expected saving and daily hours spent on television viewing.

Studies of relative deprivation show that the reactions to relative deprivation differ (see Crosby, 1976, for a review). Some people are left frustrated depending on how much control they perceive they have over their situation. Some people turn their anger outward, which might result in unconstructive reactions such as violence or crime. Others might turn their anger inward, resulting in depression. Yet others might try to resolve the situation with efforts at self-improvement. Research in a related area called "equity theory"<sup>27</sup> shows that people might change both their input and outcome from that input if they feel that the relationship between the two is unfair compared to how they perceive the relationship between input and output to be for others. People who are relatively deprived with respect to their financial affairs do not necessarily do anything about it. They might try to increase their incomes in various ways or dissave or borrow, but research shows that other variables might interfere with this relationship. For example, the relationship between relative deprivation and self-improving actions might be stronger during booms when the job market is good than it is during recessions when there is high unemployment. The relationship might be stronger among people working in the private sector, where possibilities for working overtime is higher, than for people working in the public service where such possibilities are limited.

Two recent studies support the notion of increasing income to resolve feelings of relative deprivation. Assuming that siblings constitute an important reference group, Neumark and Postlewaite (1998) tested to what extent a woman might choose to work because her sisters-in-law has raised their families' standard of living by entering the labour market, or because her husband's earnings were lower than that of her brothers. They found that, in addition to individual women's market opportunities, home productivity, other sources of income, and demographics, woman's employment decisions were influenced by the employment decisions of their sisters-in-law together with an unfavourable ratio between the earnings of own

---

<sup>26</sup> Saving was defined as the sum of expected additions to non-retirement savings plus expected additions to retirement savings minus expected reductions in existing savings accounts plus expected reductions in existing debt minus additions to debt.

<sup>27</sup> Equity theory states that people decide if they are being rewarded equitably by comparing their inputs (investments such as education and costs such as stress) and outcomes (such as pay) to the inputs and outcomes of another person. If the ratios are equal, the reward should be considered equitable, whereas if they are unequal a feeling of inequity will occur.

husband and that of her brothers. Woittiez and Kapteyn (1998) found that a woman's previous labour participation and the reference group means of females' working hours have strong impact on female labour participation decisions. In particular, the effect of presence of children was dramatically decreased when the preference formation variables were included. Although Woittiez and Kapteyn do not indicate this themselves, their results might be interpreted as a consequence of the desire to increase consumption. The results of these two studies imply that income should be treated as endogenous when social comparison mechanisms are included in consumption models. Increases in consumption caused by social comparison might be financed both by dissaving and increasing income.

#### 2.3.2.6 Summary

The theory of preference interdependence and social comparison is compelling. People compare their own situation with that of others, feel more or less deprived depending on how they perceive their relative position, and take actions (like not saving) to reduce any feelings of relative deprivation. Yet, this theory shares the same problem as the prospect theory and the reference point model discussed in section 2.3.1. The problem is that we do not know who the "others" are to assess the reference level of consumption. Veblen proposed the rich, while Duesenberry proposed the people one regularly meets, for example friends and neighbours, would set the norm for consumption. Schor proposed the "upper middle class" or people ones see on television. Kapteyn and his colleagues proposed those who have the same age and education level or "households of acquaintances". The problem is that all might be partly right. People might compare themselves to different groups for different types of consumption. It might be the case that an individual compares his clothes consumption with his colleagues at work, while his neighbours set the preferred standard for housing consumption. If this is the case, it will be a difficult task to identify the relevant reference group and the theory is difficult to test.

Some of the studies reviewed so far support the idea that satisfaction with one's own income and standard of living depends on that of "others". People might feel more or less satisfied or deprived depending on the circumstances of the people they compare themselves to. Some studies indicate that 'keeping up appearances' is important for product and brand choices. However, just as with the theory of impulsiveness and self-control, we do not know whether such considerations have an effect on the overall level of saving and spending. Spending considerable amounts on conspicuous consumption might be compensated by lowering standards for inconspicuous products, so that "keeping-up"-considerations do not necessarily mean that social comparisons affect saving. There are also behavioural alternatives to satisfy needs. Instead of borrowing, people might work more in order to increase their income.

Similarly, none of the studies reviewed above addressed the question of what is compared. These studies relied on the assumption that people compare their income or consumption to that of others. It might be possible that people also compare their saving or investments. Certain types of saving are conspicuous, such as investments in real-estate, consumer durables, artwork and jewellery. Saving is not necessarily a residual of the consumption decisions resulting from social comparison, but saving can be the first priority, which is both culturally standardised and imposed (e.g. Tucker, 1991). The extent to which people talk about their savings, insurance arrangements, and private pension arrangements might differ between groups in a population and between countries. People do talk about, for example, how much they have earned on the stock market and about their insurance arrangements. Such information is also provided by the mass media. Marketing campaigns of financial institutions seek to create the perception that saving is the right thing to do if you want to live up to a

certain image (like “the responsible parent”). So far, the effects of social comparison with respect to investment saving have not been addressed, with the exception of the studies by Alessie and his colleagues, who found expenditures on real-estate to be highly conspicuous.

The economic studies on the effects of reference groups could benefit from incorporating some of the research done in other fields. Typically, it is assumed that the groups identified as social reference groups are positive reference groups which will define a person’s aspiration level. The notion that people also compare themselves to groups they want to be *different from* has not yet been incorporated in economic studies. For example, a person having invested in high education might compare his salary to that of a person without education and feel deprived unless his pay is considerably higher than that of the lower educated. A person who is working might feel deprived if someone who is living on social welfare receives nearly the same income as himself. Distinguishing oneself from such a negative reference group might have just as strong impact on consumer behaviour as a positive reference group. Similarly, it is assumed that the reference group has a normative function, which means that the reference group will serve as a basis for defining aspiration levels. However, a reference group might also have a comparative function (Kelley, 1952) which means that the reference group primarily serves as a source of information. An unfavourable comparison of one’s own standard of living does not necessarily affect aspiration levels or cause relative deprivation.

The relationship between economic behaviour and satisfaction with one’s standard of living has been a focus of many studies. Results support the idea that social comparison is taking place, and that it affects the satisfaction level of the comparer and certain types of economic behaviour. The research also shows that these processes of comparison are complex and their effect on behaviour is not straightforward. It might be mediated by situational and personal circumstances. Much more research is needed in order to be able to understand the comparison process and the way it affects economic behaviour beyond brand choices. Now we will turn to the saving model that outperformed the model of Duesenberry and which is the framework used in most modern economic studies of saving and consumption: the life cycle model.

#### 2.3.2.7 The life cycle hypothesis

Modigliani and Brumberg (1954) proposed the most path-breaking income theory of saving, the Life Cycle Hypothesis (LCH), which is the basis of most modern research on saving. It is a theory written in the spirit of Irving Fisher and in which it is assumed that consumers allocate their resources optimally to consumption over their life. Modigliani and Brumberg criticised Keynes for his static framework and for disregarding the work by Fisher who promoted a more dynamic model of resource allocation over time. They also criticised the implication of Keynes’ consumption function which held that income receivers below some critical level would have negative saving. They criticised Duesenberry’s theory for failing to explain cyclical fluctuations in the saving ratio as well as how “relatively” poor people could go on dissaving indefinitely. Modigliani (1975) pointed out that the average dissaving must reflect the inclusion of the currently poor or the transiently poor who had managed to save in the past and could save in the future. Modigliani and Brumberg’s fundamental idea is that the marginal propensity to consume with respect to life income will equal one for all households independently of lifetime income (assuming no bequest motive). Saving in one period of life will be matched with dissaving in another. Using their experiences about the typical life cycle of income (raising until retirement) and tastes (smooth consumption), they developed their much-applied framework.



The psychological foundations of the model hold that people, in general, are forward-looking and prefer smooth consumption over time. They will make their consumption stream independent of their income stream using the financial markets. The model is based on considerations relating to the usual life cycle of income and consumption needs of households. Moreover, it is based on the assumption that people rationally determined how much they can consume over the remainder of their lifetime so as to maximise utility. Therefore, in any given year, the difference between the optimal level of consumption and income will be the amount saved. The simplest version of the model (illustrated in Figure 2.2) holds that agents will try to keep the marginal utility of expenditure constant over time, and, consequently, the lifetime path of income and consumption are independent. Furthermore, in the stripped-down version of the model<sup>28</sup> (denoted the certainty equivalent model, or CEQ, by Browning & Lusardi, 1996), it is assumed that agents have constant income until retirement and that they know the time of their death (the mortality rate is assumed to be zero up to the assumed age, and then the rate equals one). The consequence is the hump-shaped profile of wealth, rising until retirement and decreasing thereafter. Since everything is assumed known with certainty, the lifetime consumption plan is made in the beginning of life, with the consumer doing no more thereafter than following the predestined plan (Deaton, 1992).

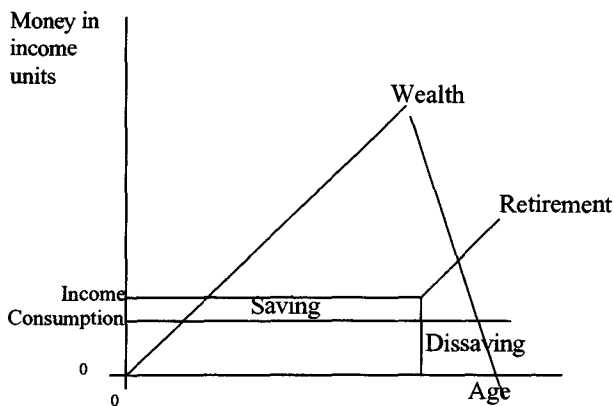


Figure 2.2  
The stripped-down life-cycle model:  
Income, consumption, saving and wealth as a function of age

Modigliani and Brumberg (1954) argued that the preferred path of consumption is likely to be relatively stable over the lifetime, when effects of family size are taken into account. They also expected current income to exhibit short-run variation of an accidental type as well as systematic variation over the life cycle, which will tend to be well below average in later years (due to retirement). This means that the relationship between a family's saving and income over short time periods would be determined by the extent to which current income was above or below average lifetime earnings (as illustrated in figure 2.1). Households with a current income above life average income are expected to save, while those with income below average are expected to dissave.

<sup>28</sup> See Chapter 1 in Deaton (1992) for the mathematical formulation of the stripped-down version of the LCH. ?

The life cycle model could explain the same findings as the relative income hypotheses (for example, findings from the budget study of Brady & Friedman, 1947) and the finding that blacks saved more than whites in the same income group (Duesenberry, 1949), as well as other puzzling findings as-yet unexplained. It also explained the high marginal propensity to save in occupations with unstable income (e.g. farmers), without implying a high average propensity to save. Although there were no data that could be used for explicit tests of the model at the time it was proposed, it was more promising than previous models and was quickly adapted as an appropriate framework for studies of household saving.

The simple LCH framework outlined above formed the basis for a long line of testable implications of the savings ratio on the aggregate level. In particular, these implications relied on the demographics of the population. For example, in a stationary economy, with zero population growth and productivity growth, the saving ratio was bound to be zero. An economy with income growth will have a positive savings ratio. Population growth leads to positive saving if the ratio of younger to older and retired households increases.

As this model is based on some simplifying (and rather unrealistic) assumptions, introduction of complicating factors has been necessary in order to reconcile the model with the observed data. Firstly, a positive interest rate has been incorporated, which has the effect that capital income is taken into account in addition to labour income (Deaton, 1992). Changes in the interest rate will change lifetime income; agents will change their consumption level accordingly. In addition, positive interest rates will tip consumption paths downward in the early years and upwards in old age due to intertemporal adjustments over the life cycle.

Secondly, the LCH has been expanded so that rising income over the career path can be accommodated. One consequence of this is that young people might want to borrow during their early years instead of engaging in saving. With these adjustments in the model, the average agent should borrow when young, save for retirement when middle-aged, and dissave when retired. On the aggregate level, with rapid growth rates, additional growth will decrease saving, as higher growth rates magnify early borrowing relative to later repayment (Deaton, 1992).

Thirdly, the LCH has been expanded to include uncertainty. This has been done by substituting utility with expected utility. In such models, the agent is assumed to choose current consumption and the allocation of net worth between alternative assets so that the expected utility of consumption over life is maximised. The effect of uncertainty is that people with an uncertain income stream will save more than those whose income is more predictable. This can, to a degree, explain why farmers and self-employed people save more than others. Combined with other factors (such as high time preference or asset-based welfare programs) this can also explain the large differences in wealth holdings.

Since not all observed saving behaviour complies with the predictions of the moderated LCH and the model cannot explain large individual differences or the behaviour of certain segments of the population, the model has been enriched with possible psychological causes for the observed behaviour. For example, many of the young do not borrow or spend as much as the theory predicts. Ando et al. (1992) proposed that this finding can be explained by consumption smoothing. Young people might expect a rising expenditure profile due to increases in the size of the household, and therefore save for the increased level of expenditure. Ando et al. also suggested that young people do not have a clear idea about their

preferences, but that these will evolve with age along with social identity. Consequently, young people postpone their expenditures until they have settled down in their “social niche”.

Inclusion of a precautionary motive is the principal innovation of the theory in the past decade (Browning & Lusardi, 1996). One implication of this motive is that the path of consumption is not necessarily independent of the path of income. If the future variability of income increases, saving for the future will increase too. Likewise, an agent facing higher income uncertainty will also save more (Carroll & Samwick, 1997; Hubbard, Skinner & Zeldes, 1995). The magnitude of the effect depends on the level of current assets and income relative to expected future income. A problem with including the precautionary savings motive in the LCH is that it fails to explain the low levels of wealth of many households.

Deaton (1992) and Carroll (1997) attributed the behaviour of the young to so-called “buffer-stock”-behaviour, which implies that there is an upper-limit for precautionary saving. The precautionary motive alone cannot explain that so many households have very little wealth, and the inclusion of a competing factor gives better predictions. The assumptions underlying buffer-stock models are that, in general, people are impatient (have a high rate of time preference). At the same time, they fear the possibility of having no consumption opportunities in the future. Carroll (1997) argued that people therefore have a (typically small) wealth/income ratio target for their saving. If wealth is below the target, prudence<sup>29</sup> dominates, as people are afraid of destitution in later periods. If wealth is above this level, impatience dominates and the available resources will be consumed. Carroll (1997) suggests that it is the possibility of poverty later in life that stops agents from borrowing when young. The more uncertainty that is associated with the future income, the higher the buffer-stock saving. The interaction between precautionary saving motives and impatience is that consumption will track income in the early part of life, while (significant) saving will only be observed in later years. Gourinchas and Parker (1999) suggested that the motives follow the life cycle, so that people are typically buffer-stock savers until they reach a certain age (around 40). After this age, they start saving for retirement, because most income-uncertainty is resolved, and their behaviour is as expected by a certainty equivalent consumer.

The saving of the young could also partly be explained by the fact that many young engage in goal saving in order to invest in their own accommodation. Investments in an apartment or house require further investments in furniture, decorations and appliances. These investments or purchases are often complementary so that a large sum of money is needed in order to be able to acquire the “full package”. If the young have a high time preference and expect a rising income profile, it would be reasonable to borrow in order to finance the investments. The fact is, however, that the young are often liquidity-constrained. Credit institutions usually give more weight to a loan-applicant's present income than his or her expected future income. Many young might therefore have their loan applications rejected due to low income at the beginning of their careers. Often mortgages have terms that are more favourable if they are well below 100% of the value of the purchased object (e.g. house). It might also be difficult to borrow money in order to invest in furniture and appliances. This might cause the young to save until they qualify for better mortgage terms.

Moreover, the observed behaviour in the elderly does not comply with the LCH. The elderly do not dissave as much as predicted by the model. Understanding the saving of the elderly

---

<sup>29</sup> Kimball (1990) defined prudence as the propensity to prepare and forearm oneself in the face of uncertainty.

becomes increasingly important because they constitute a growing part of the population (Hurd, 1990). Many explanations have been proposed for slow dissaving by the retired. The most frequently discussed explanation is the bequest motive. The bequest motive implies that the utility of children (or others that receive the bequest) is taken into account in saving decisions when maximising utility (Barro, 1974). The model implies altruism, since the person who leaves the bequest seems to reduce their own utility without getting something back. Bernheim, Shleifer and Summers (1985) criticised this view and suggest that a bequest results from strategic considerations. Their model implies that the person approaching the end of his or her life will hold wealth in bequeathable forms and use it strategically to obtain services and attention from beneficiaries.

Börsch-Supan and Stahl (1991) have observed that the old have a reduced ability to consume due to deteriorations in health. They analysed the behaviour of people aged 75 and above and concluded that they were consumption constrained. Technically, this implies a model with a declining marginal utility of consumption as households age. Davis (1981) proposed that most bequests are the result of uncertainty about the time of death, which means that most bequest is accidental. He tested whether or not the slow dissaving of the elderly could be explained without a bequest motive, and found that uncertainty about death could provide “the major element in a complete explanation of the slow decumulation of wealth” (Davis, 1981, page 576). Annuity market imperfections also contributed to the explanation.

Finally, several analyses have revealed that there is an excess sensitivity of consumption to income (consumption tracks income too closely) (e.g. Carroll & Summers, 1991). This has been interpreted by many as evidence against the life cycle model, although Attanasio and Browning (1993) and Attanasio, Banks, Meghir and Weber (1996) showed that the consumption path is smoother when household characteristics are taken into account. They explained the “bump” in the consumption life cycle profiles with “bumps” in family needs due to child bearing. The consumption profile per household member is thus quite smooth. Carroll (1997) provided the buffer-stock saving as an explanation for the excess sensitivity. Since people hold a small buffer-stock and use the rest of their resources due to impatience, consumption will track income. Uncertainty about future earnings makes people avoid borrowing. Hence, self-imposed liquidity constraints may play a part, in addition to external liquidity constraints.

### The permanent income hypothesis

Friedman (1957) proposed a similar model to that of Modigliani and Brumberg (1954). The model is called the Permanent Income Hypothesis (PIH) as the model relies on the assumption that the rate of consumption is proportional to the return on total capital (termed ‘permanent income’). Total capital is the sum of human wealth (present value of expected labour income) and non-human wealth (market value of net assets) and permanent income is the annuity of total capital. Friedman claimed that people have a notion of what their mean permanent income will be over a given time period and that they aim to consume a fixed proportion of the permanent income during that time. Their actual income and consumption may well vary from the permanent income and saving will ‘take up the slack’. The marginal propensity to consume from increases in permanent income is assumed to be close to one, while the marginal propensity to consume from an increase in transitory income is equal to the interest earned by the increment plus a little more in the absence of a bequest motive. Friedman also applied an infinite time horizon, in contrast to the life cycle model that assumes that the length of life is known. This is one of the most important distinctions between the two

life cycle models, and it implies that we cannot draw systematic conclusions about the role of age when using the permanent income model as we can when using the life cycle model. Another important difference between the permanent income and the life-cycle hypothesis is that permanent income is not the same as expected lifetime earnings. Friedman recognised that individuals make calculations based on a time-horizon that does not necessarily extend to their death<sup>30</sup>.

#### 2.3.2.8 Empirical studies

In the following paragraph, we refer to the LCH although much of the criticism also applies to the PIH. Some results from empirical studies have already been discussed<sup>31</sup>, as they explain why the life-cycle models have been changed to include other considerations than consumption smoothing over time. Some results cast doubt on the empirical validity of the model (e.g. Alessie & Lusardi, 1997; Deaton, 1992; Bernheim, 1991; Kotlikoff & Summers, 1981), while other studies support it (e.g. Attanasio & Browning, 1993; Attanasio, et al., 1996; Hurd, 1987). Results from such studies will not be further reviewed; recent and comprehensive reviews can be found in Attanasio (1998); Browning and Lusardi (1996), Deaton (1992), Modigliani (1986) and King (1985). A problem with the LCH is that it is not easily testable, and that many “anomalies” can be attributed to bad measurement or operationalization of the economic variables<sup>32</sup>. King (1985) concluded that the LCH could explain the savings of the majority of savers, while the behaviour of the remainder (20-25% of the population) would be better explained by alternative models. The following review will focus on studies that have addressed the psychological foundations of the theory. These foundations include assumptions about saving motives, homogeneity among savers, rational expectations and fungibility of money.

#### Saving motives

The LCH has been enriched by the inclusion of different saving motives. Psychologists have not addressed the issue of saving motives but the identification of their existence, with the study of Wärmeryd (1995) and Wahlund and Wärmeryd (1987) as notable exceptions. Economists, on the other hand, have tried to estimate the effect of the motives by incorporating them in their models. In particular, two motives have received much attention: the precautionary motive and the bequest motive. While there seems to be little disagreement about the existence and importance of the precautionary motive, the importance of the bequest motive is more controversial.

As mentioned in section 2.3.2.2, Swedish studies of saving show that the precautionary saving motive is the most important (Lindqvist et al, 1978). In all, 46% of the respondents reported that the precautionary saving motive was their most important saving motive. Similar results were reported by Katona (1975) and Wärmeryd (1995; 1999). Barlow, Brazer and Morgan (1966) studied motives across different income categories and found the precautionary motive to be stable across income groups, saving for retirement and children’s education to be decreasing with income, while the bequest motive increased with income.

<sup>30</sup> For more elaborate discussions of the permanent income hypothesis, see Deaton (1992) and Wärmeryd (1999).

<sup>31</sup> As empirical testing and theory development go hand in hand with respect to expanding the LCH, it is difficult to separate theory and empirical results, as indicated by the structure of this review.

<sup>32</sup> For example, failure to include annuities such as government and private pensions in the measure of wealth or a failure to take demographics into account.

The subjective data suggest that saving models not allowing for the precautionary saving motive are misspecified and several different ways of incorporating this motive in the LCH framework have been proposed. Due to the lack of subjective data on saving motives, it is often assumed that the strength of the precautionary saving motive is higher the higher the income variability (e.g. Carroll, 1997; Lusardi, 1993) or expenditure variability (Dynan, 1993) of the household, with the former being the most common assumption<sup>33</sup>. The estimates of the importance of the precautionary motive show large variations, which most likely stem from different ways of measuring uncertainty or the parameters chosen for the estimation. Carroll and Samwick (1995) reported that between 39 and 46 percent of wealth in their sample (The Panel Study of Income Dynamics) is attributable to income uncertainty. They also find that the fraction of wealth attributable to income uncertainty is higher among low-income households. Dardanoni (1991) used consumption and income data from Britain and estimated that more than 60% of savings is a precaution against future income risk. Guiso, Jappelli and Terlizzese (1992a), on the other hand, stated that precautionary saving in Italy accounts for only two percent of the household's net worth. Lusardi (1993) re-analysed the Italian data and estimated the precautionary accumulation in Italy to be about 13%. She used occupation as a proxy for income risk. In general, she found that subjective earnings variance was small because of measurement error and employer insurance. Dynan (1993) found very little support for the precautionary motive using expenditure variability as a measure of uncertainty.

The buffer-stock model of saving is one example of how a precautionary saving motive can be incorporated in the LCH framework. Carroll (1997) and Carroll and Samwick (1997) found empirical support for the buffer-stock model. Research by Gourinchas and Parker (1999) supported the finding that it is young people who engage in buffer-stock saving, while older people (older than 42 years) accumulate liquid assets for retirement in line with the standard LCH. They interpreted the findings as being a result of the life-cycle profile of expected income, which causes saving motives to change over the life cycle. Samwick (1998) reported findings suggesting that households save only to maintain a buffer stock until retirement is only a few years away.

Hubbard et al. (1995) tested a buffer stock model (assuming a rate of time preference of 10% and a consumption floor of \$1000) against a model with lower time preference rates (3%) and incorporation of the asset-based means testing of welfare programmes. The latter model fitted the data better than the buffer stock model. In particular, it could better explain why many households showed a strong persistence in low levels of wealth: saving while receiving transfers is discouraged as higher wealth is likely to disqualify for further transfers. The buffer-stock model predicts that households will have a strong motive to rebuild their buffer stock on all levels of income and wealth. The buffer-stock model therefore failed to explain why 56% of the households that had assets worth less than \$1000 in 1984, still had less than \$1000 total wealth in 1989. Carroll and Samwick (1997) argued that they found evidence of the buffer-stock model performing better than the model of Hubbard et al. (1995). Consumers facing greater income uncertainty held more wealth. In particular, they found that buffer-stock saving is important for consumers younger than 50 years of age. After this age, people engage in retirement saving. Furthermore, they reported that the sensitivity to uncertainty decreased with rising time preferences.

---

<sup>33</sup> Browning and Lusardi (1996) also cite sources that include uncertainty about household demographics, health, and future interest rates.

Ballinger, Palumbo and Wilcox (1998) performed a laboratory experiment in order to investigate certain aspects of life cycle saving decision making. They asked their respondents (36 students) to solve a sixty-“year” consumption and saving problem. Respondents were assigned randomly to three “generations”, and those belonging to the second generation could observe and interact with the first generation players in their 20<sup>th</sup> - 40<sup>th</sup> years, and the third generation players could observe and interact with the second generation players in their 20<sup>th</sup> -40<sup>th</sup> years before starting their own game. A special technique, called “the binary lottery ticket mechanism” was used in order to induce the utility function of the decision-makers. Subjects received an endowment of initial assets at the beginning of the first period and a randomly drawn income level in each period. The income variance was varied so that there was one low-variance and one high-variance treatment. The income realisation was added to assets previously accumulated so that the respondents would know the level of cash on hand for spending. The respondents were then asked how much they would spend each year. It was expected that respondents subject to the high-variability income treatment would save more than others do, in line with the theory of the precautionary savings motive. They found that subjects typically under-smooth their expenditure patterns relative to what would have been predicted by an intertemporal optimisation model. In both high-variance and low-variance income treatments, subjects failed to build and hold a large enough buffer-stock of assets to facilitate consumption smoothing. They did find, however, that the decision making improved by learning. The third generation players did better than the second and first generation players.

Another much-debated motive is the bequest motive. One testable implication of the simple version of the LCH is that even patient consumers would like to spend all their wealth before they die. In general, findings suggest that the wealth holdings of the elderly are very unevenly distributed. When collecting subjective data on the matter, the bequest motive is primarily found among the upper parts of the income and wealth-distribution. Subjective data also support that a very small part of the population regards bequest to be a reason to save. Lindqvist (1981) reported that only 3% of his sample said that leaving bequest was the most important saving motive. The same frequency was found in the Survey of Consumer Finances in 1992: 3% said that leaving inheritance was the most important motive, while 5% of the sample indicated that inheritance was among their top five reasons for saving (Carroll, 1998). Modigliani (1988) cited several surveys about saving motives, which all give little support to the bequest motive, and he also found the bequest motive to be increasing with income and wealth. Lack of dissaving among the elderly seemed more to be caused by precautionary motives, so that decumulation takes place at a very old age. Hurd and Smith (1999) found some support for this view. They used data from the Health and Retirement study and the Asset and Health Dynamics of the Oldest Old (AHEAD) and found that respondents anticipated substantial dissaving at advanced old age. Much bequest might therefore be accidental.

Bernheim et al. (1985) found some support for their notion of a strategic bequest motive. They found that contact between parents and children is much higher in families where the elderly parent has a substantial amount of bequeathable wealth to offer, controlling for potentially spurious factors such as ability to pay for frequent contact and the characteristics of the parents' house. The authors referred to an interview study by Sussman, Cates and Smith (1970), who reported that many of the interviewees in their study directly or indirectly said that bequest was used as a means of payment for services rendered to parents.

Responses to the questions about bequest in the CentERdata-panel show that all the proposed explanations for the saving of the elderly might be right, as people obviously differ in their bequest motives. Table 2.2 shows the responses from respondents with children. The exchange motive (or strategic bequest motive) does not get much support in this study, but this might be due to responses being affected by social desirability considerations. Probably, it will be difficult to make people admit to strategic use of their wealth. A considerable portion of the sample says that they want to leave some bequest for their children. This means that this motive should not be excluded from the aggregate saving models. More effort should be spent on finding a way to identify the households that want to leave a bequest so that the effect of this motive can be estimated. For example, Modigliani (1986) suggested that bequest should be treated as a luxury good, which only will be important in the upper reach of the lifetime income distribution. This has been supported in a study by Dynan, Skinner and Zeldes (2000) who found that households with higher lifetime income leave a larger bequest. Using Canadian data, Burbridge and Robb (1985) found that blue-collar households decumulated wealth after retirement whilst white-collar households did not. Alessie, Lusardi, and Kapteyn (1995, 1999) analysed Dutch data and found income, wealth and home ownership to be strongly associated with bequest. They reported that the frequencies of the respondents who have a bequest motive increased almost monotonically with wealth. Finally, Table 2.2 shows that the large majority does not want to leave bequest to their children, which supports the notion that bequest is accidental.

Table 2.2  
Motives for leaving bequests

Statement	Frequency	Percent
If our children would take good care of us when we are old, we would like to leave them a considerable bequest (exchange motive)	93	4.3
We would like to leave our children a considerable bequest, irrespective of the way they will take care of us when we are old (altruism motive)	478	22.2
We have no preconceived plans about leaving a bequest to our children because we want to enjoy our own lives (self-interest)	1524	70.8
We don't intend to leave a bequest to our children, because we don't think it is desirable (rejection)	58	2.7
Total	2153	100

Data from the first wave of data collection of the CentER Savings Survey. Source: Wärmeryd, 1999 (page 276)

The fact that the number of respondents who say that they would like to leave their children some money is higher than the number who say that they do not explicitly save for bequest, indicates that people have a hierarchy of saving motives or that the same money serve several purposes. It might be that the primary motive for saving is precaution, but when this motive is satisfied, other motives, for example bequest, becomes operational. Precautionary saving will be bequeathed in the cases it is not needed. Alessie et al. (1995) found that the bequest motive is more important among the older household than among the younger. This means that motives might change over the life cycle.

One possible determinant of a bequest motive is the ratio of parents' wealth against that of their children. If there are great differences in wealth or expected life income between generations, with the younger generation being better off, this might have an impact on the



older generation's motive for leaving a bequest (Hurd, 1990). Leaving a bequest to children who enjoy a higher standard of living than their parents ever had, might seem pointless as the utility the parents have to give up while saving does not match the marginal utility their children will derive from the transfers. This might explain why bequest is mostly found among the richer part of the population, as the likelihood of parents being richer than their children is higher for this group. Unfortunately, data sets seldom contain information about income of both parents and their offspring, so this interpretation is difficult to test directly. Kotlikoff (1988) and Bernheim and Severinov (in press) reported results from several studies that show that wealth bequeathed to children is shared equally, which indicates that parents do not take differences in their children's earnings capacities into account when they divide their bequest. However, Hochguertel and Ohlsson (2000) found indications of such considerations with respect to *inter vivos* transfers between parents and children. Using the HRS data set from the U.S., they found that only 5% of parents who give gifts divide them equally among their children. Children less well-off than siblings received relatively more gifts. Bernheim and Severinov (in press) suggested that parents divide bequest, which is observable to all children equally between children in order to make them feel equally loved. *Inter vivos* gifts do not need to be observed by other siblings, so that parents can give gifts to a favoured child without revealing this to his siblings who then might suffer from feeling less loved.

Alessie et al. (1997) found, as Börsch-Supan (1992) and Börsch-Supan and Stahl (1991), some support for the notion that old people save due to less ability to consume<sup>34</sup>. Using Dutch data, they found the decumulation of retired household to be modest (some evidence was also found for accumulation), and they found that one cause could be a substantial reduction in consumption, in particular in leisure and transportation expenditures. Still, it is puzzling that the reduction in one type of expenditure is not matched by increases in other expenditures so that substantial decumulation still could be observed. Although the elderly are taken care of by mandatory health insurance systems in many countries, they could, and should according to the LCH, still increase their utility by buying additional services. Consumption habits might therefore also play an important role. When the possibilities for engaging in the household's established consumption patterns decline, habits prevent them from engaging in new activities or markets.

Given that many people do not want to leave a bequest, there is one observation that seems to be a mystery: the infrequent use of reverse mortgages<sup>35</sup> and annuity insurance. Elderly owning their own accommodation have, for example, the option of taking out reverse mortgages, which enables them to spend housing wealth without having to go through the painstaking process of selling and moving. The reason why this type of mortgages is not popular is likely to be the uncertainty of the time of death. Such an arrangement could cause serious problems if one were to live ten years longer than expected or if one would experience a serious medical problem that would necessitate large expenses in terms of buying services. The mortgage would grow with compound interest. Although parents would not wish to leave any bequest to their children, they are not likely to want to leave them debts (although these preferences have not been subject to testing) or live their last years in poverty. The risk associated with reverse mortgages is, however, resolved in the annuity insurance contracts,

---

<sup>34</sup> They did note, however, that the precautionary motive is the best explanation for a lack of decumulation. They also find some indication that some expenditure is not measured appropriately so that the expenditures of the elderly might be under-estimated.

<sup>35</sup> With a reverse mortgage, the retired homeowner uses collateral in the house to borrow money from a bank. The proceeds of the loan are typically paid to the borrower in monthly payments. When the borrower dies or decides to sell the house, the loan is repaid.

which permits people to share the risks associated with an uncertain time of death. The fact is that also this type of annuity is less popular than expected and predicted by the LCH. The proposed explanations for this are the unfavourable rates of return on such annuities (4-6 percent below market rates of return) and uncertainty about future inflation (Kotlikoff, 1988). According to estimates provided by Kotlikoff, Spivak and Shoven (1989) the absence of well-functioning private annuity markets might cause a doubling of savings in life cycle economies and bequests might occur involuntary.

Hurd (1990) analysed panel data and found that there is a tendency for the elderly with children to decumulate their wealth at a faster rate than the childless households. This finding can be explained in many ways. Firstly, it does not necessarily mean that people with children do not think of their offspring. It can also be that they give money (or presents) to their children and any grandchildren while they live. Most people have their most difficult economic situation when they are young and are starting a family. Parents can therefore feel more motivated to help their children in this stage of their live cycle instead of saving for a bequest their children most likely will receive in a more affluent period of their lives. For example, Katona (1975) found that saving for children's education and other needs was the second most important saving motive. This supports the notion of parents engaging in *inter vivos* intergenerational transfers before their death (which in many data sources will appear as consumption). Alternatively, the results from Hurd's study can be interpreted as support for a precautionary saving motive as the elderly with children might feel a smaller need for a buffer against unforeseen contingencies. They might rely on support from their children if they would require assistance in their final years, in line with the notion of within-family annuity markets proposed by Kotlikoff and Spivak (1981). The flow of intergenerational transfers does not necessarily go in one direction only, although the net effect is a transfer from the old to the young. Although little evidence of transfers from children to parents is found (Hurd, 1990), children might still serve the same function as a buffer. Transfers will only take place in cases of unexpected bad events.

### Homogeneity among savers

One of the assumptions underlying the LCH is that people make their saving and borrowing decisions in a homogeneous way. We just need to know what they expect their age and life income to be, as well as their present income and age, in order to predict whether they will borrow or save. As shown above, the framework has been expanded by including different saving motives. The inclusions of the motives are done in such a way that it is of concern to all subjects. Either everyone has a precautionary saving motive or no one has. Either everyone has a high rate of time preference or everyone has a low rate. Segmenting of the population into different groups, as promoted by, for example, Weil (1991) and Wärneryd (1999) has so far not been common practice. Wärneryd suggested a segmentation of the population based on saving motives and showed that people with different motives might react differently to policy measures (Wahlund & Wärneryd, 1987). The research by Carroll (1997), Gourinchas and Parker (1999), and Samwick (1998) suggested that motives change with age, so that age can be used for segmenting. Weil (1991) suggested that wealth classes could be used as a basis for segmentation and that different models should be used for "non-savers", "forward-looking savers", and "non-forward-looking savers". Carroll, Rhee and Rhee (1998) found that saving patterns of immigrants are significantly different across country of origin. Other useful dimensions that can be used for segmentation are indicated by the research reviewed below.

Recent studies have revealed that people are remarkably heterogeneous with respect to their savings. One observation from the US is that many households accumulate very little. In particular, it seems that the accumulations are grossly inadequate to ensure a comfortable standard of living at retirement (e.g. Bernheim, 1995; Lusardi, 2000). Hubbard et al. (1995) explained this finding by pointing to the incentive structure built into the welfare program. Since eligibility to transfers is conditional on having assets less than some specified amount, such programs place an implicit tax rate of 100% on assets above the limit. Thus, for people with little wealth the incentives to increase their wealth are small. Carroll (1997) attributed the difference in accumulation to differences in income uncertainty and impatience. The target saving-to-income ratio assumed in the buffer-stock model is typically very low. Lusardi (2000) studied differences in saving across households 10-15 years before their retirement, using data from the Health and Retirement Study (HRS). She found that a variable called "thinking about retirement" was important for accumulation of wealth, indicating that the extent people plan ahead vary from "hardly at all" to "a lot", and that this planning affects their saving behaviour (in line with Weil's suggestion). One third of her sample had "hardly at all" thought about retirement, and she found this to have a dramatic negative effect on their saving. Thinking about retirement was also closely associated with level of education and marital status. Similar results were found by Alessie et al (1995), who found that saving increased with reported time horizon.

Lately, the rich have also received some empirical attention. In the US, the rich constituted the top 1% of the income distribution and were responsible for 29%<sup>36</sup> or 36%<sup>37</sup> of total private wealth in 1989 (Gentry & Hubbard, 1998). The rich have been found to have higher lifetime saving rates than others. Their behaviour is inconsistent with the LCH, which underestimates the wealth of the richest households. Alternative models have been proposed that could better explain the behaviour of this particular segment of the population. Carroll (1998) tested several alternative models and found that the behaviour of the rich can best be explained by a model in which consumers regard the accumulation of wealth as an end in itself (a capitalist spirit model)<sup>38</sup>. This model implies that wealthy people derive utility either directly from the ownership of wealth, indirectly from the activities that lead to wealth accumulation or from utility derived from the power or social status tied to the ownership of high wealth. An alternative model, which did not receive much support in Carroll's study, is the "Dynastic" model of Barro (1974), which implies that wealthy save mainly for the benefit of their heirs. Carroll (1998) also pointed to the fact that it is difficult for the super-rich not to accumulate assets. For example, Bill Gates would have to spend more than \$10 million every day on non-durable assets in order to avoid further accumulation, which is in itself a difficult task. Extremely rich people might also be subject to consumption satiation. Gentry and Hubbard (1998) focussed on the saving of entrepreneurs, as this group overlap with the rich to a certain extent. They found that costly external financing for entrepreneurial investments and potentially high returns of those investments can explain higher saving rates of this particular part of the population.

These studies suggest that it would be better to divide the population into segments and develop different models or use different parameters for the different segments. It is not yet

---

<sup>36</sup> Based on data from the Panel Study of Income Dynamics.

<sup>37</sup> Based on data from the Federal Reserve Board Survey of Consumer Finances.

<sup>38</sup> Carroll noted that the Capitalist Spirit model will be behaviourally indistinguishable from a psychological model stating that the wealthy enjoy doing their jobs well and that accumulated wealth is their measure of own job performance.

clear which criteria will be the most useful for segmentation. For example, the behaviour and motives of the rich versus the poor seem to be rather different. The rich have more often a bequest motive than the poor, while the poor might have small incentives to save because this might cause a loss in social benefits. Differences in time preference and in saving motives can also produce different saving behaviour. Therefore, segmenting based on these variables might prove worthwhile.

### Rational expectations and decision making

Surprisingly, only a few empirical studies address the actual decision process the consumers go through when they make saving decisions (e.g. Ballinger et al., 1998). An important reason for this is the limitations in the available data sets. They usually contain little information about decision processes, which leaves researchers to make more or less qualified guesses about how decisions are made and which factors influence them. Thaler described the decision process underlying the LCH framework in the following way:

The essence of the life-cycle theory is this: in any year compute the present value of your wealth, including current income, net assets, and future income; figure out the level of annuity you could purchase with that money; then consume the amount you would receive if you in fact owned such an annuity (Thaler, 1990; 193-194).

Thaler pointed out that it is unrealistic to assume that people can actually solve such a multiperiod dynamic maximisation problem. Firstly, this task is difficult even for trained economists, and, secondly, there is little chance of learning since people save for retirement just once. In addition, no rule of thumb that would approximate an optimal saving plan has been found to be known and in use. Thaler pointed to research within decision theory and claimed that the intertemporal allocation calculations that are assumed underlying saving decisions are too difficult for most people to perform. Thaler's criticism is supported by experiments data. Ballinger et al. (1998) found that people did not allocate money as predicted by the LCH. Rather, people undersaved compared to the models prediction. Ng (1992) reported that people failed to calculate compound interest, with the result that they underestimate the long-term effects of saving. When they were shown the right figures, they indicated a willingness to save much more. Köhler (1996) conducted an experiment in which people were asked to make saving and consumption decisions, and found that the respondents were simplifying the saving decision by restricting the amount of information considered. Respondents typically considered only a few years ahead instead of the whole remaining lifetime. Finally, Johnson, Kotlikoff and Samuelson (1987) conducted an experiment in which respondents were paid to answer a computerised consumption questionnaire. The subjects were asked to place themselves in a simple life cycle setting and were given all information necessary in order to perform the calculations assumed by the LCH. Johnson et al. found a widespread inability to make coherent and consistent consumption decisions. Errors in consumption decision-making were substantial and systematic.

In both the LCH and the PIH, consumers are presumed to have a set of expectations about lifetime wages, lifetime family structure and the rate of return to assets over the lifetime. From these expectations, consumers visualise potential lifetime resources. The variable "expectation" is central to the LCH framework. Current saving or dissaving is considered a reflection of the expectations. Research on the formation of expectations and the effects of expectations on economic behaviour was left to psychological economists for decades (see Dominitz & Manski, 1997). Economists rejected the notion that consumer expectations data

could contain any information of predictive value, embracing the theory of rational expectations. Alternatively, they assumed that people used extrapolated or adaptive expectations (Wärneryd, 1997). These could be estimated based on realised changes or past changes adjusted for new information, and subjective data were unnecessary. In recent years, however, economists have explored the usefulness of the Index of Consumer sentiment as well as other types of subjective expectation data (e.g. Vanden Abeele, 1983; Souleles, 2001).

Two issues have been in focus in studies using subjective information about expectations. The first is the accuracy of the measures. Their accuracy has been assessed by comparing subjective expectations with realised changes. Dominitz and Manski (1997) found that subjective data on income expectations corresponded well with data on realised income changes. They derived the subjective expectations using the following question formulation: "What do you think is the percent chance (or what are the chances out of 100) that your total household income, before taxes, will be less than Y over the next 12 months?" A sequence of such questions was posed for different income thresholds (Y). The responses allowed them to estimate each respondent's subjective probability distribution for next year's household income. Alessie, Lusardi and Aldershof (1997) and Das (1998) found that reported expected changes in income correlated significantly with actual income changes. Das and van Soest (1997), Das, Dominitz and van Soest (1999), and Das (1998) using data from the Dutch Socio-Economic Panel, found some evidence in favour of extrapolation and consequently against the rational expectation assumption. They found that people who had experienced an income decrease in the previous year were more pessimistic about their income in the following year than others, while those who had experienced an increase in income were more optimistic about their future income than others. Das and van Soest (1997) also found that the forecast errors are correlated with household demographics. On average, future income growth was underestimated. Souleles (2001) used the household data set from the Michigan Survey of Consumer Attitudes and Behavior, which contains the Index of Consumer Sentiment, and analysed the rationality of consumer expectations. He found that the expectations appeared to be biased and that people tended to underestimate the amplitude of the business cycle. The forecast errors did not average out even over the sample period of almost 20 years. The forecasts were also inefficient, since he found that people's forecast errors are correlated with demographic characteristics (income and education level). He also found that the most useful information was derived when asking about the respondent's economic situation rather than the aggregate economy.

The second issue of interest is the effect of uncertainty with respect to income changes. The reason for increased effort in understanding the combined effects of expectations and uncertainty is that empirical studies indicate that precautionary saving is an important saving motive and that income uncertainty has an effect on this type of saving. Carroll (1994) found that income uncertainty had a depressing effect on consumption. Similar results have been found in studies by Banks, Blundell and Brugiavini (1995), Guiso, Jappelli and Terlizzese (1992a), and Lusardi (1993). This means that uncertainty will mediate the effects of expectation on saving. Optimistic expectations concerning future income might not lead to more spending if the uncertainty of its realisation is high. Both expectations and uncertainty must therefore be taken into account.

So far, little research has addressed the more interesting research concerning the effect of the subjective expectations on behaviour. It is useful to know whether people's expectation concerning their future earnings is a good predictor of their actual earnings. Dominitz (2001) concluded that the high consistency between subjective expectations data and expectations

derived from realised income changes provide a validation for the subjective measurement. It is more important to assess, however, the extent to which people act upon their expectations, regardless of how they were formed. Souleles (2001) found that consumption was excessively sensitive to consumer sentiment. Higher confidence is correlated with less saving, consistent with precautionary saving motives and ideas put forward by Katona (1975). Guiso et al. (1992b) and Alessie et al. (1995) used subjective income expectations as explanatory variables and found that they predicted saving. Similar results were found by Carroll, Fuhrer and Wilcox (1994) who also found the index of consumer sentiment to predict consumer spending. Souleles concluded that the subjective measures contained important additional information to that captured by other variables. All these results support the notion of precautionary saving as saving decreases in times of optimism.

Another important assumption underlying the LCH is the fungibility of money ("a dollar is a dollar"). The LCH predicts that an extra dollar of housing wealth, pension wealth or liquid assets generates the same increase in consumption. Empirical research suggests that this is not the case. Most studies report that a large portion of households have loans despite holding money in a saving account. For example, some cash is held for precautionary reasons. Poterba, Venti and Wise (1994; 1995) did not find much substitution between targeted retirement saving accounts and other wealth components and this pattern is consistent with studies of substitution between personal financial assets and the value of employer-provided pensions and between housing equity and personal financial assets. Engagement in some types of saving seems to increase the total saving of the household. The nonfungibility of money will be discussed more extensively in the next section.

#### 2.3.2.9 Summary

The life cycle model, as it was originally proposed by Modigliani and Brumberg, is now regarded as obsolete. The assumptions of perfectly far-sighted families operating in complete insurance and financial markets are not regarded as satisfactory with respect to predicting household saving. The LCH is now more a framework for studies of saving. The idea that people are forward-looking is still the basic underlying idea of the model and empirical studies support that expectations play an important role. In order to investigate the role of expectations further, future research should also include expectations towards lifetime earnings and not only the next one to five years. Although lifetime earnings might be difficult to quantify in exact amounts for most respondents, they could give meaningful answers by reporting, for example, the expected income profile. Only by measuring life expectations is it possible to test whether the assumed decision-process, which is critical for the LCH framework, makes sense. Some findings suggest that people vary in their planning horizons (Alessie et al, 1995; Lusardi, 2000); some people report it to be only a few months ahead. Still, it is possible that people have a more-or-less detailed idea of both their income and expenditure levels and profiles in the future that in turn might lead to goal-directed behaviour.

Many studies apply the assumption that people are maximising lifetime utility. Some studies suggest that people are unable to make the necessary calculations in order to maximise utility. We should also know more about what is giving consumers utility (what is maximised) as well as the constraints experienced by households. Several attempts have been (and continue to be) made to enrich the model to make it more behaviourally realistic. In particular, uncertainty and precautionary saving seem to be important factors. The role of other saving motives has also been investigated, and it seems like saving motives might change over the life cycle.

The above review shows that economists allow for consumer heterogeneity, use experimental techniques, use subjective data as well as use psychology to enrich their models. Progress in the field is not hindered by a lack of openness or willingness to explore new and uncharted waters. Rather, the limitation exists within the data sets. Existing data sets seldom provide the data necessary to separate one interpretation of the findings from another. In the lack of direct measurement of the variables of interest, researchers are bound to assume parameters for many important variables or estimate them based on other available data. The empirical results presented above do not represent the final say in the discussions about the LCH. Reaching consensus concerning which motives are important, how to measure bequest and *inter vivos* transfers, whether the most appropriate time horizon is one month, three years, the life time, or longer, whether the rate of time preference is high or low, etc., is still far into the future.

Future research should make more use of subjective data because this might provide more accurate tests of the theory at the individual level. This is not easy, as huge measurement problems must be solved. The scepticism towards subjective data by many economists is sound. Subjective measures assume that individuals are aware of their preferences, are able to express them, and express them in a way similar enough to others for their answers to constitute an ordinal scale. Recent attempts to measure people's rate of time preference show that there are many problems that have to be solved (e.g. Knetsch, 1997; Nyhus, 1997). More work is also necessary in order to develop measures of expectation, uncertainty and the strength or importance of different saving motives.

Some of the recent developments in the field deal with complex human behaviour. Attempts are made to find out more about the reasons for saving, in order to explain observed behaviour and modify the models accordingly. It seems evident that it is time for more qualitative research in order to improve the interpretations of the findings in the data. In-depth interviews, either by psychologists or by economists, could reveal the relative importance of different motives. Such an investigation could shed some light on whether people actually think as prescribed by the buffer-stock model or whether a completely different explanation can account for the low saving among large parts of the population. In depth-interviews could also give some insights about the extent to which increased labour supply is considered a substitute for precautionary saving. Further, we could learn more about the critical incidents that could trigger use of savings that were accumulated for precautionary reasons and which type of uncertainty would trigger the precautionary motive - income uncertainty or expenditure uncertainty (for example, that associated with children, owning house and cars, and health) or both. There are many more questions than answers with respect to household saving behaviour, and the studies reviewed in this section can only answer a few of them. Estimates that either confirm or reject the existence and importance of a particular motive often rely on certain parameters chosen by the researchers. The conclusion we can draw is, for example, that when given a high rate of time preference and a certain level of uncertainty or absence of a perfect financial market, people act *as if* they have a buffer stock motive. It would be nice to know what people actually are doing.

The next section presents a model that is an extension of the LCH. It is designed to be more realistic with respect to consumer decision making. In particular, the possible self-control problems people might face when trying to allocate income rationally over time as well as methods to deal with the self-control problems are incorporated.

### 2.3.3 Behavioural saving models

#### 2.3.3.1 The behavioural life cycle hypotheses

In recent years, a new stream of research on saving behaviour has received attention. This research represents a rather extensive modification of the LCH, drawing on behavioural theories of consumer choice. The enriched model was called the Behavioural Life Cycle Hypothesis (BLCH) and it was proposed by Shefrin and Thaler (1988). The BLCH includes the notion of self control (Thaler & Shefrin, 1981; Schelling, 1984), mental accounting (Thaler, 1985) and the effects of framing. The most important assumption of the theory is that household wealth is nonfungible, which means that households divide their wealth into different mental accounts. Shefrin and Thaler (1988) propose that three mental accounts are useful in studies of saving<sup>39</sup>: current income, current assets and future income. They argue that the temptation to spend from these accounts varies so that the propensity to consume from the different accounts also varies.

The incorporation of self-control reflects recognition that refraining from consumption is difficult. In the LCH framework, it is not considered a problem for the consumer to distribute her income over the life span. Giving up consumption today in order to increase consumption possibilities in, for example, thirty or forty years, is considered unproblematic. However, as discussed previously in this chapter, research on intertemporal decision making (e.g. Ainslie, 1975) has revealed that such a model is too simplistic. Although people have preferences for saving in order to have a smooth consumption stream, they also have preferences for immediate gratification. Shefrin and Thaler (1988) modelled this as an internal conflict between two coexisting and mutually inconsistent personalities; one concerned with the long run (“the planner”) and one with the short run (“the doer”). They argued that modelling these two competing forces is consistent with findings from brain research and that it corresponds to the interaction between the prefrontal cortex and the limbic system.

Apart from the use of sheer will power (which is effortful), the planner controls expenditures by introducing rules of thumb and mental accounts (for example, pension plans). The purpose of mental accounts is that each is associated with different levels of spending temptation. The temptation to spend is assumed greatest for current income and least for future income and the self-control needed to refrain from spending is higher for current income than for wealth (past income) and future income. Consequently, the marginal propensity to consume wealth is assumed to be account-specific. For example, the marginal propensity to spend from the account “wealth” will be different from the account “income”. This contrasts with the LCH framework in which such labelling of money is absent.

An implication of this theory is that the propensity to consume from income is dependent on into which mental account it is entered or how the income is viewed. If, for example, a windfall income is entered into the “wealth account” the propensity to consume the windfall would be lower than if it is entered into the “present” income account. For this reason, Shefrin and Thaler (1988) argued that lump sum bonuses are treated differently than increases in regular income. The saving rate can be affected by the way increments to wealth are described.

---

<sup>39</sup> Shefrin and Thaler (1988) admitted that the rules applied by households will differ from one household to another and might be context specific. However, in spite of representing a great simplification of actual mental accounting rules, they argued that there are some common elements that can be used for aggregate predictions, which are the three accounts mentioned here.



An important implication of the BLCH framework is that saving would be inadequate without Social Security and pensions. This opinion is reiterated by Maital and Maital (1994), when they criticised the deregulation of the credit markets. Adopting the doer-planner framework of the BLCH, they pointed to the fact that externally imposed restrictions as well as self-imposed constraints on spending and debt have been weakened the past decades. They attribute the general decline of saving in the West to this weakened precommitment and argue that saving will not increase again before the precommitment mechanisms are re-installed. It is increasingly easy to borrow money and automatic teller machines provide easy access to savings. Some banks even offer automatic loans if a consumer overspends his bank balance. Hence, both Shefrin and Thaler (1988) and Maital and Maital (1994) raised concerns about not taking the role of self-control into account when making policy decisions that deal with household spending and saving.

### 2.3.3.2 Empirical findings

The BLCH has only been partially tested, but it is supported by some scattered empirical findings. Shefrin and Thaler (1988) presented some results from a small survey designed to study the differences in propensity to consume from an increase in regular payments (\$200 in 12 months), a lump-sum payment (\$2400), and a future payment (2400 plus interest in 5 years) respectively. They found that the students in their sample would use more of the regular payments than of the lump-sum payment (the total amount of the payments was identical). Most of the respondents also answered that they would not increase their present consumption because of a promise to get money five years on. This was interpreted as support for the assumption of the existence of mental accounts and that people have different propensity to consume for different mental accounts.

In addition, Shefrin and Thaler (1988) derived ten predictions, which will support their theory if confirmed:

- 1) Changes in discretionary saving from a change in pension saving is less (absolutely) than 1.0 and declines sharply as age falls.
- 2) The change in discretionary saving from a change in pension saving increases with income or wealth.
- 3) Without sufficiently large compulsory schemes, postretirement consumption is less than pre-retirement consumption.
- 4) The saving rate increases with permanent income.
- 5) Holding wealth constant, consumption tracks income.
- 6) The marginal propensity to consume bonus income is lower than that for regular income.
- 7) For (non-negligible) windfalls, the marginal propensity to consume is less than the marginal propensity to consume regular income but greater than the annuity value of the windfall. The marginal propensity to consume out of windfall income declines as the size of the windfall increases.
- 8) Holding lifetime income constant, home ownership increases wealth at retirement.
- 9) The marginal propensity to consume inheritance income will depend on the form in which the inheritance is received.
- 10) The marginal propensity to consume dividend income is greater than the marginal propensity to consume increases in the value of stock holdings.

To find support for these predictions, Shefrin and Thaler (1988) reviewed studies in which investigators have distinguished between different types of wealth and incomes. The results from these studies supported the ten predictions derived from the BLCH, although the studies

were not designed for testing the BLCH so that the applied definitions of different types of wealth deviated from those of the BLCH. In addition, they reviewed some studies of the effect of pension saving and social security wealth on saving. The results from these studies also supported the BLCH. Finally, Shefrin and Thaler reported findings that support the assumption that the propensity to save increases with income.

Levin (1998) carried out the first study designed to test the BLCH using a large panel data set (The Retirement History Survey). He conducted a comparative study to investigate which of the two models (the LCH or the BLCH) could best explain variation in consumption. He tested the effects of level of wealth as well as the form of the wealth on the expenditures on ten different goods. The results are strongly in favour of the BLCH as they reject the fungibility assumption, they support a different propensity to consume of different wealth components, and they show that the labelling of income (into which account it is entered) affects spending. These results were valid both for liquidity constrained and unconstrained subjects. However, Levin did not find support for the assumption that the marginal propensity to consume past (non-liquid) wealth was higher than that for future wealth. Levin explained this finding by the increase in the value of social security in the period of the data collection. The increase in one period might have influenced the confidence that it would continue to rise in the future.

Other studies have been conducted in order to test some of the underlying assumptions of the BLCH. For example, Heath, Chatterjee and France (1995) found support for the existence of mental accounting principles<sup>40</sup>. Heath and Soll (1996) found that people do apply mental budgeting and that these mental budgets affect our consumption. People use resources differently depending on how they are labelled. They found evidence that consumers earmark money for certain product categories and that labels affect expenditures within the categories in predictable ways. In particular, they found that the mental budgets were quite inflexible.

Prelec and Loewenstein (1998) elaborated the idea of mental accounting and suggested a "double-entry" mental accounting theory in which they took the pain of paying as well as the thought of paying into account. They introduced a mental accounting theory in which one set of entries records the net utility of consumption (which means that the disutility of associated payments are subtracted) and the other set of entries records the net disutility of payments (after subtracting the utility of associated consumption). An underlying assumption of their theory was that pre-paid consumption can be enjoyed as if it was free and that the pain associated with payments made prior to consumption (but not after) is buffered by thoughts of the benefits financed by the payment. They conducted several experiments to investigate this assumption, and they found that people preferred to pay before consuming and to be paid after finishing work. An implication of their theory is that people are debt-averse and prefer to prepay for consumption or to be paid for work after it is performed. Moreover, the degree to which consumption calls to mind thoughts of payments is important.

#### 2.3.3.3 Summary

The BLCH represented a refreshing and challenging framework to research on saving behaviour. In particular, substitution of the rational maximisation framework with assumptions relying on more behaviourally realistic assumptions is a promising start. It is

---

<sup>40</sup> A review of evidence of physical labelling of money can be found in Zelizer (1993, as cited in Heath & al, 1995). People have been found to use sets of envelopes, china pitchers, tin cans etc. for dedicating different parts of their wages to particular expenses.

disappointing, though, that the ideas put forward in this theory have not been subject to empirical studies but for a few cases.

Some weaknesses concerning this theory should also be addressed. The theory about the effect of framing suffers from the same weaknesses as the Prospect theory (Kahneman & Tversky, 1979) and the Reference Point model (Loewenstein, 1988): since we know little about how reference points are formed, we know little about how different people will frame a certain payment and therefore it will be difficult to predict behaviour. Shefrin and Thaler (1988) noted that people might differ in their mental accounting practices, but did not elaborate on how these differences can be identified so that they can be taken into account when testing the model. The framing of a lump-sum payment might, for example, depend on the ratio between the present income and the size of the lump-sum, so that high-income people will have a higher tendency to put lump-sum payments into the “current-income” account than people with low income. Alternatively, the effect of the size of the lump-sum might interact with saving motives. Many possible factors that might influence the framing of an income component need yet to be explored.

Moreover, the theory should be elaborated in order to incorporate factors that influence the marginal propensity to spend from the different accounts. The theory does not say anything about whether the differences in the propensities will be stable across time. Is it possible that the propensity to spend current income decreases while the propensity to spend future income increases? What happens to current income which is not spent? Does it automatically enter the “savings-account” or does it stay in the current-income account? How do expectations about future income affect the propensities to spend from the different accounts? Although this model is based on ideas about human decision making, which are more behaviourally realistic, we do not know more about whether these assumptions correspond more to actual behaviour than what is the case with respect to the LCH.

## 2.4 CONCLUSIONS

Table 2.3 provides a summary of the proposed relationships and the empirical results concerning these relationships. It is clear that many of the relationships have not been tested empirically by economists or psychologists, although they have been flagged as important by several authors. The economists who proposed the most important saving theories displayed substantial psychological insight. However, when they formalised their models the effect of the psychological variables was reduced to mathematical constants. In Fisher’s theory the rate of time preference equals the market interest rate; likewise, the marginal propensity to consume is a constant in the theory of Keynes. For this reason, the underlying assumptions of their theories received little attention. Nevertheless, more recent contributions show that the trend is to abolish the simplifications and to allow for individual differences. It is clear that, in addition to the differences in economic variables, people differ in their motives, ability, and willingness to save and, further, that these differences can be quantified and used in empirical analysis.

Income is the most important variable in all the reviewed models. This is obvious because it defines the limit for spending and saving. The psychological variable that has been given the most weight is time preference, which describes the degree of concern for the present as opposed to the future. A variable that relates to time preference is self-control. The combined effects of time preference and self-controlling strategies have been tested empirically but only

to a limited extent, although the concepts themselves are often mentioned. Several authors mention upbringing and education as important in the shaping of time preference and self-control, which indicates that they think of these variables as reflecting enduring personal characteristics.

The various motives for saving are also frequently mentioned, with a special emphasis on the precautionary motive. It is still debatable how much of total saving can be attributed to a precautionary saving motive, and from this derive its importance. More research is necessary in order to establish the importance of, for example, the bequest motive in the elderly, the downpayment motive of the young, and the investment motives of the rich. The importance of the different saving motives might vary across household groups.

The effects of social comparison mechanisms have not been regarded important for saving behaviour within economics, although in other social sciences they are regarded as important for many types of behaviour; including spending behaviour. Duesenberry's theory has not inspired many of his successors, and the effects of interdependent preferences have not been addressed in all but a few studies. The research reported in this review shows, however, that social comparison variables are likely to have an effect on saving. Consequently, these effects and their implications should be studied further. In particular, ways of defining the reference group that people use should be given attention.

"Upbringing" is a variable that is mentioned by many authors. This indicates that they believe financial behaviour to be influenced by our earliest learning experiences. It can imply both a general training in the delay of gratification behaviour or specific training in economic behaviour by having to budget pocket money or discussing and participating in economic decisions with parents. For obvious reasons, the impact of differences in upbringing has barely been tested. The data necessary for a careful study would take years to collect. Nevertheless, the studies conducted thus far support the notion that elements of an individual's upbringing, such as observing role models delay gratification, are important for economic behaviour in adult life. This area should receive more attention in the future.

Economic theories are often based on a narrow set of explanatory variables. A phenomenon is observed (often on the macro level) and a story is produced to explain the behaviour that must have caused the phenomenon. This may lead us to overlook the most important variables. Perhaps it would prove useful to take a step backwards and attempt to get an overview of variation in saving behaviour over a longer period. The historian David A. Tucker (1991), for example, examined the past hundred to two hundred years in such a manner. In a book on saving behaviour in the US, he shows how the American culture shifted from a one valuing frugality and the virtue of thrift to a culture valuing immediate gratification and spending. In the eighteenth and nineteenth century, religion played a crucial role with respect to controlling luxury spending and extravagance. The attitude could be described as 'vice is wrong, saving is right'. The virtue of saving was taught in schools and in churches, it was promoted by politicians, and it was advocated in contemporary modern literature (for example, in the writings by Benjamin Franklin<sup>41</sup> and in books and magazines edited by Sarah Hale<sup>42</sup>). Even the saving banks produced propaganda-like literature that argued that the only effectual way of assisting the poor was to encourage the moral habits of industry, economy and sobriety. Some schools had "school banks", which were founded in order to teach children to save. From all institutions in

---

<sup>41</sup> "The Way to Wealth"

<sup>42</sup> "Boston's Ladies' Magazine", "Godey's Lady's Book", "Keeping House or House Keeping", "Boarding Out"

society, the take-home message was that one should delay gratification and save for better experiences in the future.

Tucker showed that the long-running affair with the virtue of thrift started to fade in the 1920s. The concept of thrift was gradually removed from language, textbooks and reference books. For example, female teachers preferred the concept “scientific management of households” to “thrift and frugality”. In women’s magazines, saving was more often described as the most serious financial mistake that was dangerous for the community and the nation<sup>43</sup>. Thrift was even described as a curse and a vice. It represented the least praiseworthy qualities a man or woman could have. Self-restraint was rejected, while living for the moment was in fashion. Advertising and the possibilities of credit and instalment buying played a role in this shift. Moreover, the stock market crash in 1929, followed by the Great Depression convinced people that saving would not do any good. Over 5000 banks shut down without repaying their depositors. Finally, Keynes won recognition when he preached that people should spend in order to reach full employment. The government practised deficit spending and the idea that thrift was not a virtue trickled down.

Tucker did not try to model saving or identify the variables that should be included in theories of saving. He left that to the reader. From his writing, it is clear that decisions about whether to save or to spend are not decisions made in a vacuum. Individuals are certainly affected by the norms in the society they live in. When thrift was considered as a preferred trait, spending would be subject to disapproval by others. Post World War II, the norm was that saving was bad and spending was good. These shifts in education are reflected in the savings rates. The saving rates in America are now less than half of what it was in the nineteenth century.

Tucker’s descriptions also showed that people’s beliefs and attitudes differ across individuals and groups in the society. There were people speaking in favour of spending in the nineteenth century, and people speaking in favour of thrift in the 1950ies. Saving habits could also differ between ethnic and religious groups. The economic theories reviewed in this chapter have not looked at variables like attitudes, norms, and beliefs. These are variables that not only might explain individual differences at one point in time, but might be important variables at the macro level as well, although they might change very slowly in a population. The next chapter will review some psychological research on saving behaviour in which the role of the variables identified by this economic historian, such as attitudes and norms have been focused upon.

---

<sup>43</sup> Examples (cited in Tucker, 1991) include: Martha B. Bruere: “Good Housekeeping” and “Increasing Home Efficiency”. C.W. Taber: “The Business of the Household”. Christine Frederick: “Efficient Housekeeping or Household Engineering”.

**Table 2.3**  
**Overview of proposed relationships and their empirical support**

Important variables at the household level	Proposed by	Results from empirical studies
<p>The rate of time preference → Saving (neg.)            People will harmonise their time preference rates in the financial market so that it will equal the market real interest rate. Time preference higher than the interest rate leads to dissaving and/or borrowing</p> <p>Determinants of time preference:            Size of income            Expected future income            Income uncertainty            Degree of foresight (length of time horizon)            Consumption habits            Self-control</p> <p>Expected remaining lifetime            Strength of bequest motive            Dependence of fashion            Stage in life cycle            Upbringing/ teaching of parents /social pressure</p>	<p>Fisher (1930)</p>	<p>Rates of time preference vary across decision scenarios, are often much higher than the real interest rate in the market, and vary across individuals. Time preference has been found to predict financial problems</p> <p>Ambiguous results            Weak support            Not tested            Supported in one study            Not tested            Not tested, but some observations indicate that self-control might mediate the effect of time preference.            Not tested            Not tested            Not tested            Not tested            Indirectly supported by studies on ability to delay gratification. Supported by the finding that those encouraged to save as children save more than others.</p>
<p>Absolute income → Propensity to save (pos)</p> <p>Saving motives → Propensity to save (pos)            Precaution, foresight, calculation, improvement, independence, enterprise, pride, avarice are motives thought to increase propensity to save.</p>	<p>Keynes (1936)</p>	<p>Supported by most studies.</p> <p>The precautionary motive influences saving behaviour, although researchers disagree about how much. Some support also exists for the improvement motive. The effects of other motives are not well documented, apart from the fact that people state that some of them are important.</p>
<p>Habits → Propensity to save</p> <p>Determinants of habits:            Race            Education            Convention            Religion            Current morals</p> <p>Generosity → Propensity to save (neg)            Hopes → Propensity to save            Extravagance → Propensity to save (neg)            Ostentation → Propensity to save (neg)            Distribution of wealth → Propensity to save            Established standard of living → Propensity to save</p>		<p>Not tested directly (but past consumption can predict present consumption)</p> <p>Not tested            Not tested            Not tested            Not tested            Not tested            Not tested            Not tested            Not tested            Not tested            Not tested</p>
<p>Relative income of people one meets frequently → Saving (neg)</p>	<p>Duesenberry (1949)            Modigliani (1949)</p>	<p>Support for the existence of social comparison is found, and that this influences purchase behaviour. Weak support for the notion that social comparison influences saving</p>
<p>Habits → Saving</p>		<p>Past income level and past consumption level have been found to predict saving</p>

Table 2.3 continued

Important variables on the household level	Proposed by	Results from empirical studies
Expectations towards life time income and remaining life time → saving (neg).	Modigliani & Brumberg (1954)	Studies support that subjective expectations towards future income influence expenditures in the predicted manner.
Households maximise their utility by distributing their life-time income evenly over their remaining expected life-time		Not supported by any experimental studies.
Uncertainty → saving (pos)		Higher saving has been found among people who are subject to income or expenditure uncertainty.
Precautionary motive → saving (pos)		Found to have effect, but researchers disagree about the magnitude.
Bequest motive → saving	Barro (1974)	Ambiguous results concerning importance and impact
Strategic bequest motive → saving	Bernheim et al (1985)	Supported in one study, but the explanations concerning the saving of the old are difficult to distinguish in the available data sets.
Consumption constraints → saving (pos)	Börsch-Supan & Stahl, 1991	Supported indirectly by observed decrease of certain types of consumption
Framing of income → propensity to save	Shefrin & Thaler, 1988	Support is found for the existence of “mental accounting” and that the marginal propensity to consume from these accounts differs.





# Chapter 3

## The psychological approach to saving

*The primary lesson here is admittedly a depressing one for economic theorists. The lesson is that their job is much harder than we may have previously thought. Writing down a model of rational behavior and turning the crank may not be enough, and writing down a good model of less than fully rational behavior is difficult for two reasons. First, it is not generally possible to build good descriptive models without collecting data, and many theorists claim to have a strong allergic reaction to data. Second, rational models tend to be simple and elegant with precise predictions, while behavioral models tend to be complicated, and messy, with much vaguer predictions. But, look at it this way. Would you rather be elegant and precisely wrong, or messy and vaguely right?*

R. Thaler 1992: *The Winner's Curse*, p. 198

### 3.1 INTRODUCTION

In this chapter is presented a review of empirical tests of the impact of psychological variables on saving and debt. The chapter closes with a discussion of the results of research using a psychological approach.

Psychological research on saving differs from economic research in several ways. A striking difference is that the psychological research on saving is fragmented, while the economic research is more thorough and consistent. Psychologists also tend to use different definitions of saving than those used by economists. Psychologists often focus on active decisions to save, while many economic models treat saving as a residual of consumption decisions. Moreover, psychologists have a fundamentally different perspective of human beings. Psychologists focus on the heterogeneity of savers - they assume that human beings do not react to stimuli mechanically - while economists often focus on homogeneity. Consequently, psychologists and economists often differ in their choice of explanatory variables. Finally, psychologists use a different methodology when studying saving. For example, economists test the relative importance of the precautionary saving motive and the bequest motive by testing the assumed implications of the two motives using structural models. Psychologists approach the same research question by asking people about why they save and which motive they consider the most important.

Research results from the two fields do not necessarily conflict. Instead, we often find that they are complementary and serve different purposes. As pointed out by Wärneryd (1999: p 297):

The primary purpose of economic-psychological research on saving is to provide descriptions and explanations of saving that are detailed and close to reality (cf. Katona, 1975; Simon, 1986; Lea et al., 1992). This enterprise is in no way in conflict with the economic approach nor is it a competitor. It will be a source of ideas which can in the long run become something more: a good descriptive and explanatory theory of savings and saving behavior. We are not quite there yet.

Many books and articles have been published in which both economic and psychological approaches to economic behaviour are reviewed and discussed (e.g. Furnham & Lewis, 1986; Lewis, Webley & Furnham, 1997; Maital, 1982; Maital & Maital, 1993; Lunt & Livingstone, 1992; Thaler, 1992; Wärneryd, 1999). Although they differ in scope and magnitude, the authors seem to agree on one thing: we need more descriptive and psychological research on the economic behaviour of individuals in order to restore economics' relevance to the human condition. The authors mention numerous examples of economic behaviour that do not lend themselves to being described by models of rational behaviour. One example is the division of labour between spouses (Lewis et al., 1995). For an economist, it would be natural to predict that the person who can earn the most "in the market" will be the breadwinner of a family. Household members would try to maximise their outcome and divide labour between them in the (economically) most efficient way. A psychologist, having a wider base of alternative explanations to choose from, might instead argue that the division of labour *also* depends upon factors such as social identity, preferences, values and cultural considerations. The same is true for saving behaviour. Psychologists see the act of saving as embedded in a larger behavioural layer of financial management, and do not limit explanations to economic stimuli alone<sup>44</sup>.

In 1970, Ölander and Seipel introduced their review of psychological approaches to the study of saving with the following statement: "The phenomenon of saving has been dealt with in many different economic theories, but several circumstances contribute to the fact that the factors influencing the saving behavior of private individuals have not been investigated to any large extent" (page 1). Today, 30 years later, this statement stands as an introduction to this study. Despite repeated calls for research both by economists and psychologists (e.g. Arndt, 1976; Ferber, 1973; Katona, 1975; Maital & Maital, 1994; Van Veldhoven & Groenland, 1993; Wärneryd, 1989, 1999) that stress the importance of increased psychological research on saving, empirical tests of the impact of psychological factors on saving are surprisingly scarce. The review in this chapter contains results from studies that have had saving as the dependent variable.

This chapter proceeds with a closer look at the ways psychologists define saving and the different approaches used, after which a review of the individual studies of saving is presented. To facilitate the review, it is organised according to the variable in focus. The variables are presented in the following order: expectations with regard to future economic conditions, attitudes towards saving and borrowing, saving motives, impulsiveness, personality structure, mental accounting, time perspective, risk taking and control of use of income and financial coping.

### 3.2 PSYCHOLOGICAL STUDIES OF SAVING

The study of saving is located within a branch of psychology called economic psychology. George Katona, being trained in both economics and psychology, is considered the founding father of modern economic psychology, although the term was coined by Gabriel Tarde as long ago as 1881 (see Wärneryd, 1999). Katona's observation of the economic development towards affluent economies, in which the consumers have a great variety of postponable expenditures,

---

<sup>44</sup> It is important to note that this difference is not necessarily due to economists being unaware of other variables that might play a role. The difference is more a consequence of how models are built within the two fields. Economists prefer to start with a simple model, and do not include new variables before empirical evidence suggests that the first model is too simplistic.

gave rise to increased focus on psychological variables in studies of consumption and saving. Consumers' saving and spending decisions became increasingly more important for fluctuations in the business circles and Katona (1975) argued that these fluctuations are influenced by people's motivations, attitudes and expectations.

One of Katona's most important contributions to the savings literature was to develop an index called the "Index of Consumer Sentiment" or the "Index of Consumer Expectations", which is described below. Through repeated surveys throughout several decades, Katona and his colleagues at the Survey Research Center at the University of Michigan demonstrated that models including psychological variables could, in some cases, provide better predictions of household saving and consumption than pure economic models. Katona's research has served as an important source of reference and inspiration for psychologists in exploring effects of psychological variables on economic behaviour.

### 3.2.1 Definitions of saving

Economists and psychologists often measure saving in different ways. Economists being concerned with predicting saving at the macro level, have often stressed that savings should be measured accurately and should include a broad range of ways of saving. Many psychologists, on the other hand, have been concerned with measuring what people mean about the word "saving" (see for example Bloem & Groenland 1995; Lyck 1992) and argue that we should study saving according to people's perception of the word saving. Some psychologists have therefore studied *perceived* saving rather than *actual* saving.

The definition of saving used by Katona and his colleagues was similar to that used by economists (see Lansing, 1954). However, Katona (1975) proposed a division of saving into three different types that he labelled "discretionary saving", "contractual saving", and "residual saving". They differ with respect to the decision processes underlying them. Discretionary saving is saving deposits of income made in the present period. Contractual saving is saving resulting from decisions in the past, such as down-payments on mortgages and saving contracts. This saving is fixed and regular and requires no new decisions in the present period. Finally, residual saving is saving in which is money "left over" by the end of the accounting period without being a result of an explicit decision to save. Katona (1975) argued that it is important to give special attention to discretionary saving, since it is this form of saving that will vary between periods and therefore influence the business cycle.

Scherhorn and Fricke (1961) divided saving into "Ansparen", which means to increase the value of assets, and "Absparen", which means reduction of debt. They studied the corresponding saving ratios and found that they relate to income in different ways. The "Ansparen -ratio" increases with income while the "Absparen-ratio" decreases.

Lindqvist (1983), inspired by Ferber (1973), distinguished between four different saving motives and argued that they are hierarchically ordered. The motives were labelled: 1) cash management, 2) buffer for unforeseen emergencies, 3) financial means for attaining a desired goal, and 4) wealth management. The underlying idea is that people respond differently to economic stimuli depending on which level in this hierarchy is most relevant to them. According to Lindqvist's theory the motives are not considered direct causes of saving; rather, they are mediating factors that might explain variation in reactions to economic stimuli, both in terms of saving and portfolio choice. Wahlund (1991) has found some evidence that people on different levels in the hierarchy responded differently to a tax reform.

Lunt and Livingstone (1991) distinguished between recurrent saving and total savings. They defined recurrent saving as saving done on a regular basis (“recurrent commitments to discretionary savings”) and total saving as liquid assets in banks and building societies. They found that variation in regular saving was predicted by disposable income, savings, amount spent on clothing and food, importance attached to the value of enjoyment and other psychological variables. Total saving, on the other hand, was predicted by disposable income, demographic variables, amount of money invested and purchases of insurance. Little of the variation in total saving was predicted by the psychological variables. Similar results were reported by Daniel (1997). She found that total saving was best predicted by age, while regular saving was associated with a healthy current financial situation, tendency of the decision-maker to save rather than spend a windfall income, high self-control and low time preference.

Results from these studies show that it might be important to distinguish between saving types. Different factors play a role in different types of saving. These factors might be neutralised when total saving is the dependent variable and the effects of psychological variables is difficult to identify. This speaks in favour of having a more advanced perspective on saving when the underlying processes behind saving are studied. Studying different types of saving in isolation might be deemed necessary in order to understand the psychological mechanisms underlying saving.

### 3.2.2 Approaches used in psychological studies of saving

Psychologists differ with respect to the approaches they use when they study saving. From the psychological literature, three approaches can be identified:

- 1) Saving is a result of a goal-oriented decision process in which evaluation of all possible outcomes concerning dispositions of income is assumed to be the underlying mechanism behind decisions about saving and consumption (e.g. Julander, 1975; Ölander & Seipel, 1970). So far, this hypothesis has not been tested empirically.
- 2) S-O-R models, in which psychological variables (“Organism variables”) are assumed to moderate effects of economic variables (“Stimuli variables”) like income on saving (“Response variables”) (e.g. Brandstätter, 1996, Julander, 1975; Katona, 1975; Lindqvist, 1981; Wahlund & Wärneryd, 1987).
- 3) Psychological variables (e.g. personality and attitudes) have an independent effect on saving (e.g. Lunt & Livingstone, 1991).

With a few notable exceptions (e.g. Wärneryd, 1996a, 1996b) it is the third perspective that has been subject to empirical testing. In the empirical work, researchers have made use of statistical tools such as multivariate regression, which do not easily lend themselves to testing models that include moderating or intervening variables. Instead, the stimulus and organism variables are combined and the statistical tools used actually assume that little interaction between the variables exists. For this reason, the S-O-R models of saving have hardly been tested empirically.

### 3.2.3 Concepts used in studies of saving

In the following section, some of the most important concepts applied in empirical studies on saving are reviewed as well as the results from the studies. Some of the work of Katona (1975)

on expectations and attitudes is a natural starting point. The review will then proceed with other psychological variables that have been proposed more recently.

### 3.2.2.1 Expectations - optimism vs. pessimism

Katona and his colleagues at the Survey Research Center at the University at Michigan conducted extensive surveys on the determinants of consumption and saving. In Katona's opinion, the most important variables for predicting changes in consumption and saving were income and expectations of future economic conditions (optimism or pessimism). Katona argued that saving is a result of both ability to save (measured directly by disposable income) and willingness to save (measured by how optimistic or pessimistic a person feels about the development of the economy both at a personal and national level). Willingness to enter into new credit agreements or to keep a low buffer for unforeseen events is a result of a high level of consumer confidence with respect to future economic situation.

Katona suggested that psychological factors lead people to react to macro economic changes in predictable ways. In particular, Katona (1975) disagreed with economists' faith in the laws of large numbers and the assumption that individual differences cancel out on the aggregate level. He argued that a variable like consumer expectation towards economic development is likely to be uniform and distributed in a population rather than cancel out. The reason for this is that economic news about business developments and economic policymaking are passed on to most households via the mass media. Based on this framework and on empirical results from multiple surveys using numerous questions about attitudes and expectations, the researchers at the Survey Research Center at the University in Michigan developed an index called "The index of consumer sentiment" (or "the index of consumer expectations"). The predictions based on the ICS are not quantitative, but they are used to indicate the changes or turning points of business circles.

The index consists of five questions, which cover three dimensions of consumer confidence and attitudes towards the future:

- Two questions concern expectations about the personal financial situation: whether the family expects to be financially better off, worse off or in the same situation compared to one year earlier and whether they expect to be better off, worse off or the same one year hence.
- Two questions relate to expectations about the national economy as a whole: whether the next year and the next five years will bring good or bad times.
- One question concerns expectations about the market situation (the prices and assortment of goods offered): whether it is a good or a bad time to buy durable goods.

The results from repeated surveys on these dimensions using representative samples of the target population provide economic forecasters with two useful measures. The first is a measure of uncertainty with respect to the future. The ratio of uncertain respondents to the total number of respondents gives an indication about the degree of uncertainty in the population. This measure is used for adjusting predictions, since uncertainty tends to discourage consumption. The second measure is obtained by calculating the ratio between optimistic and pessimistic respondents while disregarding the uncertain respondents. Changes in the ratio over time provide an indicator of aggregate economic behaviour. For example, when the ratio of optimistic people increases, it is expected that consumption will increase, resulting in an upswing in the economy. The use of this method in predicting business circles has spread to Australia and almost all European countries but its usefulness has been subject to disagreement. Katona (1975) found support for the index being an efficient indicator for development six months ahead and for changes in the business circle (Katona, 1975). Mueller (1963) concluded that the Index of Consumer Sentiment in combination with income data provides valuable information that cannot be obtained from financial and business cycle indicators. Juster (1981) reported that changes in the index predicted

personal saving and automobile sales at the aggregate level. Hymans (1970) and Sharpio (1972) on the other hand, argued that variation in the ICS could be explained through objectively measured economic antecedents and found that the contribution of the ICS to the prediction of discretionary consumer spending was modest when economic indicators of a more objective nature were included in the models. Vandel Abeele (1983) replicated these findings when predicting new automobile registrations in four European countries. Williams and Defris (1981) found that the index of consumer sentiment served as a useful predictor for short-term saving, while the index had little effect on the consumption of durables and motor vehicles. They also noted that real income and relative price effects were more important predictors. Finally, Carroll et al (1994), analysing data from the US for the years 1955 - 1992, found that the ICS explained 14 % of the variation in the growth of total real consumption expenditures. However, they did not find that the ICS contributed much beyond that of other available indicators.

According to Katona (1975), the Index of Consumer Sentiment failed to predict expenditure at the micro level in both cross-sectional and panel studies. For this reason, the Survey Research Center constructed a similar index for individuals. Using this moderated index, they found that the median expenditures on durables of optimists was higher than those with middle attitudes, who in turn spent more than the pessimists. Van Raaij and Gianotten (1990) tested the index of consumer sentiment's ability to predict expenditures on durables, non-durables, "other things", credit and saving. They found that the expectation-oriented questions about the household financial situation was a better predictor of saving than the questions concerning the development of the general economic situation. They reported that the evaluation of the development of the household financial situation is positively correlated with the consumption of durables, credit and savings, while it is negatively correlated with the consumption of other products and services. Disposable income was another important determinant of expenditure on durable goods, credit and saving.

Gianotten and van Raaij (1982) examined consumer credit and saving as a function of income and confidence. They found that the expectation of being able to save remained relatively stable over time, while the expectation of utility of saving showed a cyclical pattern. Generally, the more optimistic one is about the general economic situation, the more one expects to save, but the utility of saving is unrelated to general economic expectations. Also Souleles (2001) found that consumption was excessively sensitive to consumer sentiment. Higher confidence is correlated with less saving.

Lunt and Livingstone (1991) found that two items reflecting optimism ("expect to better off in one year hence" and "feel better off compared to one year ago") discriminated between savers and non-savers. Those who felt better off than before and were optimistic about their financial future, were "savers". This is the opposite of what would be predicted by Katona's theory. These items were not significant predictors of differences in saving. Moreover, they did not discriminate between debtors and non-debtors or predict debt repayment (Livingstone & Lunt, 1992).

Webley and Nyhus (2001) used the data from the CentER Savings Survey and found that debtors and non-debtors differed with respect to their five-year-income-expectation. Debtors were more optimistic than the mild- and non-debtors, which might explain why they borrowed money in the first place. This is in line with the life cycle hypothesis and Katona's theory.

The conclusions we may draw from this research is that the index of consumer sentiment is a useful predictor for aggregate saving and expenditures, but it is not yet clear whether it contributes much beyond other economic variables. With respect to predicting individual behaviour, expectation data (measured by the ICS or by other methods) seem to be useful, but

more research on the effect of expectations is necessary. The results concerning the relationship between optimism and saving are contradictory.

### 3.2.2.2 Attitudes

Attitudes towards saving are assumed to be deeply rooted and connected with upbringing and life style (Julander, 1975; Ölander & Seipel, 1970). For example, both Keynes (1936) and Katona (1975) argued that most people have positive attitudes towards saving. This may mean that attitudes towards saving would not be expected to predict actual saving well, as indicated by a failure to find any relationship between attitudes and saving in surveys. On the other hand, the non-findings may be the result of the measurement of attitudes towards saving. Numerous investigations have shown that when the relationship between attitudes and behaviour is studied it is important that the items used to measure attitudes match the specificity of the behaviour in focus. While most people are positive towards saving in general, they might differ in their attitudes towards specific acts of saving and towards their own saving (as opposed to that of others). As there are so many different "saving acts", it might be necessary to use a substantial number of items in order to cover all the relevant acts. The fact that people's reasons for (and ways of) saving also vary merely adds to the challenge.

The general goal of studying the relationship between attitudes towards saving and saving is to establish whether differences in attitudes or changes in them predict saving or a change in saving behaviour. A stream of research projects on the effect of attitudes and other psychological variables on household saving were carried out at the Stockholm School of Economics from the end of the 1960s until the beginning of the 1980s. Julander (1975) carried out an experiment on 215 young single women in Stockholm in order to establish the effect of feedback on saving behaviour. He found that attitudes towards saving correlated positively with each measure of saving. He measured "saving in the past month", "saving last year", "regular saving arrangements", "saving in the 32 days before the time of the interview", "how much of the respondents' last month's salary was left the day before payday", and "balance on bank accounts".

A second project commenced in the second half of the 1970s. One its purpose was to find cheap and reliable proxies for household saving and wealth. Another was to investigate the impact of some psychological variables on saving. The project was composed of three rounds of data collection: 1) personal interviews with 50 households in Stockholm, 2) telephone interviews with 200 randomly chosen Swedish households, and 3) telephone interviews with 400 randomly chosen Swedish households. In these projects, great emphasis was put on the role of attitudes towards saving. In the first study, 17 attitude questions were included, which were then used to build an index. The researchers identified four factors with a Cronbach's alpha<sup>45</sup> higher than 0.6, and these were used in the second and third round of data collection. The factors did not correlate with the saving measures<sup>46</sup> used in the first study, but some significant relationships were found in the second and third study. Lindqvist et al (1978) reported the findings from the second study. Attitudes towards saving were, in general, quite positive among all respondents, but they were more favourable among elderly people. The researchers could not, however, deduce whether this is an age effect or a cohort effect, as they had cross-sectional data. Using the same three measures of saving as reported above, they did not find any strong relationships between saving and attitudes. Two of the factors (these were modified versions of the ones found

---

<sup>45</sup> Chronbach's alpha is a summary measure of the intercorrelations that exist among a set of items. It is commonly used to assess reliability.

<sup>46</sup> These are "changes in assets and asset components the past month", "changes in assets and asset components the past three months", "expectations and plans to save the next six months", "number of assets components", and "use of savings".

in the first study) correlated positively with the total bank saving and some other assets components. They also found that people with a positive attitude towards saving tended to have more diversified economic portfolios.

In the third study, Lindqvist (1981) tested the effects of attitudes towards saving and four different estimates of saving. These were stated bank saving (banking accounts, stocks and bonds), repayments of debts, total savings and a liquidity estimate (the amount the household could withdraw from the bank at the time of the interview). He controlled for household income, family size and composition, educational level of husband and wife, employment, and type of residence. Using a fourteen-item scale for attitudes, he reported that they had little predictive power. However, his study suffered from two serious weaknesses. The scale used for measuring attitudes consisted of three points that were labelled: "strongly agree", "partly agree" and "don't agree" (Lindqvist, 1981). The high reported Cronbach's alpha of .96, could be due to the few points on the scale and that the scale is asymmetric. Moreover, the measures of saving were not adequate. Respondents were asked about changes during the past three months. One indication that the measures were inadequate was that none of the economic variables (for example, income) were related to bank saving.

Furnham (1985) investigated attitudes towards saving in Britain. More specifically, he investigated the relationship between attitudes and variables such as age, sex, education, likelihood of voting, and income. Attitudes toward saving and habits of saving were measured using a 15-item 7-point agree: (7) disagree (1) scale. A Factor Analysis revealed five clearly-interpretable factors, which accounted for over 55% of the variance. These were labelled "pointlessness of saving", "benefits of saving", "wealth", "denial", and "investments". He found that education could discriminate between the various saving attitudes: the higher- and lower-educated held negative attitudes towards saving, while the middle-educated were more positive. Age was linearly related to saving attitudes (older people were more positive with respect to saving). In addition, conservatism and alienation were found to have a relationship with certain attitude dimensions. Furnham found that although older, left-wing, lower-income, more-alienated people believed saving to be pointless, they did recognise its benefits. He concluded that people can hold different attitudes towards their own saving as opposed to attitudes towards saving in general. The relationship between attitudes and saving could not be analysed due to a lack of variation in both how regularly the respondents saved and in their saving-to-income ratios. In addition, this study suffered from weaknesses that might have affected the results. First, the applied sampling technique was rather unorthodox, as the respondents were sampled in three different ways. The sample came from two university subject panels, colleges of further education and departments of external studies, and one third were recruited by post and by undergraduate students in their hometowns. This might have influenced the results regarding education. Secondly, the data collection procedure differed between the subjects. Thirdly, Furnham (1985) did not specify the level of analysis. He collected data at the individual level, but he did not report whether he asked people about their personal saving or their household saving.

In their study of determinants of saving, Lunt and Livingstone (1991) found that one attitude item was significantly related to recurrent saving. The more people save, the more inclined they are to disagree with the notion that being in debt means people do not manage their money properly. The attitude items used in their study did not contribute towards an explanation of total saving.

Wärneryd (1996b) tested a model similar to Ajzen's Theory of Planned Behaviour (Ajzen, 1991), using structural equation modelling and data from the CentER Savings Survey. Because this data set was not tailored for his study, Wärneryd's model deviated from that of Ajzen (1991)



by not including attitude measures reflecting specific actions to save. Proxies had to be used for the variables “subjective norms” and “perceived control”. Wärmeryd analysed 21 attitude-to-saving items and identified five orthogonal factors, which he labelled “thrift”, “no need to save”, “saving involvement”, “shame of debt”, and “saving habits”. These factors accounted for 47% of the variance. Webley and Nyhus (2001) found some confirmation of this factor structure using data from other waves of the data collection for the CSS. Contrary to expectations, Wärmeryd found a negative relationship between attitude towards saving and intention to save. This could be explained by three other findings: 1) attitudes were positively correlated with age and age was negatively correlated with saving, 2) women were more positive towards saving than men (independently of whether they had saved or not, but women still reported less intention to save than men) and 3) certain savers were less positive towards saving than non-savers. Interestingly, Wärmeryd found that the highest values for thrift were found among women whose households did not save and did not plan to save. This might indicate that behaviour influences attitudes: those who save, do not see much use of further saving and their attitudes are less positive than for those who do not save, but would have liked to save. Wärmeryd also mentioned that contractual saving and being forced to pay off debt can explain why we find a negative relationship between saving and attitudes towards saving.

Some studies have focussed on attitudes towards debt. Attitudes towards debt and credit were found to be relevant by Livingstone and Lunt (1992) and Lea, Webley and Levin (1993), but not by Lea, Webley and Walker (1995). Livingstone and Lunt (1992) reported that four attitude items concerning attitudes towards debt significantly discriminated between debtors and non-debtors. Those who had no debt held negative attitudes towards debt, while those in debt tended to think that credit makes life easier. However, among those with debt, these attitude statements could predict neither the amount of debt nor debt repayment. Other attitude statements were significant when predicting amount of debt. The more positive attitudes towards debt a person had, the more debt he/she repaid

Lea et al (1993) studied people with no debt, mild debt, or serious debt to the Welsh Water Company. Non-debtors were those with no outstanding debt to the company, mild debtors were those who had received a second request for payment and who had yet not paid the bill at the time of the study, and serious debtors were defined as those against whom court proceedings for recovery of debt had been initiated. Using a twelve-item attitude scale, they found that serious debtors held slightly more permissive attitudes towards debt than the non-debtors, although no group can be described as being positive towards debt.

Lea et al (1995) performed a new study of the customers of the Welsh Water Company in which they put more effort in developing an attitude scale than had been in Lea et al (1993). Lea et al (1995) carried out a preliminary analysis in order to develop a satisfactory attitude scale following psychometrical methods. A set of 17 items was selected for use and the Cronbach's alpha for this scale was 0.77. This scale did not differ significantly between the non-debtors, mild-debtors and serious debtors. A Factor Analysis resulted in five factors with Eigenvalues greater than 1.0<sup>47</sup>. Scales corresponding to these five factors were constructed and tested for differences between the groups. Only one of these factors showed significant differences between the three debt-groups. This factor contained items that most closely related to money management.

Davies and Lea (1995) and Webley and Nyhus (2001) found some support for the assertion that attitudes towards debt are a consequence of debt rather than a cause. Davies and Lea collected

---

<sup>47</sup> The Eigenvalue expresses the amount of variance explained by a factor. An Eigenvalue greater than 1.0 means that the factor accounts for the variation in at least one item.

data from 140 undergraduate students at the University of Exeter and found a higher tolerance of debt in students who had been at university longer. The attitude score was slightly anti-debt in the first year, when the average of debt was £53 and 25% of the students were in debt, while the attitude score was strongly pro-debt in the third year when the average of debt was £527 and 65% of the students were in debt. Further analyses showed that the increase in debt occurred earlier in students' careers than the increase in tolerance towards debt. Davis and Lea ascribed this to attitude adjustments designed to ensure consistency between behaviour and attitudes. Webley and Nyhus, using data from three waves of the CSS, found that debtors were less unfavourable towards debts than mild debtors and non-debtors. Further analyses, using a cross-lagged panel design, provided some evidence that being in debt modifies one's attitudes towards debt. Both studies indicated that attitudes towards debt might be adaptive. Attitudes change after debt has been incurred. This causal direction would be in line with Festinger's (1954) cognitive dissonance theory. Nevertheless, the relationship needs to be studied further, as the study by Davies and Lea was a pseudo-longitudinal study rather than a true longitudinal one. Moreover, panel attrition might have affected the results of Webley and Nyhus.

### 3.2.2.3 *Purposes and motives of saving*

Both psychologists and economists have studied the reasons for saving behaviour. Keynes (1936) proposed eight saving motives (see Chapter 2), while Lindqvist (1981) proposed four.

Lindqvist (1981) proposed a hierarchy of saving motives inspired by Ferber's (1973) suggestion that households' financial decisions consist of four types: cash management, consumption decisions, saving decisions and assets management. Cash management involves decisions concerning the households' handling of money: how regular expenses are paid, the number of or types of bank accounts the household owns, etc. Consumption decisions concern both routine purchases and strategic purchases of consumer durables. These decisions might result in saving or borrowing decisions. Saving decisions are decisions in which the allocation of income between now and later periods are made. According to Ferber, available resources and household members' goals and attitudes will influence these decisions. Other influential factors might be the household composition, life style and news from mass media and reference groups. Asset management deals with how the saved money is invested; i.e. portfolio choice. The household has to decide the time horizon and the risk to which they are willing to expose their savings.

According to Lindqvist, this division corresponds to the function of bankbooks in households found in a German study by Schmölders (1969). He found that bankbooks serve four functions: daily expenses, saving for consumption, precautionary reasons and increasing assets. Building on these findings, Lindqvist proposed that it is possible to define a hierarchy of saving motives: 1) The cash management motive, which means that a household has to keep a liquid reserve so that expenses and bills can be paid. This motive is caused by the fact that salary often is paid once a month, while bills and expenses have to be paid on a more continual base. 2) The buffer and safety motive, which means that people need to have a (liquid) reserve to cover unexpected expenses. 3) The goal saving motive, which stems from the fact that some products (holidays, durables, or accommodation) are so expensive that the consumer needs to save to be able to buy them. 4) The asset management motive requires that the other three motives are satisfied. This motive arises when a household has a satisfactory reserve of liquid means for unexpected expenses and their planned purchases. It concerns the needs to choose the suitable portfolio for savings exceeding the necessary liquid reserve.

Wahlund and Wärmeryd (1987), and Wahlund (1991), found support for this saving hierarchy. Wahlund and Wärmeryd performed a Cluster Analyses on a sample of Swedish males and found four clusters that could be called, respectively, cash managers, buffer savers, goal savers and wealth managers according to their most important saving motive. Wahlund (1991) studied the

effect of a Swedish tax reform and found that the four types of households responded differently to the reform depending on their place in Lindqvist's saving motive hierarchy. The reform was constructed to reduce debts and increase saving, but Wahlund found that cash managers dissaved after the reform was introduced, while the wealth managers acted according to their intentions.

Psychologists have studied the purposes or motives of saving by asking people why they save. Table 3.1 reports the results from two surveys conducted in 1960 and 1966, in which people were asked about their reasons for saving (Katona, 1975).

Table 3.1  
Purposes of saving

Purpose of saving	1960	1966
Rainy day	46%	45%
Retirement/old age	27%	31%
Children's needs	25%	22%
Buying a house	8%	8%
Buying a durable good	6%	7%
Total	*	*

Source: Katona (1975, Table 15-1 page 235)

Note: Totals add up to more than 100% because some respondents mentioned more than one purpose.

The table reports frequencies in percent.

Only purposes mentioned by more than 3% of the respondents are listed.

Katona grouped the reported reasons for saving into the following categories:

1. *For emergencies.* This corresponds to the economic "precautionary saving motive", which implies reserving funds for "rainy days".
2. *For retirement.* Includes retirement and money needed for old age.
3. *For children and family needs.* This includes expenditures associated with raising children and their education.
4. *Other purposes.* This includes buying a house or saving for a vacation.

Furthermore, Katona (1975) reported that few respondents mentioned saving for the purpose of improving one's future standard of living, earning interest or bequeathing money to their heirs. In spite of this, these motives are frequently mentioned by economists in studies of saving.

Both economists and psychologists agree that people have reasons for saving and that saving might differ with respect to which motive is the most important. Some research has supported the hypotheses that people with different saving motives respond differently to economic stimuli (Wahlund & Wärneryd, 1987). Still, little has been done in order to develop this research further. For example, the saving motives vary with respect to the time perspectives they imply. Saving for old age implies more long-term planning than saving for a specific vacation that is likely to imply a much shorter period. Saving for a "rainy day", on the other hand, is less associated with a specific time period. It might be beneficial to investigate how the length of the time periods involved with the savings motives will interact with the ability to control expenditures, the impatience to spend, and the attitudes towards saving and borrowing. Furthermore, saving motives might be related to the planning horizon people use and their expectations about future economic expectations.

#### 3.2.2.4 Impulsiveness

Impulse control has been associated with self-control and the ability to delay gratification (see Daniel, 1997). Impulse control relates to the extent a decision-maker thinks about advantages and disadvantages before making decisions. Individual differences in delay of gratification

behaviour are considered behavioural manifestations of a general disposition to contain impulses and desires. It is expected that impulsiveness will be negatively correlated with saving.

Julander (1975) found that impulsiveness correlated negatively with several of the different measures he used for saving (see 3.2.2.2). A low degree of impulsiveness was related with high saving. In his study, impulsiveness was measured using Barrette's index of "lack of impulse control", which consists of items meant to measure the degree to which a person likes to do things that require patience.

Daniel (1997) studied the relationship between saving behaviour and impulsiveness together with related concepts such as impatience, time preference, the ability to delay gratification, self-control and consideration of future consequences. Data were collected from 110 households in South-West England and analyses were conducted both at individual and at spouse level. Saving was measured as total saving and recurrent saving (amounts saved regularly). Impulsiveness was significant in some parts of the analyses of recurrent saving, but the finding was not robust. Depending on the methods of analyses, different psychological variables were significant.

### 3.2.2.5 Personality structure

Although the links between saving behaviour and personality were identified over thirty years ago (Schmolders, 1966), few studies have addressed the relationship between personality structure and saving behaviour. Traditionally, economists have not considered the concept to be of much importance, since they are interested in changes over time, whereas personality traits are, necessarily, stable over time (Wärneryd, 1999). Psychologists' interest in household economic behaviour has been limited and psychologists have failed to establish the relationship between personality and saving. However, the concept might be important in explaining individual differences in saving, and the few psychological studies that have been conducted in order to study the effect of personality structure are reviewed below.

Within the field of psychology, controversy exists about which personality factors are the most important. Consensus concerning the matter is increasing in favour of a model of personality structure comprising five dimensions: Extraversion (vs. Introversion), Agreeableness (vs. Dominance), Conscientiousness (vs. Inconscientiousness), Emotional stability (vs. Neuroticism), and Intellect (vs. Openness) (Digman, 1990). Some of these dimensions might be associated with the willingness and ability to delay gratification and, therefore, with saving behaviour. For example, Wärneryd (1996a; 1999; 2000) linked the concept of thrift, which has been considered being a stable personal characteristic important for saving, to the dimension "conscientiousness", while Brandstätter (1996) proposed that stable introverts might score low on impulsiveness while unstable (or neurotic) extroverts might score high on impulsiveness<sup>48</sup>.

Routh and Burgoyne (1991) tested the relationship between the "Big Five" personality factors and "absent-mindedness with money". Absentmindedness refers to a range of human mistakes, slips and lapses, and the authors designed an instrument to measure absentmindedness in the domain of money (AWMQ). The instrument contained thirty questions for assessing a person's proneness to commit everyday errors involving money. The scale used for measuring the five personality factors contained 181 items (the NEO-PI). They found a high negative correlation between the AWMQ and the measure of conscientiousness. The correlation coefficients between the AWMQ and the other four personality factors were low. Hence, more conscientious people

---

<sup>48</sup> He relied on a study by Schmolders (1966) (as cited in Brandstätter, 1996), who found that both attitudes towards saving as well as actual saving behaviour were deeply rooted in personality. Conscientious, self-disciplined people, compared to the easy going, carefree people, were three times as often saving regularly and saved on the average 10-12% of their income compared to 5-7% of the opposite type of persons.

are less absentminded with respect to money. Relying on their own work as well as previous studies that showed similar results, Routh and Burgoyne (1991) concluded that their study established the importance of considering conscientiousness when seeking to understand behaviour involving money. Similar conclusions were reached by Wärneryd (1996), who found that conscientiousness was the most important personality dimension associated with financial self-control.

The CSS contains the 16PA personality adjective list developed by Brandstätter (1988). The index contains 32 bipolar scales of adjectives<sup>49</sup>, two for each of the original 16 dimensions of Cattell's second order personality dimensions (the so-called Cattell's 16PF test) (Schneewind, Schröder & Cattell, 1983). It is an index that takes five to seven minutes for the respondents to answer and, according to Brandstätter (1988), it represents a sufficiently reliable substitute for the full personality scales, which often comprise hundreds of questions. Hence, the scale should be well suited for surveys. The idea is that these personality dimensions might moderate some of the most theoretically important causal effects between economic factors and saving behaviour. Brandstätter (1996) argued that the personality traits are broad and abstract variables and one should not expect strong relationships with behaviour. Instead, the personality traits might affect attitudes and intentions, which in turn will influence behaviour.

Brandstätter (1996), analysing the CSS data<sup>50</sup>, found that the three dimensions "emotional stability", "introversion", and "conscientiousness" are related to saving (saving was measured as self-reported saving the previous year). He did not propose direct relationships between the five factors and saving, but he suggested that the personality factors predominantly would influence saving attitudes, which in the next round would influence saving behaviour. He also proposed specific interaction effects between the factors. For example, he proposed that extroversion causes a larger difference in saving with emotionally unstable subjects than with emotionally stable subjects. Conscientiousness was also assumed to dampen the influence of extroversion on saving. Brandstätter found that couples scoring high on conscientiousness found saving attractive, and more so if they also were introvert. However, when saving attitudes were included in the model, conscientiousness lost its impact. Brandstätter also found that the relationship between saving attitudes and actual saving was stronger among introverts than among extroverts. He also reported that there was a relationship between the personality factors and household income, which makes it unclear how large the pure effect of these factors is on saving. The personality factors were only found significant predictors if they were entered before the socio-economic factors.

Wärneryd (1996a) found similar results as Brandstätter when using the same data set and the 16PA when measuring the personality dimensions. He used reported saving motives, saving attitudes, and saving behaviour as dependent variables and found that conscientiousness and inflexibility were significantly related to intention to save and saving behaviour. The strength of the relationship was mediated by saving attitudes. Saving attitudes were also found to be influenced by saving motives, which had no direct influence on saving. Overall, different personality traits correlated significantly with different attitude factors, saving motives and saving behaviour. But the results were not always robust, as they were not significant in both panels (the representative panel and the high income panel – see Chapter 5 for a description of the panels) and some results were also difficult to interpret, as the direction of influence was opposite from what was expected. It is also difficult to compare the results of Brandstätter's and Wärneryd's studies since there is considerable disagreement between the factor structures they

---

<sup>49</sup> Sixteen questions were included in the first wave of data collection, while the other sixteen were included in the second wave.

<sup>50</sup> Brandstätter used the sixteen items collected in the first wave of data collection.

found when analysing the personality data. Only the conscientiousness factor was formed by the same items across the two studies. As few as eight of the items used in Brandstätter's analysis loaded on the same factors as in Wärneryd's study. This might explain why different personality factors came out significant in the two studies. Webley and Nyhus (2001), analysing personality data from more waves, found the factor structure reported by Wärneryd (1996a) to be robust. They also reported that it had some relationship with being in debt.

In a second study of the CSSdata, Wärneryd (2000) analysed the Five-Factor Personality Inventory (FFPI) (Hendriks, Hofstee, De Raad & Angleitner, 1999), which consists of 100 items (these were collected in the fourth wave of the CSS taking place in 1996). He used only the sub-scale for "conscientiousness" and found that it was a significant predictor for "financial situation", "saving habits", and "saved sum". The increase in pseudo- $R^2$  was rather low when conscientiousness was added to the equation (containing socio-economic variables), so inclusion of the variable did not contribute greatly towards explaining variance in financial behaviour.

In a recent study, Nyhus and Webley (2001), used the CSS data to explore the effect of personality on six different measures of saving (liquid saving, investment saving, insurance saving, debt, total saving and plans to save). They used both the 16PA and the FFPI to see whether the personality variables contributed towards explaining variations in saving. As the factors derived from the two indexes only partly overlapped, they used nine personality factors in the analyses. They found that three personality factors - emotional stability, autonomy and extraversion - were robust predictors of saving and borrowing behaviour. Agreeableness, inflexibility and tough-mindedness could explain certain types of saving. The inclusion of the personality factors significantly increased the explained variance in saving. Evaluating all the studies reviewed above together, we may conclude that the personality factors seem to be important for explaining individual differences in saving but more research is necessary to explore the nature of the impact of these traits further.

#### *3.2.2.6 Mental accounting*

In some of the most recent contributions within the saving literature, the concept of mental accounting receives some attention. The idea is that people allocate previous (current assets), present, and future income to different mental accounts, and that their willingness to use money from these accounts differs. Mental accounting describes the process of coding, categorising and evaluating final financial outcomes. For example, Shefrin and Thaler (1988) proposed that the marginal propensity to spend will be highest for present income and lowest for future income (see Chapter 2), and they reported results from an experiment where students had expressed that they expected to consume more during a year if money was coded as current income. The students were less willing to use savings and least willing to spend future income.

Karlsson, Gärling and Selart (1997) performed two experiments on Swedish undergraduate students in order to test whether the propensity to consume varied for current income and assets. They found that the propensity to consume was greater when subjects were asked to imagine that they received an income increase than when they were asked to imagine that they experienced an income decrease with saved money available. The total amount of available money was equal between the two situations. The results of Shefrin and Thaler were replicated in this study. In a different study, Selart, Karlsson and Gärling (1997) collected data from a nationwide Swedish sample (996 individuals) and a student sample (277 randomly-selected undergraduate students) in a second attempt to replicate the results of Shefrin and Thaler. In this study, they found that subjects expected to consume more when they were asked to imagine that an income increase would be received as an immediate lump sum than when the income increase would be received as future monthly increments. Selart et al. interpreted this as being contrary to the predictions of the Behavioural Life Cycle Hypothesis. There is, however, a possibility that the respondents

have perceived the (future) monthly increments as future income, and the findings are then in accordance with the BLCH. The results are still puzzling, since the alternative with the monthly increments was described as a permanent income change. The net value of this alternative was therefore much higher than for the two lump-sum alternatives. For this reason, it would be natural to expect that the willingness to consume would be highest for the monthly-increment alternative.

The results from the research on mental accounting suggest that the assumption about fungibility of money does not hold. It might, therefore, be sensible to take people's labels of their money into account when predicting saving and consumption. We still know little about the process of labelling money. For example, we do not know the threshold value of an income increase that determines whether an increase will be labelled asset instead of income. We also need to know whether the threshold value varies between individuals or households and which factors that might influence the threshold value. Only with this knowledge will we be able to improve predictions of the effect of an income increase on saving based on the concept of mental accounting.

### 3.2.2.7 Time perspective and time horizon

Time horizon, in this context, expresses how far into the future a person plan their consumption. In Modigliani and Brumberg's life cycle hypothesis described in Chapter 2, the time horizon is set equal to the expected remaining lifetime. Friedman, the creator of the Permanent Income Hypothesis, used consumption data to estimate people's time horizon and concluded that it is three to four years. Other economists have argued that the time horizon lasts longer than a person's remaining lifetime, as people take the needs of their heirs into account (e.g. Barro, 1974).

Psychologists have studied time horizons by asking people about whether they make plans or not with respect to economic decisions and about the length of their planning horizon. Responses to these questions suggest that time horizons vary between individuals and between purchasing situations. The overall conclusion from the studies is that people with a longer planning horizon save more. Juander (1975) found that future time perspective is positively related to saving. He defined time perspective as "the degree to which the future is seen as predictable structured and controllable" and he used an index consisting of twelve statements about the future to measure it. Lea et al (1995) found that the debtors' time horizon was shorter than that of non-debtors and mild debtors. Wämeryd (2000) used a "Future-orientation"-scale, which was included in the fourth wave of the CSS, and found that foresight was positively related to financial situation, saving habits, and savings. Webley and Nyhus (2001) found that people with debt problems had a shorter time horizon than others. However, a dynamic analysis indicated that the shorter horizon was more likely to be a *result* of the debt problems rather than a cause. The causal direction is uncertain and further work is required to clarify the relation between saving and time horizon.

### 3.2.2.8 Risk taking

Dahlbäck (1991) studied the effect of risk taking on saving among single-person households in Sweden. Treating propensity to take risk as an enduring trait variable, he argued that people's propensity to take risk would influence saving and portfolio choice. He constructed an index of propensity to take risk by asking subjects about their risk-taking across various situations. He found that cautious persons tended to have a lower burden of debt and were more likely to have a larger portion of their total savings in bank accounts. He did not find, however, a relationship between caution and total net capital. The index used for measuring propensity to take risk was only weakly related to a variable called "the security motive" of saving.

### 3.2.2.9 *Control with use of income and financial coping*

Julander (1975) studied the influence of keeping track of expenses using a diary, knowledge about how income was spent and to what degree goals were accomplished on saving. He also studied the relationships between these explanatory variables. His sample consisted of women between 24 and 28 years of age living in one-person-households in Stockholm. They also had full-time jobs, were without any university degree and had a taxable income between SEK 16000 and 20000. He did not find the results he expected. First, satisfaction with saving and use of income declined among the respondents who had kept track of their expenses for a month. Second, the effect of bookkeeping on saving was not straightforward. Julander (1975) found that those reporting the highest variable expenditures reduced their saving after practising bookkeeping for a month, while he found the opposite effect among those who had reported low variable expenditure.

Lunt and Livingstone (1992) reported that those who did not save regularly felt less in control of their finances and did not monitor their finances as well as the people who saved regularly. Non-savers were also more fatalistic than savers. Non-savers preferred flexible strategies in their financial management while savers used a more fixed financial management. However, the question remains about what is cause and effect here. We do not know whether it is lack of saving that makes people feel they have little control or whether lack of saving is caused by little control.

## 3.3 WEAKNESSES OF PSYCHOLOGICAL RESEARCH

One problem with the studies reviewed above is that they are difficult to compare. Thus, it is not always possible to link results to any general theory of saving. One reason is the differences in the definitions of saving, as discussed in the introduction of this chapter. A second problem is the large number of independent variables used in the studies. Some studies can be characterised as fishing expeditions in which questions are added to questionnaires without being associated to any theoretical construct. It seems that the researchers have not given much thought to which theoretical concepts they want to measure and which impact they are expected to have on the behaviour in focus. Results are sometimes reported at the item level instead of at construct level. This makes theory development in this area of research difficult. For example, Julander (1975) used variables like “perception of how easy/difficult it is to make ends meet”, “attitudes towards book keeping”, “attitudes towards planning”, “attitudes towards more leisure time”, “satisfaction with standard of living”, “how often one feels tired and depressed” in his study of saving (Julander, 1975). Questions meant to measure these variables are asked and a significant correlation between them and saving is found, but it is difficult to relate these findings to any general saving theory. Likewise, Lunt and Livingstone (1991) reported that the following variables predict recurring saving: “The use of for-sale columns in newspapers”, “frequency of shopping around for the best buy”, “discuss money with friends”, “attitude to debt as bad management”, and “value of enjoyment”. Livingstone and Lunt (1992) found that “think about money”, “enjoyment of shopping for clothes”, “shop in favourite shops” may be used as predictors for personal debt. It is not self-evident which theoretical construct these psychological items are meant to tap. The measurement scales or indexes are not reported and the relationships between the variables are not further explained.

A third problem is that it is difficult to conclude anything about the relationships between the different psychological variables. Empirical tests suggest that attitudes towards saving and debt, saving motives, and personality factors are related, but we do not know much about how they are



related. We also need to know more about causes and effects with respect to these variables. A fourth problem is that the studies vary with respect to level of analysis. Ideally, the household or the decision unit within a household should be the unit of analyses. Instead, many psychological studies are done at the individual level, without giving any account for how the problem of common assets and joint decision-making is avoided (e.g. Furnham, 1985; Webley & Nyhus, 2001). Research by Gunnarsson (1999) and Daniel (1997) showed that results were affected by the level of analyses and also by how the data are aggregated.

### 3.4 CONCLUSION

The reviews presented in this chapter and the previous one show that psychology has a lot to offer with respect to increasing our understanding of individual saving behaviour. The economic literature on saving is rich on plausible theories about which psychological mechanisms influence the choice between saving and consumption. Unfortunately, many of these theories have not been subject to empirical analysis, which make them little more than deductive theories of saving. Psychologists can contribute towards testing the psychology-based assumptions underlying the economic models.

Many studies have shown that the inclusion of psychological variables in saving models increases the explained variance in saving. Beyond that, we know little about the size of the impact of the psychological variables on saving and the relationships between the psychological variables. We also need to establish whether the psychological variables are causes or effects. Empirical psychological research on saving behaviour is in its infancy, and we need extensive and systematic research before we can develop a psychological model of saving.

The most significant contribution of psychological research to the saving literature is the inclusion of subjective expectation in saving models. As shown in the previous chapter, this way of measuring expectations has been adopted by some economists. This variable can be used successfully in studies at both the micro- and macro-economic levels. Saving motives, attitudes, and individual time horizon have been found to have an effect on saving. In addition, these variables might be useful in investigations of aggregate behaviour, as they might be used as a criterion for segmenting the population. Psychologists are also focussing more on individual traits that might be important for saving behaviour, such as personality, impulsiveness, and self-control. Although these variables will be difficult to use in macro analyses of saving, they might contribute with respect to explaining the large individual variance in saving left unexplained by economic models. Some of the findings presented in this chapter can also be used as support for some of the economic models presented in Chapter 2. For example, Wärneryd (1996b) found some indication that those who save do not see much use of further saving and their attitudes are less positive than for those who do not save, but would have liked to save. This finding supports the ideas behind the buffer stock model: People prefer to have a buffer against unforeseen emergencies and people who have a satisfactory buffer are not interested in further saving.

### 3.5 IMPORTANT PSYCHOLOGICAL CONCEPTS IN THE SAVING LITERATURE

The first research question to be addressed in this study was: Which of the psychological explanations for saving found in the existing economic and economic psychological literature are supported by empirical findings? The reviews presented in Chapters 2 and 3 show that many plausible relationships between economic and psychological variables and saving have been proposed. The review also shows that the empirical foundations for most of these theories are quite uncertain. Although it is tempting to propose and test a general economic-psychological

theory of saving, it is not advisable because the primary need must be to identify the most important factors. This identification must be empirical. We have to establish which of the proposed factors are the most important for saving behaviour before putting them together in a model.

It is sensible to follow Katona's (1975) suggestion when summarising the most important psychological saving theories. He proposed to study both ability and willingness to save when studying household saving behaviour. Katona spoke predominantly about income as the ability factor and expectations about the future as determining the willingness to save. The reviews presented suggest that this framework can be used and further developed.

The psychological factor mentioned most frequently in the savings literature is time preference. Time preference is almost equivalent to an individual's willingness to save because it captures the preference for immediate consumption as opposed to future consumption. The results from empirical investigations of the relationship between time preference and saving are not conclusive, though some confirming evidence exists. Experimental studies also make it clear that one of the problems that must be solved before we can learn more about this relationship is the measurement of time preference.

Several factors proposed as important psychological determinants of saving might influence the willingness to save. In particular, the possibility that we do not adequately imagine the intensity of our future feelings has been the topic of many discussions about saving behaviour. If we fail to consider the utility we derive from consumption in the future, we might fail to save enough, because we will put too much weight on the utility derived from present consumption. Several authors advocate that time preference or willingness to save is related to, and might be determined by, the time horizon people use when planning their economic behaviour. If people use a short time horizon, time beyond the horizon is given no weight, which might result in focus on consumption of the present and inadequate saving for the future. Some empirical support for such a relationship between time horizon and saving and borrowing exists. Time preference and willingness to save is also thought to be influenced by people's expectations about their future income and expenditures. If a person is optimistic, he or she is less willing to save and more willing to borrow, while pessimism makes a person more concerned about the future and more willing to save. This relationship receives some empirical support.

Results from surveys show that people differ in the reasons or motives they have for saving. Some people want to earn interest while others want to have security by having an economic buffer against unforeseen emergencies. Empirical findings support that the saving motives might have some effect on the levels of saving. However, research so far has only established the existence of the motives and some estimates of how much saving that might be attributed to the motives (in particular, the precautionary saving motive). No study has investigated whether individual differences in the perception of how important the motives are have any influence on saving. Few studies have also investigated why people vary in their saving motives. For example, the precautionary saving motive might be related to both risk attitude and the uncertainty with respect to future income and expenditures. Uncertainty has been found to encourage saving, while positive attitudes towards risk might have the opposite effect. Other frequently mentioned saving motives are retirement and children's needs. Their importance is most likely to vary over the life cycle.

Although not proposed in the reviewed literature, it is possible that the influence of reference groups might affect the willingness to save. If people feel deprived with respect to their consumption, their willingness to save might be weak. Some empirical studies support the idea that saving (or consumption level) is influenced by the consumption of others. It is also likely

that trait variables such as attitudes towards saving and debt and personality factors are important for explaining individual differences in the willingness to save. Empirical research suggests that these factors have an independent effect on saving. These factors might also be related to the importance people assign the different saving motives.

Katona (1975) mentioned economic resources as a primary determinant in the ability to save. The findings reported above suggest that we should add some psychological variables to this 'ability' factor. Both psychological and economic research has demonstrated that the concept of time preference is not straightforward in its prediction of saving, as many consumption situations involve a conflict between short-term and long-term desires. Ability to delay gratification or the ability to use self-controlling techniques is therefore an important factor in explaining how much planned or wanted saving actually takes place. Self-control is regarded an enduring trait variable that is formed through upbringing and training. Some weak empirical evidence supports the effect of such variables on saving. The empirical evidence presented gives some weak support for expanding the list of willingness-to-save factors to time horizon, expectations about future economic situation, uncertainty with respect to income and consumption, saving motives, attitudes towards saving and debt, personality factors and the influence of reference groups. The ability to save factors should include ability to exercise self-control in addition to the economic resources available to the household.

In the following chapters, the last three research questions from Chapter 1 are addressed. More specific hypotheses to be tested in the empirical part of this thesis are put forward. They concern the psychological variables identified as being the most important for saving behaviour.



# Chapter 4

## Hypotheses

*Is the consumer rational or is he irrational? This is not the right question to ask. The consumer is a human being, influenced by his past experience. His sociocultural norms, attitudes, and habits, as well as his belonging to groups, all influence his decisions. He is apt to prefer shortcuts, follow rules of thumb, and behave in a routine manner. But he is also capable of acting intelligently. When he feels that it really matters, he will deliberate and choose to the best of his ability*

*George Katona (1975), p. 218*

### 4.1 INTRODUCTION

The reviews in the two previous chapters show that our knowledge of which psychological factors influence saving behaviour is limited, and the results from the studies that include psychological variables are not very robust. We still know little about the mechanisms that can explain individual differences in saving behaviour. The variables that have been regarded as important for saving and that get some empirical support are: income, family composition variables, expectations, uncertainty, attitudes towards saving, debt and risk, time preference, social comparison mechanisms, saving motives and personality factors. Some of these variables will be used to answer the second, third and fourth research questions presented in the introduction. These are: (2) Do psychological variables contribute towards explaining differences in household saving? (3) Do psychological variables have different impacts on discretionary and contractual saving respectively? and (4) Do psychological variables have more impact on the saving of high-income households than of low-income households?

When investigating the effects of psychological variables on saving, we should distinguish between saving types that differ with respect to the psychological processes underlying them. In this study, we will distinguish between saving types that are likely to differ with respect to ability to delay gratification. As discussed in Chapter 3, the effect of a certain psychological variable might influence different types of saving in different ways. The variables' effect on total saving might therefore be modest, and even counteract one another. This might be the explanation for the general failure to find any effect of psychological variables on saving and, when found, why the results are not always robust. Here we will analyse the impact of the selected variables on discretionary, contractual and total saving. Total saving includes saving in real estate. Total saving is the sum of bank saving, financial investments, the sum of real estate minus the sum of debt and mortgages.

Another important issue to consider when studying the effect of psychological variables on saving is discretion to make saving decisions. Both discretionary income and discretionary saving are frequently used concepts in the economic psychological literature on saving. Discretionary income is income beyond that required for necessities, so that there is a surplus that can provide means for a choice between spending and saving. In practical work, there is a

problem with the measurement of discretionary income, as people will disagree on the definition of a necessity. This will be further discussed in Chapter 6. Discretionary saving relates to saving decisions made in the period under study. A household may save during a year without making decisions about doing so. For example, if a household has borrowed money and has to repay the loan during the following three years according to a fixed schedule, they will save during these three years without making discrete saving decisions. Saving that results from such previous commitments is called contractual saving (Katona, 1975). Researchers interested in the effect of psychological variables on saving are interested primarily in discretionary saving. Psychological variables are not likely to have much effect on households which do not have postponable expenditures or which save primarily because they are forced by contractual obligations.

In this study, both discretionary and contractual saving will be analysed. It is, however, necessary to clarify the difference in the definition of contractual saving used here from that used as by Katona (1975). Contractual saving can consist of both repayments of loans and of saving arrangements such as pension schemes and insurance. Katona (1975) included both types in his definition of contractual saving. But, as borrowing and committing oneself to a long-term saving contract are acts that differ with respect to willingness to delay gratification, the psychological mechanisms determining these two types of saving might differ. Contractual saving is therefore limited to include repayment of different types of loans. A distinction is also made between measures of debt and debt repayment, which includes mortgages and mortgage payments and debt measures excluding mortgages and mortgage payments respectively. Mortgages are connected to investments in real estate, and there might be different psychological mechanisms governing these kinds of investments other than borrowing for consumption. Contractual saving in terms of participating in pension schemes or other fixed savings arrangements is not studied due to measurement problems (see Chapter 6).

In addition to making a distinction between discretionary (voluntary acts of saving in the present) and contractual saving (saving due to contractual obligations made in a previous period), we will in the following also differentiate between flow and stock measures of saving. Generally, in studies of the relationship between saving and psychological variables, more attention should be paid to the definition of saving used and the possible consequences the various definitions can have for the results. Much of the ambiguity in empirical findings concerning saving and psychological variables might be due to the use of different saving definitions. Some studies focus on stock measures such as wealth (savings), which is the total value of savings on a specific point in time and the result of saving behaviour during an extended period. It can be regarded as a measure of a household's long-term tendency to save, although it will be influenced by events such as illness, accidents, inheritances and lottery prizes. We might expect long-term saving to have a stronger relationship with enduring personal traits such as personality structure and attitudes than with psychological variables that might change over time such as some of the saving motives and time preference. Other studies focus on saving during a shorter period in the past, like for example the previous year. When studying such flow variables, we need to pay attention to the time period involved. A household saving 5% of its incomes each month for a year and then spends it all on a holiday has saved nothing over the year. The household will be classified as a "non-saver household" and the researcher might expect that this should be predicted by various psychological variables. In contrast, if the period used in the study was shorter than a year, the same household might be classified as a "saver-household" (depending on whether saving was measured before or after the holiday), and the opposite relationships with the psychological

variables would have been expected. The amount saved during a specific time period is found to be highly influenced by the incomes in the same period. In order to control for the effect of income level, some studies focus on the percent of income that is saved during a period or “the savings ratio”. This measure might tap a household’s willingness to save more than the ability to save. We should therefore expect that psychological variables have a stronger effect on saving ratios than on saved amounts. In the following, we will distinguish between three types of saving measures: wealth at a specific point in time, saving during a specific period, and the saving ratio in the same period. An overview of the expected relationships is found in Table 4.1.

When studying the contribution of psychological variables towards explaining borrowing behaviour, we should consider all three types of decisions involved in a borrowing decision. First, there is the decision to borrow money in the first place. There might be significant differences in for example attitudes and personality between those deciding to borrow and those deciding not to borrow. Second, given that a household has decided to borrow money, there is the decision about how much to borrow. The size of the amount borrowed might also be associated with psychological character traits. Third, there is the decision about how fast to repay the loan. The creditor might suggest or insist on a plan for repayment of the loans, but, in some cases, the borrower might decide to repay the loan at a faster or slower rate than that proposed by the creditor. This preference for rate of repayment might be influenced by psychological variables.

The variables included in this study are presented in the following section. As this is a cross-sectional study, it is important at the outset to note that some presumably important determinants of saving are omitted. Longitudinal studies have shown that variables used in macro economic studies, such as inflation, tax rules and interest rates are likely to have an impact on aggregate household saving, and may also influence individual saving decisions. The effect of changes in such macro variables cannot be studied here since a cross-sectional study does not lend itself to exploring adjustments to changes in the (real) interest rate. Moreover, the sample is drawn within one country, which might cause little variation in the macro variables. To some extent, the interest rates offered on loans and mortgages might vary depending on the credit worthiness of the loan applicants and tax policies may affect people in different ways, but we do not have enough information about such differences to analyse their effect. Another variable that might have a substantial effect on saving is the change (actual or perceived) in the value of assets. Households owning real estate and financial wealth such as shares and mutual funds might experience quite substantial changes in the value of their assets, which in turn might influence consumption and further spending. In this study, these effects are omitted because of limited information about changes in value of assets. For example, it is difficult to disentangle changes caused by changes in the price of a specific asset component from changes due to purchase or sale of (parts) of the asset.

## 4.2 HYPOTHESES

Hypotheses about the relationships between the selected independent variables and the different saving measures will be put forward below. In addition to the psychological variables, hypotheses concerning some of the socio-economic variables found to be related to saving are proposed. Table 4.1 provides an overview of the proposed relationships.

### 4.2.1 Income

Income has always been considered the most important determinant of saving, as it defines the intertemporal budget constraint subject to all saving and expenditure decisions. Income defines the upper limit for saving. A positive relationship is usually expected between income and wealth and between income and saving, which most empirical investigations confirm (e.g. Deaton; 1992; Carroll & Summers, 1991). Households require a certain minimum expenditure in order to survive, which means that we often find low saving with low income. When income rises and the most important needs of the household are fulfilled there is room for discretionary saving. This means that both financial wealth, discretionary saving and the tendency to save (measured by the saving ratio) are expected to increase with income.

The relationship between income and repayment saving is not necessarily as straightforward. Repayment saving is a result of borrowing. The tendency to engage in repayment saving is therefore associated with the tendency to borrow. Previous research on debt (e.g. Lea, 1998) has shown that borrowing is more likely to occur in low-income households. For this reason, the tendency to be in debt and thereby save by repaying loans might be higher among the low-income households than among high-income households. On the other hand, households with larger incomes tend to be granted larger loans and mortgages than those with lower income and they may also have a higher tendency to buy their own house. We therefore expect households with low income to have more debt and higher repayment saving when mortgages are excluded from the definition of debt, while we expect a positive relationship between income and debt and income and repayment saving when mortgages are included in the debt definition.

As high-income households are expected to borrow in order to invest in real estate, we expect a positive relationship between income and total wealth. Any borrowing by high-income households are more likely to be outweighed by a positive value of real-estate or other valuable assets than debt among low-income families. The relationship between income and total saving is also expected to be positive.

### 4.2.2 Education

Education has been found to have a positive effect on financial wealth (Hochguertel, Alessie, & van Soest, 1997). One explanation for this might be that those with higher education have higher income and therefore higher ability to save. A psychological explanation might be that both the tendency to save and the tendency to get through higher education are associated with high ability to delay gratification. We therefore expect to find the same relationship here: the higher the education level the higher the financial wealth. Assuming that education is associated with an individual's ability to delay gratification, a positive relationship with discretionary saving is expected. To what extent higher education also will influence the saving ratio has not been investigated so far, but given the assumption of higher education means a higher ability to delay gratification, a positive relationship is more likely than a negative.

High education is often linked to student debt. As educated people are likely to expect a steep increasing income profile, they might also decide to borrow in their early stages of their career in spite of having a high ability to delay gratification. In particular, the tendency to borrow in order to buy real estate is expected to be higher among the higher educated. A



positive relationship between education and the size of debt and repayment saving is therefore expected. Since discretionary and contractual saving are expected to be positively associated with education, a positive relationship between total saving and education is expected. The relationship between education and total wealth is more uncertain since education is expected to be positively associated with both financial wealth and debt.

### 4.2.3 Household composition

The composition of the household is likely to influence saving as it defines the number of income earners present as well as among how many persons the income should be distributed.

Family size is an important variable to consider in investigations of saving behaviour. The larger the family, the larger the expenses for necessities such as food, clothes, transport and so on. A negative relationship between family size and discretionary saving is therefore predicted, and between family size and financial wealth. It is also reasonable to expect that the smaller the family, the higher proportion of income can be saved, so that there also will be a negative relationship between discretionary saving and the savings ratio. Family size may increase the probability that the household will borrow money as a larger family increases the likelihood of buying real estate. Larger families are more likely to have a more strained economic situation than smaller families (all things being equal) that in turn may increase the likelihood of incurring consumer debt. Family size is therefore expected to increase the tendency to borrow, the amounts borrowed and the subsequent contractual saving. The relationship between family size and total wealth is expected to be negative. The effect of family size on total saving is more uncertain since a positive relationship between family size and contractual saving is expected while the opposite relationship is expected for family size and discretionary saving.

Children's presence in the household means that the demands placed on income are higher than in similar childless households. The presence of children is therefore expected to have a depressing effect on financial wealth and discretionary saving. Households with children are more likely to invest in real estate (McLeod & Ellis, 1983) and to borrow for other purposes. The presence of children is therefore likely to increase the tendency to borrow, the amounts borrowed and the subsequent contractual saving. The effect of presence of children on total wealth is therefore likely to be negative, while it is uncertain what the effect will be on total saving.

Presence of a partner is likely to affect saving as a partner might imply that the household has multiple sources of income. Presence of a partner might also mean that the household benefits from economies of scales with respect to heating, cooking, rent/interest on mortgage etc. We therefore expect households made up of couples to have higher financial wealth and engage in higher discretionary saving than households made up of singles. The presence of a partner might increase the tendency to invest in real estate, as there are two adults to share the risks associated with it. Presence of a partner might therefore be associated with a higher probability of having debt, higher amounts of debt and higher contractual saving when mortgages are included in the debt definition. Couples are less likely to incur consumer debt than singles as they have a higher possibility of increasing their income. Presence of a partner is therefore more likely to be associated with lower debt and lower contractual saving when mortgages are excluded from the debt definition. The effect of the presence of a partner in the household on total wealth is expected to be positive, and although the partner's effect on

discretionary and contractual saving respectively is opposite when mortgages are excluded, a positive relationship between presence of a partner and total saving is expected.

#### 4.2.4 Time preference

As shown in Chapter 2, time preference is regarded as one of the most important variables in many saving theories. Time preference is defined as the value we assign one marginal unit of consumption now (in the present period) as opposed to the value we assign the same unit later (in a future period). It describes how intensely we wish to increase our consumption or the resistance to decrease our consumption in the present, and it can be regarded as synonymous with Katona's (1975) "willingness to save". The empirical evidence presented in Chapter 2 suggests that time preference should be treated as a variable as opposed to a constant discount rate equal for all individuals (e.g. Hausman, 1979; Benzion et al., 1989). The empirical findings concerning the relationship between time preference and saving are inconclusive, but the usual hypothesis is that high time preference has a depressing effect on saving. People impatient to consume will be less willing to put money aside than the more patient people will. We therefore expect that high time preference will be associated with low financial wealth as well as low discretionary saving. The research by Antonides (1988), who found that savers have lower discount rates than no-saver, supports these propositions.

The empirical findings concerning the relationship between time preference and borrowing behaviour is consistent. Two studies have found high time preference to be related to debt problems (Ritzema, 1992; Webley & Nyhus, 2001). Households who borrow money are more willing than others to pay extra for present consumption, and this might be due to high time preference. Households with a high time preference are therefore more likely to borrow than those with low time preference are and, among households having debt, to have higher debt. Donkers and van Soest (1999) found a negative relationship between time preference and the probability of owning a house. This means that high time preference is more likely to be associated with high debt when mortgages are excluded from the debt definition, while we might expect the opposite relationship when mortgages are included in the debt definition. The consequences for contractual saving might be, because of the size of the debt, that higher time preference leads to higher contractual saving when mortgages are excluded from the debt definition, while low time preference is associated with high contractual saving when mortgages are included in the definition of debt.

Time preference is expected to have a negative effect on total wealth as high time preference means a preference to spend any available resources and to borrow for consumption. For the same reason, high time preference is expected to have a negative effect on total saving.

#### 4.2.5 Expectations

Expectation towards future economic situation is a central variable in the dominant saving models. Human beings are assumed to be forward looking and to take their expectations about the future into account when making decisions in the present. Both Brumberg and Modigliani (1954) and Katona (1975) proposed that expectations of an improved economic situation would have a depressing effect on saving because people would feel less need to save or because they want to have a smooth consumption stream. This has been supported in empirical investigations by Alessie et al. (1995), Carroll, et al. (1994), Guiso et al. (1992b)

and Souleles (2001). We therefore expect to find a negative relationship between expectations about future economic decisions and financial wealth and discretionary saving.

The assumption that people want to smooth their consumption stream means that people may prefer to borrow in times of optimism. For example, Webley and Nyhus (2001) found that people with debt problems were more optimistic about their future income the next 5 years than others. Optimism with respect to the future economic situation might therefore increase the willingness to borrow, the amounts borrowed and the subsequent repayment saving. We therefore expect that optimism will be associated with a higher probability of having debts, higher amounts borrowed and higher repayment saving.

As optimism is expected to decrease financial saving and increase the amount of debt, we expect a negative relationship between expectations and total wealth. The relationship between expectations and total saving is more uncertain since positive expectations might reduce discretionary but increase contractual saving.

#### 4.2.6 Time horizon

Empirical studies indicate that people differ with respect to how far into the future they think and plan. While some people plan years ahead, others limit their planning to weeks. Most empirical studies have found a positive relationship between time horizon and saving (e.g. Alessie et al, 1995, Julander, 1975; Wärmeryd, 2000), and a negative relationship between time horizon and debt. Moreover, those with debt problems have been found to have a shorter time horizon than mild debtors and non-debtors (Lea et al, 1995; Webley & Nyhus, 2001).

In line with findings in previous investigations, we expect a positive relationship between time horizon and financial wealth as well as between time horizon and discretionary saving. When mortgages are excluded from the debt definition, we also expect that people with a short time horizon are more likely to borrow than those with a longer time horizon. We also expect a short time horizon to be associated with higher amounts of debt and higher contractual saving.

Investments in real estate and taking up a mortgage require long-term planning. The relationship between time horizon and the sum of debt when mortgages are included in the debt definition might therefore be opposite than when mortgages are excluded from the debt measure. We therefore expect a positive relationship between time horizon and the tendency to borrow, the amount borrowed and the repayment saving when mortgages are included in the debt definition. The total effect of time horizon on total wealth and total saving is expected to be positive.

#### 4.2.7 Economic uncertainty

Previous empirical investigations have found some support for the notion that people who feel uncertain about their future will have a tendency to save more and to borrow less (Browning & Lusardi, 1996; Carroll, 1997). A high degree of uncertainty is likely to increase discretionary saving because people will try to build a buffer against unforeseen events and they are therefore expected to have a higher financial wealth than those feeling more certain about their future. At the same time, uncertainty will discourage borrowing and investments,

and uncertainty will therefore be associated with lower tendency to borrow, lower amounts borrowed and less repayment saving. Uncertainty is expected to have a positive effect on household total wealth while its effect on total saving is uncertain.

#### 4.2.8 Attitudes towards saving

Many psychological studies of saving have included attitudes. As shown in Chapter 3, the empirical results with respect to the impact of attitudes on saving are ambiguous and the direction of causality is not yet established. One reason why attitudes towards saving have had mixed success as a predictor of saving is that most people are positive towards saving. Thus, the variation in this variable is not large enough to discriminate between different saving practices. Another reason might be that attitudes work in opposite directions with respect to influencing discretionary and contractual saving respectively. Positive attitudes towards saving might have a positive effect on discretionary saving while the effect is likely to be negative on the tendency to borrow and subsequent repayment saving.

Positive attitudes towards saving are likely to influence both discretionary saving and financial wealth in a positive direction. As people who favour saving are less likely to be in favour of borrowing and are less likely to need to borrow, we expect a negative relationship between attitudes towards saving and the tendency to borrow. Among those having debt, a positive attitude toward saving might imply a smaller amount of debt that that incurred by households with a negative attitude towards saving. As positive attitudes towards saving are expected to result in higher financial wealth and lower debt, we expect a positive relationship between attitudes towards saving and total wealth. The relationship between attitudes towards saving and total saving is more uncertain as a positive attitude towards saving is expected to increase discretionary but decrease contractual saving.

#### 4.2.9 Attitudes towards debt

Studies into the relationship between attitudes towards debt and actual debt have found that debt attitudes can discriminate between debtors and non-debtors (Livingstone & Lunt, 1992). Some attitude statements have also been found to predict the amount of debt and debt repayment. In general, a negative attitude towards debt is assumed to cause people to avoid debt, repay debt as quickly as possible and to save in order to avoid debt. These are also the relationships expected here.

Negative attitudes towards debt may also influence discretionary saving, as saving in most cases is necessary in order to avoid debt. Avoiding debt often means being able to pay for unexpected expenses (for example, when the washing machine breaks down), which for most households requires a financial buffer. A negative attitude towards debt is therefore expected to be associated with both higher financial wealth and discretionary saving. A negative attitude towards debt is expected to be associated with higher total wealth, while the effect of debt attitude on total saving is less certain. A negative attitude towards debt might give higher discretionary saving but lower contractual saving.

#### 4.2.10 Saving motives

Saving motives define a person's reasons for saving. Individual differences in saving motives have been found to influence how people respond to economic stimuli with respect to their saving behaviour (Wahlund & Wärneryd, 1987). Despite Katona (1975) proposing that it is the *strength* of the saving motives that would change over time (i.e. not the existence of the motives), no studies so far have focussed on the effect of the perceived importance of the different saving motives with regards to a person's tendency to save. Katona (1975) proposed that the strength of the saving motives would weaken during upswings and strengthen during recessions. In the same vein, we might find individual differences in the strength of saving motives depending of stage in the life cycle, perceived risk of unemployment, expectations concerning future income and so on. Surveys have shown that the precautionary saving motive is the most important saving motive, while a smaller portion of the interviewed household considers retirement, children's needs, investment opportunities and larger purchases are important reasons to save. Here, we will study the relationships between the perceived importance of six different saving motives and saving.

Precautionary saving deals with the need to have a buffer against unforeseen events. People who regard precautionary saving as important are likely to have higher financial wealth than people who do not think it is important. In addition, it is likely that a person who thinks that precautionary saving is important will engage in further saving. The investment (calculation), retirement, goal-saving, *inter vivos* transfer and bequest motives are expected to work in a similar fashion: the stronger the motives, the higher financial wealth and the higher the saving.

So far, few investigations have studied the relationships between saving motives and borrowing behaviour. The most likely relationships are that strong saving motives will have a negative effect on the tendency to borrow because higher discretionary saving and financial wealth will reduce the need to borrow. We therefore propose that stronger saving motives will be negatively associated with not only the tendency to borrow, but also the amount borrowed and repayment saving. As strong saving motives are expected to be associated with high saving and little borrowing, it follows that we also expect a positive relationship between strength of saving motives and total wealth, while the effect on total saving is more uncertain.

#### 4.2.11 Perceived position in reference groups

Duesenberry (1949) was one of the first to propose a saving model based on social comparison, which acknowledges that saving decisions are not made in a vacuum but in a social context. He argued that people would compare themselves to others (in particular, their neighbours). Because we seldom can observe other households' saving, it is other households' consumption that must be subject for the comparison. Duesenberry also argued that people use their own past consumption (or income) as a basis for comparison. If they have less than others or their previous selves, they will feel deprived with respect to their expected standard of living and this, in turn, will dissuade them from saving. As shown in Chapter 2, these ideas have not been adopted by economists with the exception of some recent work by Alessie and Kapteyn (1991) Kapteyn et al (1997), Kapteyn, 2000, and Schor (1998). Their work gives some empirical support to the idea that social comparison mechanisms are important for saving behaviour.

The usual hypothesis is that a feeling of deprivation with respect to one's standard of living will lead to little saving, due to constant desires to consume more. A positive relationship is therefore expected between a person's perceived position in his or her reference group and discretionary saving. People feeling wealthier than others are also likely to have higher financial wealth than people who say that they feel poorer than others. At the same time, people who feel worse off than their reference group might be tempted to borrow money in order to consume more or to buy their own accommodation. Hence, saying that the household is worse off than others is likely to be associated with a higher tendency to borrow and, therefore, higher debts and repayment saving. Feeling deprived compared to one's reference group is therefore likely to be associated with low total wealth. The impact on total saving is not as straightforward, because a feeling of deprivation with respect to the reference group may result in low discretionary saving, but high contractual saving.

#### 4.2.12 Personality structure

Brandstätter (1996) argued that personality factors are broad abstractions that should not necessarily correlate with specific behaviours. However, some studies have shown that personality structure might be important for explaining individual differences in saving. The findings from these empirical investigations are both ambiguous and weak, but they do indicate that further studies of the relationship between saving and personality structure are worthwhile. For example, Nyhus and Webley (2001) found that personality factors had robust and independent effects on different types of saving. In addition, it is quite plausible that personality factors might be important for saving behaviour.

Emotional stability has been found to increase discretionary saving (Brandstätter, 1996; Nyhus & Webley, 2001). This is a probable relationship as emotional stability also encompasses elements of self-control and planning. Emotionally stable people are therefore more likely to follow their own plans and budgets than their emotionally unstable counterparts. For example, some people have been found to engage in impulsive and excessive buying (e.g. Hoch & Loewenstein, 1991). It is likely that people who have a tendency to give in to short term desires also are on the more neurotic side of the emotional stability dimension. We therefore expect a positive relationship between emotional stability and financial wealth and discretionary saving. It is also more likely that emotionally unstable people will incur consumer debt, and for this reason we might expect higher debts and higher contractual saving among emotional unstable persons. Because emotional stability is expected to be associated with higher wealth and lower debts, we expect a positive relationship between emotional stability and total wealth, while the effect on total saving is uncertain.

The personality dimension mentioned most frequently in the savings literature is conscientiousness (Wärneryd, 1999). Conscientiousness is related to traits such as planning, self-discipline, and the ability to delay gratification. Conscientiousness might therefore affect both the willingness and the cognitive ability to save. It is therefore natural to expect higher discretionary saving and higher financial wealth among conscientious people. Some evidence for the existence of such a relationship has been provided by Brandstätter (1996) and Wärneryd (1996a), but it was not supported in the research by Nyhus and Webley (2001). With respect to contractual saving, it is plausible to expect the opposite relationship. It is likely that conscientious people have less debt and therefore lower contractual saving, as they are likely to be able, and perhaps to prefer, to save before buying. Indication of such a relationship has been reported by Webley and Nyhus (2001). They found that people who

have had mild or serious debt at least once in their lifetime were less conscientious than people who never have been debtors. Because conscientiousness is expected to be associated with higher wealth and lower debts, we expect a positive relationship between conscientiousness and total wealth, while the effect on total saving is uncertain.

Autonomy was found to be a significant predictor of saving by Nyhus and Webley (2001). They found that autonomy is associated with lower saving and increases the likelihood of a household having debt. This means that we are likely to find a negative relationship between autonomy and financial wealth and autonomy and discretionary saving, while we might expect to find a positive relationship between autonomy and debt and autonomy and repayment saving. Because autonomy is expected to be associated with smaller wealth and higher debts, we expect a negative relationship between autonomy and total wealth, while the effect on total saving is uncertain.

Agreeableness codifies the extent to which a person adjusts to other people's feelings or opinions. It is likely that less agreeable people, being more selfish, will be less willing to share their money with other people. Agreeable people might be more inclined to share their resources with others which might be reflected in generosity in terms of gift-giving, *inter vivos* transfers, charity and so on. Nyhus and Webley (2001) found a negative association between agreeableness and financial wealth. Agreeableness was also associated with a higher probability of having debts. We might therefore expect to find a negative relationship between agreeableness and financial wealth and agreeableness and discretionary saving. Further, we may expect a negative association between agreeableness and debts and agreeableness and repayment saving. The expected effect on total saving is that agreeableness will reduce total wealth while the effect on total saving is uncertain.

Brandstätter proposes that extroversion may be important for saving behaviour, which makes sense in light of the social comparison theory of saving (e.g. Schor, 1998). Social comparison theory states that people are influenced by the consumption behaviour of people they meet regularly. One aspect of extraversion is a desire to spend time with other people. Extroverts are therefore more likely to meet more people than introverts and might more often be exposed to consumption patterns that make them less inclined to save. Frequent interaction with other people often also causes extra expenditures. Going out, inviting people home, or visiting other people's homes often incur some spending that in turn will reduce saving. Brandstätter (1996) and Nyhus and Webley (2001) have found introverts to have more savings than extroverts. We therefore expect a negative relationship between extraversion and financial wealth and discretionary saving. Because introverts are expected to save more, it is also plausible to expect that they borrow less, while extroverts might be expected to borrow more. This means that extroverts might have higher contractual saving than introverts as they might borrow in order to pay for conspicuous consumption. Since introversion is expected to be associated with higher wealth and lower debts, we expect a positive relationship between introversion and total wealth, while the effect on total saving is uncertain.

Table 4.1 includes an overview of the expected relationships.

Table 4.1  
Overview of expected relationships

Independent variables	Dependent variables							
	Wealth				Saving/Saving ratio			
	Finan- cial wealth	Debt mortg. Incl.	Debt mortg. Excl.	Total wealth	Discr. Saving	Cont.sa Mortg Incl.	Cont.sa Mortg. Excl.	Total saving
HH disposable income	+	+	-	+	+	+	-	+
Level of education	+	+	+	?	+	+	+	+
Family size	-	+	+	-	-	+	+	?
Presence of children in HH	-	+	+	-	-	+	+	?
Presence of partner in HH	+	+	-	+	+	+	-	+
Time preference	-	-	+	-	-	-	+	-
Expectations toward econ. situat.	-	+	+	-	-	+	+	?
Time horizon	+	+	-	+	+	+	-	+
Economic uncertainty	+	-	-	+	+	-	-	?
Attitude towards saving	+	-	-	+	+	-	-	?
Attitude towards debt	-	+	+	-	-	+	+	?
Strength of prec saving motive	+	-	-	+	+	-	-	+
Strength of bequest motive	+	-	-	+	+	-	-	?
Strength of retirement sav. motive	+	-	-	+	+	-	-	?
Strength of goal saving motive	+	-	-	+	+	-	-	?
Strength of investment motive	+	-	-	+	+	-	-	?
Perceived position in ref. group	+	-	-	+	+	-	-	?
Emotional stability	+	-	-	+	+	-	-	?
Conscientiousness	+	-	-	+	+	-	-	?
Autonomy	-	+	+	-	-	+	+	?
Agreeableness	-	+	+	-	-	+	+	?
Extraversion	-	+	+	-	-	+	+	?

#### 4.2.12 The importance of psychological variables for different income levels

Katona (1975) argued that the relative influence of psychological variables on saving increases with discretionary income and level of postponable expenditures. As yet, this conjecture has not been tested explicitly. If Katona's suggestion is true, the substantial increase and spread of discretionary income among households in Western economies may have increased the importance of other variables than income when explaining and predicting households' saving- and spending decisions. It is reasonable to expect that an increase in discretionary income alters the relative influence of economic, situational, and psychological variables on saving in favour of psychological variables. This preposition will be tested by comparing the results obtained from separate analyses for different levels of income.

So far, this study has shown which psychological variables that have been proposed as important for saving behaviour and which variables that have been found associated to saving in empirical studies. Hypotheses to be tested in the empirical part of this study have been proposed. The next part of the thesis reports the procedures followed in order to test the proposed relationships between psychological variables and saving.



# Chapter 5

## Data collection and questionnaires

### 5.1 INTRODUCTION

This chapter describes the sampling procedures, the data collection method, the election of key informants, the questionnaires, and the design used when testing the hypotheses. The chapter closes with an account of how the data file used for the analyses was constructed. Strengths and weaknesses related to the methods are identified and their implications are discussed.

Testing the hypotheses involves the collection of data from individuals and households. In the recent decades, it has been widely recognised that it is too simplistic to use the individual as unit of analysis when studying various aspects of purchasing behaviour and financial decision-making. This is because people are often communal, pool their resources and incomes and often make combined decisions. The most meaningful unit of analysis when studying saving is therefore the household. This is a challenge when studying the effect of psychological variables on saving. Most theories that involve psychological explanations of behaviour refer to individuals. Therefore, in order to test the effect of these variables we need information from all household members who have an effect on saving decisions. The required information is both economic and psychological. We also need some information about decision influence in financial affairs in order to construct measures of psychological variables at the household level.

As the independent variables specified in the proposed hypotheses are difficult to manipulate, the ideal situation would be to observe a panel of households over several years to see if changes in the independent variables are followed by the expected changes in saving. It is useful to use the year as period of analysis to avoid variation in the saving estimates due to seasonal fluctuations in expenditures, such as holidays. It is also beneficial for data quality to collect data for one year at a time, since most people use the end-of-the-year reports about their incomes and assets of the previous year as reference when answering the questions.

The required types of data are not easily found. Most panel studies of economic behaviour focus exclusively on economic and demographic variables where the effects of psychological variables cannot be tested. However, at CentER for Economic Research at Tilburg University, the Netherlands, a panel was set up as a part of a large project called the VSB CentER savings project that was succeeded by the TMR project on Savings and Pensions. The project is now called the CentER Savings Survey (CSS) and data collected for this project will be used here. The data collected for the CSS contain answers to questions that may be used as indicators for all the variables included in the proposed hypotheses. As the method applied for this study is closely connected to the two saving projects, they are presented below. The methods are outlined in the subsequent sections.

## 5.2 THE CENTER SAVINGS PROJECT

The (VSB-)CentER Savings Project was started in 1990 at the Center for Economic Research (CentER) at Tilburg University, The Netherlands. The project is interdisciplinary and involves many researchers with different backgrounds, but a common interest in household saving and economic behaviour. The goals of the project were 1) to test the descriptive and predictive power of economic and psychological factors on households' saving behaviour and 2) to study the stability of any possible influence of these variables on saving behaviour. The project terminated in 1996 and was succeeded by the TMR-project "Savings and Pensions".

Data has been collected every year from a panel consisting of about 3000 households. The first and second rounds of data collection took place in 1994, while the third was carried out in 1995. Data concerning financial matters, work situation, demographics, psychological traits, health and other living conditions are collected. The first rounds of data collection were conducted by a fieldwork company called Stichting TelePanel (the TelePanel Foundation). A telepanel is a panel of households that are connected to a central computer via modems. Participants in the panel answer questions via computer sessions in their homes. The questions and the answers are transmitted between the respondents and the central computer by the use of the modems. The panel was taken over by CentERdata in 1996.

## 5.3 SAMPLE SELECTION

The sample used for the CSS consists of two sub-samples. One sub-sample is intended to be representative of the Dutch population with respect to certain socio-economic variables (the Representative Panel, or RP). This panel consists of individuals in about 2000 households. The other sub-sample is a sample of Dutch high-income households, consisting of individuals in about 1000 households (the High Income Panel, or HIP).

The initial sampling for the RP was carried out using telephone directories as the sampling frame. Researchers used a procedure that gave new and unlisted numbers an equal chance of being selected as listed numbers. In order to obtain a sample that was representative with respect to region and urbanisation, a four-step stratified sampling procedure was used. This involved (1) selecting primary sample areas (communities), (2) secondary sampling units (banks of 100 telephone numbers within the selected communities), (3) telephone numbers from those banks and finally (4) the households themselves. The specific sampling procedure meant that all the largest communities in the Netherlands were represented and about half of the smaller ones. Potential participants were telephoned, asked for background information and whether they would be willing to take part in the panel. Those expressing willingness were interviewed and introduced to the computer-aided interviewing technique. Individuals ultimately agreeing to participate accepted to complete questionnaires administered by the computer in return for the use of a PC (and modem). This group constituted around 18.5% of those households that were originally telephoned. Households with older members, one-person households and families without children were less willing to participate than others, and in order to correct for this, quotas were assigned for some demographic characteristics. Note that this sample was not especially recruited for research into economic behaviour but participants had to agree to answer questions on a variety of topics on a regular basis. A more detailed description of the sampling procedures can be found in Appendix 1.

The members of the HIP were recruited specifically for the CSS because of a wish to study high-income households in more detail. Because income and wealth distributions in populations often are skewed, a simple random sample would not provide enough wealthy households to draw conclusions about their behaviour and distributions of many financial variables (Kennickell & McManus, 1993). The high-income households are defined as households with the 10% highest incomes of the Netherlands. A problem related to this recruitment was that the target population (high-income households) is much smaller than the sample population (households with a telephone). Hence, the probability for drawing a telephone number for a high-income household is much smaller than for hitting a household that would fit for the RP. In order to reduce costs by reducing the number of households that would have to be approached, two different sampling schemes were used for selecting households to the HIP. The first procedure was (1) to select area postcodes for wealth areas, (2) select telephone numbers within the selected wealthy areas and (3) selection of households. This procedure increased the probability of approaching a high-income household from 10% to 20%. 20,000 households were approached based on this sampling scheme. In addition, another 10,000 households were approached using the same 4-step sampling scheme as described for the RP. Further information about the sampling procedures can be found in Appendix 1.

## 5.4 DATA COLLECTION TECHNIQUE

Data were collected by using computers and modems which were installed in each selected household. In return for this, household members agreed to answer questions for 30 minutes every week. The data programmes used for administering the questionnaires and responses were user-friendly, so that it should be possible for all kinds of respondents to complete the questionnaires without assistance. Respondents having problems with any of the questions could call a help desk that had weekend service. In addition, there were technical staff available if problems arose related to the computers or the telephone lines.

The RP members received questions every Friday and they were supposed to complete them during computer sessions the following weekend. The intention was that no session would last more than 30 minutes. The responses were transmitted to the fieldwork company's central computer. Panel members who did not answer within three days (the following Monday) were called and asked to fill in the questionnaire before the following Wednesday. If the household members still did not respond, they were counted as non-response.

The HIP members received questionnaires once a month. They got longer questionnaires than the RP members, but the total number of questions was lower. No session was supposed to last more than an hour. The HIP members also got more days to answer the questionnaires than the RP members.

Further information about the advantages and disadvantages related to this data collection technique can be found in Appendix 2.

## 5.5 THE QUESTIONNAIRE AND KEY INFORMANTS

Below a short description of the different parts of the questionnaire is given along with a list of the household members who are supposed to answer each part (key informants). The parts of the questionnaire are called WRK (household, work and pension), INC (income and health), HS (accommodation and mortgages), WTH (assets and loans), and PSY (economic psychological variables) respectively. The routing system in the questionnaire is quite complicated and can be found in the questionnaire or in the variable documentation distributed from CentER. Any routing reported here serves mainly the purpose of identifying key informants.

### 5.5.1 The questionnaire

The total questionnaire consists of five parts that were distributed to the respondents according to the described agreements with the panel members. The description of the questionnaire is based on the questionnaire for the first wave of data collection. The questionnaires used for later waves contained additional questions.

#### Household, Work, and Pensions (WRK)

The first block of WRK, called “Block household”, contains questions about primary occupation. All household members 16 years or older answer these questions. The responses to these questions decide what questions the respondents receive. The heads of the households are asked about marital status and children, and heads of the households born before 1953 are asked about grandchildren. Heads of the households responding that they have children no longer belonging to the household, are asked about the date of birth and sex of these children, as well as their reasons for moving.

#### Health and Income (INC)

INC contains questions about health and about income in 1992. “Block Health” is asked of all household members who are 16 years or older. It includes questions about height, weight, subjective judgements about one’s own health, smoking and drinking habits, absence from work because of illness, and expected length of life.

“Block Income” was asked of all household members aged 16 or older. Respondents were first asked about their personal income sources in 1992; that is, whether they were self-employed, received social benefits or pensions, had paid jobs on a contractual basis or any other income sources. Responses to these questions were used for routing. They were then asked to specify the yearly income they received from the relevant sources of income. They were also asked to specify transfers to children or other family members, the price of medical insurance, fringe benefits and inheritances and gifts.

The last questions in “Block Income” concerned household net income and were directed at the households heads and their partners/spouses only. They were asked to estimate the household net income for 1992. They were also asked to specify what incomes they considered to be “very bad”, “bad”, “insufficient”, “sufficient”, “good”, and “very good”. INC also entailed a part in which respondents were asked to evaluate the questionnaire and their own responses as well as report how much time it took them to finish it.

### Accommodation and mortgages (HS)

This part of the questionnaire contains questions about current and former accommodation and about plans to move. It also contains questions about housing costs, such as rent and mortgages and rent allowances. The questions are answered by one person from every household; the "household financial manager" (HFO - defined below).

"Block Accommodation" contains questions about the household's former and current accommodation (also any possible second residence); ownership, type of house, number and size of the rooms; how long the household has lived there; the possession of a garage, garden and so on. It also contains questions about how much the accommodation costs per month and possible rent allowances. If any of the households have mortgages on their accommodation, they are routed to "Block Mortgages". The HFOs are also asked whether their household is looking for other accommodation. If they are, they are asked about the reasons for this and what kind of accommodation they are searching for. They are also asked about economic support from relatives with respect to former, current and future accommodation.

"Block Mortgages" starts with detailed definitions of different kinds of mortgages. This might increase the accuracy for the data collected about mortgages, as the probability of misunderstandings is reduced. The questions are about the amounts that the households have borrowed, how much of the loans are left as of December 31<sup>st</sup>, 1992, interest rates, the creditors, and payments on the mortgages.

### Assets (WTH)

WTH is the longest and most complicated part of the questionnaire with respect to routing. A large effort has been made in order to assess the value of assets as accurately as possible. Questions often begin with definitions of the specific assets under consideration in order to prevent misunderstandings of the questions. Responses to questions about balances can also be given in two different ways: First, respondents are asked to give the exact amount in guilders, the former monetary unit of The Netherlands (abbreviated Dfl). If they decline to answer such an open-ended question, a second question is asked, for which amounts can be given in brackets. This second option of giving answers results in less accurate data than the first, but less missing data (see Appendix 3 for examples of the question formulation). All household members who are 16 years or older are asked about the value of their private assets as of December 31<sup>st</sup>, 1992. With respect to shared assets, the respondents are told to report them only once per household. If, for example, the first member of the household reports shared assets, the other household members should ignore them.

"Block Assets" contains initial questions about ownership of different kinds of checking accounts, saving accounts, saving certificates and other ways of holding assets. They are also asked about whether they plan to open new accounts in the next 12 months. They are then asked about ownership of cars, motorbikes, boats, caravans, real estate that is not serving as own accommodation, and debts to friends or family. The answers to these introductory questions are used for routing. There are separate blocks for each of the asset types. The respondents get the blocks that are relevant for them in which they are asked to report the balances of accounts and earned interest. They are also asked to estimate the values of durables as of December 31<sup>st</sup> 1992. With respect to real estate, questions about any mortgages connected to them are also included. Note that not all assets are included here. Information about ownership of own accommodation is found in the HS described above.

“Block Debts/Liabilities” follows the same procedure as “Block Assets”. The question block starts with questions that are used for routing. All household members 16 years or older are asked about the existence of private loans, extended lines of credit, outstanding debts with mail-order firms, loans from family or friends, study loans, debts through credit cards and other loans. Respondents are also asked about their opportunities to borrow money (liquidity constraints) and whether they would like to borrow money. Questions about mortgages on accommodation are not asked here. They are found in “Block Assets” (described above) for real estate that does not serve as accommodation for the household and in the HS for real estate that does serve as the household’s accommodation.

### Economic Psychology (PSY)

PSY starts with some questions that are to be answered by the head of the household and their spouse/partner only. They are about income in the past 12 months, a subjective evaluation of this income, income development and expectations about their income in the future (the next year and the next five years.) They are also asked about plans for saving, motives for saving, attitudes towards saving and debt, risk aversion, and changes in consumer expenditures. The questions about risk attitudes were only asked if the households’ net income was above Dfl 20,000 over the past 12 months.

The next part of PSY contains questions that constitute scales developed to measure certain economic psychological variables like time preference, time horizon, self control, expected life time, saving motives, self controlling strategies, expectations of inheritance or gifts, and personality structure. These questions are answered by all household members 16 years or older. Next, questions about family relations and perceived deprivation with respect to living conditions were asked. These were to be answered by the heads of the households and partners/spouses only.

Also the PSY entails questions where respondents are asked to evaluate the questionnaire and their own responses. Responses to these questions are discussed in Chapter 6.

### 5.5.2 Selection of informants

Not all household members answered all the questions of the savings questionnaire. No household member below 16 years was asked to answer any questions. For some parts of the questionnaire, only one or two members of each household were asked to answer on behalf of the entire household. An overview of which persons in the households answered the different parts of the questionnaires is provided in Table 5.2.

Panel members were categorised according to their self-reported position in the household, the categories being “head of the household”, “spouse”, “unmarried partner”, “parent” (in law), “child living at home”, “house mate” and “other”. The routing was based on these categories in addition to a category called the “Household Financial Officer” (HFO). Some blocks of the questionnaires were routed only to the HFOs, others to the heads of the households, or to the heads of the households and their spouses/partners. Other sections were answered by all members of the household 16 years or older. Questions were only asked those respondents to whom they were relevant, so questions about last paid job were not asked to respondents who were in their first paid job, and respondents who did not have a boat were not asked about the value of a boat. It is therefore difficult to estimate how much time it

would take each respondent to answer the questionnaire and, moreover, how many should have answered each question.

Table 5.2  
Overview of key informants of the households

Main Subject of Questionnaire	Key informants
1) WRK - Household, Work, and Pension	All household members > 15 years to whom the specific questions are relevant (who have, had or are looking for a paid job). Some questions concerning children are only asked the heads of the households.
2) INC- Health and Income	Personal income: All household members > 15 years to whom the specific questions are relevant. Household income: Heads of households and spouses/partners
3) HS - Accommodation and Mortgages	Household financial officer
4) WTH - Assets and loans	Questions about personal properties to all panel members > 15 years. Questions about shared property should be answered by one household member only.
5) PSY - Economic psychological variables	Questions about income, income expectations, saving plans, saving motives, attitudes towards saving and debt, risk aversion, and changes in consumer expenditure were asked to the head of the households and spouses/partners only. (The questions about risk aversion were only asked households with net income above Dfl 20,000 a year.) Questions about personality traits were asked all household members > 15 years.

## 5.6 DESIGN OF THE STUDY

The original plan for the data collection was to collect data on a yearly basis from 1993, concerning income and savings in the year before the data collection. However, due to unforeseen problems, the first wave of data collection was delayed by 6-7 months. Because of the delay, data for 1992 were collected in the period December 1993 to April 1994 instead of in the period May –to October 1993. The second wave of data collection took place in May to October 1994 and concerned incomes and assets in 1993.

Financial data from the first wave of data collection will not be used in this study for two important reasons. Firstly, the delay of the first wave of data collection reduces the reliability of the financial data collected concerning incomes in 1992 and assets as of 31<sup>st</sup> of December 1992. This is because of the long time between the data collection and the period for which information is sought. Secondly, use of financial data from the first wave would also result in a rather peculiar design. The financial behaviour in focus would take place in the year 1993, while the variables expected to influence this behaviour are measured as of May - October 1994.

For this study, data concerning the psychological variables collected in the first wave together with some of the additional psychological data collected in the second wave will be used. They were all collected in 1994 which is the year in which saving will be studied. The saving and income data used were collected in the second and third wave respectively. Saving is calculated by using assets data as of 31<sup>st</sup> of December in 1993 and 1994. Data concerning income for 1994 was collected in the third wave. The independent variables were measured during the time the studied behaviour took place. This resembles a cross-sectional design that cannot be used for establishing causal relationships.

## 5.7 CONCLUSION

The data collected for the CSS are unique, as they contain information on both economic and psychological variables. Although great efforts have been made in order to make the panel representative of the Dutch population, a rather high degree of non-response (see Appendix 1) gives reasons to doubt that this goal is obtained. The representative panel is representative to the Dutch population with respect to some selected socio-economic variables, but this does not secure representativeness with respect to the psychological variables.

The data have been collected using a rather new technique. The extent to which this method increases or decreases data quality compared to other methods is left to speculation (see Appendix 2). No study has so far compared the data collected by CAPAR with the more traditional methods. Data on financial affairs are often plagued with missing or under- or over-reporting. CAPAR might result in improved quality due to the possibilities for routing and editing in the field and because any effects caused by the presence of an interviewer is avoided. On the other hand, the complex routing might also lead to errors in the data that are hard for the users of the data to detect.

## 5.8 PREPARING THE WORKING DATA FILE

The data used for this study are drawn from three waves of data collection:

First wave of data collection (beginning of 1994):

Psychological variables

Data about first and second residence and mortgages

Second wave of data collection (May - 1994):

Data about assets and loans as of 31.12.93

Additional psychological variables

Psychological variables - new panel members

Household information

Third wave of data collection (May - 1995):

Data about assets and loans as of 31.12.94

Data of first and second residence and mortgages - May 1995

Data about household income for 1994

These data are found in different data files. As data from three different waves of collection will be used, only respondents having been members of the panel in all three waves and having answered the relevant questionnaires will be used in the hypothesis testing.



A household can be divided into several decision units with respect to spending and saving. When it comes to the overall financial affairs, children and parents seem to act as separate decision units. Children living at home, either studying or working, are likely to keep their finances separate from their parents and they are unlikely to have any important decision influence in major decisions concerning their parents' saving plans and strategic purchases like the purchase of a house. Other adults living in the households like, for example, a mother in law, or an unmarried son, are also likely to keep their finances separate from the HH and spouse, although they might contribute with a sum to cover household expenses. In this study, we therefore only study one of the decision units within a household, defined as the head of the household and his/her spouse or partner. Other respondents were deleted from the data file. Respondents who had a partner who had not responded to all questionnaires were also deleted from the files. Information about further cleaning necessary due to non-response with respect to the assets questionnaire can be found in Appendix 4.

The sample resulting from following the procedures described above consisted of 2078 individuals, 1061 (51,1%) males and 1017 (48,9%) females, in 1212 households. 307 (25,3%) of the households were one-person households while 346 (28,5%) households had no partner. 752 (62,0%) of the households had no children living at home. 62,2% of the households were members of the representative panel while 37,8% were members of the high-income panel. Members of these two panels differed in their household composition. In the high-income panel, only 20 (4,4%) of the households were single-person households, while the corresponding number for the representative panel was 287 (38,1%). 26 high-income households (5,7%) had no partner, while 320 (42,4%) of the households in the representative panel were without a partner. 48,5% of the high-income households had no children living at home, while the corresponding number for the representative panel was 70,3%. This sample of 2078 individuals will be used in the next chapter when reporting the measurement of relevant variables.



# Chapter 6

## Measurement

*“Yes, I save money when I go shopping at ‘Rema’”*

*Answer to the question “Do you save money?”  
Rema is a low-budget grocery store.*

### 6.1 INTRODUCTION

The concepts taken to be important determinants of household saving behaviour were described in Chapter 4. In this chapter, the operational definitions of these concepts are outlined. The chapter will start with operational definitions of household saving and household income. The measurement of the psychological concepts and household characteristics are presented successively. Examples of the exact question wording are found in Appendix 3.

### 6.2 HOUSEHOLD SAVINGS, SAVING AND THE SAVING RATIO

As explained in Chapter 4, when defining and measuring saving it is necessary to make a distinction between *savings* (or wealth) and *saving*. Savings is a stock variable, and refers to the stock of assets and debts at a particular moment in time, for example, as of 31<sup>st</sup> of December in a particular year. Saving is a flow variable and refers to accumulation of assets and debts over a specific period of time (for example, a year). Both savings and saving can be positive and negative. Saving is negative if total expenditures exceed total incomes during the given period. This is called dissaving. Savings are negative if the stock of debts exceeds the stock of assets.

Saving can be estimated in at least three different ways. One way is simply to ask respondents how much they have saved during the period in question. This gives us a direct estimate of saving, but this way of measuring saving might result in saving estimates that cannot be compared across respondents. For example, Lyck (1992) carried out an explorative study in Denmark to establish what people mean by the word “saving”. She found that only 12% of the sample defined saving in accordance with the standard macro economic definition, while 62% define saving simply as money placed in a bank. 26% gave mixed answers, among them that saving is “when you buy cheap”. Only 6% included their house in the definition of saving. Similar results can be found in the data set used for this study. The respondents are asked if they consider certain types of assets as saving. The exact question formulation was “If you had to calculate the sum that you have saved over the past 12 months, which of the alternatives below would you include in your calculation?”. The valid percents of the answers to these questions from the second wave of data collection are displayed in Table 6.1. These results highlight the importance of ensuring that the respondents have a common

understanding of what information the researcher seeks when asking questions about saving. The results support Katona's conception that most people's definition of saving includes discretionary saving but not contractual saving, although in this sample, just as many regarded payback of loans as saving as the number who did not.

Table 6.1  
What respondents would include when calculating "own saving"

Include in definition of saving?	Yes	No	Not applicable
Increase in the balance of total savings account	69.0	8.3	22.7
Increase in the balance of a checking account	26.7	39.8	33.5
Increase in the market value of shares/bonds	15.5	12.7	71.7
Increase in the market value of own house	11.3	40.1	48.6
Increase in the market value of cars, boats, motorbikes	5.6	38.6	55.7
Loan paid back in the past 12 months	18.4	19.9	61.7
Loan granted to someone else in the past 12 months	3.3	10.5	86.2
Increase in the market value of antiques/art/ jewellery	1.8	22.4	75.8
Increase in the value of a life insurance	8.1	27.5	64.5
Other things?	5.5	94.5	

N= 1984

The wording of the question was changed in the third wave of data collection. Rather than ask respondents about their own saving, they were asked about which acts they would consider as saving. The exact question formulation was "To what extent do you consider the following actions a way of saving? If you really do not know, type 0 (zero)." The respondents could indicate their view by choosing a number on a 7-point scale, where 1 means "has nothing to do with saving" and 7 means "a proper way of saving." Table 6.2 displays the valid percents of the respondents' answers.

Table 6.2  
Whether alternative saving acts are perceived as saving

Alternative ways of saving	Nothing to do with saving						A proper way of saving	Don't know
	1	2	3	4	5	6	7	
To deposit money onto a savings acc.	1.8	1.3	1.9	5.4	9.2	24.1	53.3	3.0
To deposit money onto a checking acc.	31.7	22.7	12.2	13.5	9.3	5.0	2.6	3.1
To open a fixed-period deposit	6.9	4.4	5.2	12.6	13.6	18.8	18.5	19.9
To put money in a piggy bank	18.9	9.6	9.4	13.5	14.8	12.6	17.9	3.3
To buy stocks	9.4	5.5	8.8	20.0	21.0	15.7	7.2	12.4
To buy shares	9.5	7.2	10.2	19.4	22.5	14.4	5.8	11.0
To buy bonds	7.3	5.0	7.2	14.7	21.1	20.7	10.6	13.4
To participate in investment funds	6.6	5.0	7.0	15.5	21.1	21.6	7.7	15.5
To speculate in money	35.9	18.7	13.3	12.7	5.1	2.2	.7	11.3
To take out a mortgage	18.2	9.2	8.8	15.3	16.4	17.0	6.9	8.2
To consume less than your income	12.4	8.0	7.9	15.6	20.8	18.8	11.9	4.6

N=2033

The results shown in Table 6.2 also show that deposits in savings accounts as well as saving in piggy banks are what most people consider as proper ways of saving. A deposit of money into a checking account is not considered to be saving. People tend to be less certain if

investment saving is a proper form of saving. Also these results highlight the fact that people's understanding of the word "saving" differs from person to person, and measuring saving by just asking people "how much did you save last year?" is inadequate.

The second way to measure saving is assess income and money spent on consumption during a period of time - expenditure is then deducted from income. This method may give good estimates of saving if the period in which saving is measured is sufficiently short. If we want to study saving behaviour during longer periods, like, for example a year, it is unrealistic to expect accurate data on expenditure. The result is most likely a very inaccurate estimate of saving.

The third way to measure saving is to compute the differences between assets and debts, as reported at the beginning and at the end of a period. This approach to measuring saving is the most reliable one, as the respondents are asked about stock data from one point in time, which is more likely to be accurate compared to flow-data (Ferber, 1977). Stock-data may be easier for the respondent to remember than changes in stocks or expenditures. Besides, many holdings are also often recorded, as most people regularly receive notifications from financial institutions concerning balances on accounts. The accuracy of saving estimates can therefore increase by asking about holdings at a particular moment in time and giving respondents time to check their records before answering. The different saving measures used in this study will therefore be based on stock data. Below, the exact way of calculating the saving measures is described.

### 6.2.1 Questions about assets

The part of the questionnaire labelled "WTH" contains the questions concerning assets and mortgages as of 31st of December. Data concerning assets and mortgages for 1994 were collected in May 1994 (the second wave of data collection concerning value of assets as of 31.12.93) and in May 1995 (the third wave concerning value of assets as of 31.12.94). The part of the questionnaire called "HS" contains questions concerning accommodation and mortgages (see Questions 17-31 in Appendix 3). As questions concerning these assets are about "present value", relevant information concerning value of accommodation and mortgages in 1994 was collected in the beginning of 1994 (in the second wave of data collection) and in May 1995 (the third wave of data collection).

Appendix 3 contains the first pages of the WTH questionnaire (Questions 1-16). It shows the questions used for routing the respondents to the relevant assets questions, as well as all questions concerning checking accounts. Some of the instructions given to the respondents are also included. As the total questionnaire is too long to be included here, this sample from the questionnaire will serve as example of how information about different assets was collected. The full questionnaire is available from CentER upon request.

When answering questions about assets, the respondents are allowed to answer certain questions by choosing one of several brackets (see Questions 5 and 15 in Appendix 3). This option is given to those who refuse to report the exact amount of, for example, the balances on their accounts (Questions 4 and 14, Appendix 3). The option to answer by indicating a bracket was used in order to reduce non-response. The method leads to problems when the values of different assets are to be added. In order to make additions and subtractions possible, the middle of the bracket was used as the value for the asset. The last bracket was defined with the lower edge, although this may cause underestimation of the real value.

Appendix 4 contains an overview and definition of the asset components that were included in the questionnaire. In addition, the appendix contains an overview of missing values for each asset component. Because of a high proportion of missing values, some of the asset components are not included in the operational definition of saving used in this study. The exact definitions of discretionary and contractual saving are outlined below.

### 6.2.2 Saving definitions

The review of the saving literature in Chapters 2 - 3 shows that saving can be defined in different ways. The operational definitions can also vary in scope and complexity depending on the purpose of the investigations and the resources available for the data collection. No single definition is adequate for all purposes. Here, following Katona (1975), a distinction will be made between discretionary and contractual (repayment) saving, in order to test the extent to which the underlying psychological mechanisms are different for the two types of saving. In addition, we will distinguish between saving during a year and the sum of savings at a particular point in time (wealth).

Tables 6.1 and 6.2 show that discretionary saving is the saving most people would recognise as saving. This is saving resulting from genuine decisions to save in the relevant period, not performed because it was needed or governed by habit. A simple operational definition is to equate discretionary saving with changes in liquid assets, such as currency, checking accounts, and saving accounts. Liquid assets are either cash or assets that are immediately convertible into cash. A more complete operational definition of discretionary saving is to include changes in financial or intangible assets. Such assets can for example be government bonds, stocks, annuities and mutual funds. These assets are described more as investments than a form of saving, but they do imply decisions of putting money aside. The measure of discretionary saving should be adjusted for so-called residual saving. Residual saving is a result of a failure to spend the money, so that money is saved accidentally. As we do not have the ability to distinguish between discretionary and residual saving in the data set, the measure of discretionary saving includes any residual saving.

The operational definition of discretionary saving used in this study equals that used by Katona (1975, pages 232-233), except for including contractual saving not being repayment of loans in the definition of discretionary saving. The reason for this is the assumption about the underlying mechanisms for repayment saving being different from other fixed savings arrangement. Contractual saving done by repaying loans may be associated with a preference for buying before paying. Contractual saving through participation in pension schemes may be associated with a preference for the opposite. Moreover, the savings arrangements are not so fixed than that they cannot be cancelled within a relatively short period. Automatic transfers to a saving account can be stopped within a day. Insurance saving is often done by paying a bill or accepting a transfer from one's checking account, and the household does, in principle, make a decision on whether to continue this type of saving every time the amount is to be paid. It is therefore reasonable to argue that these types of contractual saving are discretionary saving.

A problem with the measures of financial assets such as shares, growth funds and mutual funds is that it is difficult to identify the reason for changes in value of the funds from the responses to the wealth questionnaire. For example, a rise in the value of funds is a result of

two factors: more investments in the funds, or an increase in the value of the funds due to an increase in their market value. Only the first factor can be characterised as discretionary saving. Likewise, a reduction in the value of the funds might be caused by reducing the investments in the funds or by a reduction of the value of the funds. Only the first factor might be considered discretionary dissaving. It would have been better to ask respondents directly about purchases and sales of such assets. Nevertheless, since this information is not available, the change in the value of these assets will be treated as discretionary saving. The exact definition of discretionary saving is the sum of the balance of checking accounts, savings in Post bank accounts, saving in deposit books and deposit accounts, employer-sponsored saving, money lent out to family or friends, the value of mutual funds, growth funds, saving certificates, bonds, shares, annuity insurance and endowment insurance. The sum of these assets is calculated for December 1993 and December 1994 respectively. The sum of financial assets as of December 1994 is used as the "stock" measure of discretionary saving and is denoted "financial wealth". The "flow"-measure "Discretionary saving during 1994" is calculated by subtracting the sum of financial wealth as of December 1993 from the sum of financial wealth as of December 1994. The discretionary saving ratio is found by dividing discretionary saving during 1994 by income in 1994.

Contractual saving is defined as repayment saving. Katona notes that this is regarded as expenditure by many consumers, rather than a form of saving. Contractual saving is saving that occurs when the household pays back their mortgages and other debt. The repayment schemes can seldom be changed, and this saving is therefore more likely to be non-discretionary than the fixed saving arrangements. As mortgages usually are used for investments in real estate while the other loans usually are used for financing consumption, we will analyse debt inclusive and exclusive mortgages and mortgage repayment respectively.

Debt is defined as the sum of loans to family, private debt, outstanding credit, instalment debt, credit to shops, credit card debts, study loans and other loans. Mortgages are the sum of mortgages on real estate (house used for accommodation, any second house used for accommodation, real estate not used for accommodation). Total debt is the sum of debt and mortgages. The sums of these different types of loans are calculated for December 1993 and December 1994 respectively. The sum of debt and mortgages as of December 1994 is used as the "stock" measure of negative saving. The "flow"-measure "Contractual saving during 1994" is defined as the reduction in the sum of debt and mortgages calculated by subtracting the sum of debt as of December 1994 from the sum of debt as of December 1993. The contractual savings ratio is found by dividing contractual saving during 1994 by income in 1994.

A complete operational definition of saving also includes changes in the value of assets like houses, cars, and other durable goods. These are generally valued at market (resale) prices. One reason for including these assets in the saving definition is that many people regard these assets as investments instead of expenditures. Particularly in times with raising prices, the purchase of a durable good may represent a substitute form of saving. This can be the case for possessions as different as houses and quality clothes. For some households, the resale value of their durable goods may represent the major part of the household's capital. Not including it in the operational definition of saving may result in considerable underestimation of saving. This is particularly the case when the loans associated with the possession are counted as negative assets. The "stock" measure of real savings is therefore defined as the value of real estate and items such as cars, motorbikes, caravans, and boats as of 1994. Saving in real estate during 1994 is defined as the change in the value of real savings between 1994 and 1993.

Total household wealth as of December 1994 is defined as the sum of financial wealth and value of real estate subtracted by the sum of debt and mortgages. Total saving during 1994 is defined as the sum of discretionary saving during 1994, the sum repaid on debt and mortgages and the change in the value of real estate and other valuable assets. The total saving ratio is defined as total saving during 1994 divided by income in 1994.

### 6.2.3 The saving measures vs. the subjective estimation of household saving

In each wave, the respondents were also asked about whether they put any money aside the past 12 months. Those who answered “yes” to that question (1494 respondents) were asked how much money their household had put aside in the past 12 months (Question 59, Appendix 3). The answer was given by choosing one of seven brackets. Here we will compare the responses to this question (the mid-value of the brackets) in the third wave of data collection (1995) with the saving estimates calculated following the description above. Although the question about past saving involves a different accounting period than 1994 and involves all household members as opposed to only the head of household and spouse/partner, the responses to this question should be correlated with the other saving estimates.

Since the question about “money put aside” concerned the household, the comparison was carried out at the household level. If the partner and spouse had chosen different brackets when answering how much money the household had put aside, the average of their answers was used as measure. Of the 704 households with a partner present, the partners had chosen the same bracket in 571 cases, while they deviated by one bracket in 107 cases and by two or more brackets in 26 cases. These last 26 households were excluded from the analyses. Table 6.3 displays the results (Spearman's rho) of a comparison between responses to the question “how much money did your household put aside last year” and saving estimates based on differences in assets at the beginning and in the end of the year. Only the households in which one of the spouses/partners had indicated that they had put money aside in the past 12 months and where the household had a positive value for total saving were included in the analyses. Separate analyses were carried out for the households who had not given any “don't know” answers (see Appendix 3).

Table 6.3  
Correlations between different saving measures

		Amount put aside past 12 months (reported in 1995) (households with don't know-answers included)	Amount put aside past 12 months (reported in 1995) (households with don't know-answers excluded)
Total saving (1994)	$r_s$	.279**	.377**
Discretionary saving (1994)	$r_s$	.190**	.257**
Bank saving (1994)	$r_s$	.098*	.171**
N		559	326

\* Significant at the .05 level (2-tailed) \*\* Significant at the .01 level (2-tailed)

Given the results displayed in Tables 6.1 and 6.2, the results in Table 6.3 are surprising. Taking into account what most people consider to be “saving”, it is natural to expect that the



question about “money put aside” would make most respondents report their bank saving. The highest correlation coefficient was, however, found between the rather crude measure “amount put aside” and the estimate of total saving during 1994, which also include repayment saving, investment saving and changes in the value of real estate. The discretionary saving measure includes both bank saving and investment saving and correlates more with the “money put aside” measure than the estimate of bank saving (which includes saving in savings accounts and employer-sponsored saving only).

The correlation between the two different saving measures is not very high. The reasons for this might be many. First, as already mentioned, the accounting period and the definition of household differ between the two measures. In addition, the “money put aside” question might be unreliable as the respondents most likely define “money put aside” differently. The fact that 17.8% of couples also disagreed on which bracket to choose further indicates that the “money put aside” measure might be unreliable. Nevertheless, the positive and significant correlations give some indication that the different saving measures have some reliability.

Table 6.4  
Saving ratios (saving in percent of disposable income)

<b>Total sample N= 1189 (758)</b>	Mean	Median	Minimum	Maximum
Total saving/ disposable income	19.2 (26.0)	10.6 (11.4)	-5185.5 (-1731.0)	6273.9 (6273.9)
Repayment saving (mort.incl.)/disposable income	-8.3 (-7.4)	.0 (.0)	-934.5 (-879.7)	685.5 (685.5)
Repayment saving (mort excl.)/disposable income	-2 (-.7)	.0 (.0)	-341.0 (-341.0)	685.5(685.5)
Discretionary saving/disposable income	1.3 (5.4)	.7 (1.3)	-1127.8 (1127.8)	5588.4 (5588.4)
<b>Low Income group N= 238 (145)</b>				
Total saving/ disposable income	17.0 (3.6)		-1266.7 (-928.1)	2621.4 (342.6)
Repayment saving (mort.incl.)/disposable income	-3.7 (.5)		-366.8 (-366.8)	416.8 (416.8)
Repayment saving (mort excl.)/disposable income	.7 (-2.1)		-231.0 (-231.0)	269.2(169.6)
Discretionary saving/disposable income	-2.9 (-.6)		-536.3 (-411.5)	894.8 (894.8)
<b>Middle Income group N = 238 (151)</b>				
Total saving/ disposable income	2.9 (2.5)		-1242.32 (-440.0)	999.4 (733.4)
Repayment saving (mort.incl.)/disposable income	-5.2 (-12.6)		-716.2 (-716.2)	444.0 (245.5)
Repayment saving (mort excl.)/disposable income	-3 (-4.4)		-341.0 (-341.0)	254.9 (254.9)
Discretionary saving/disposable income	-4.3 (-8.7)		-555.0 (-555.0)	864.1(727.5)
<b>High Income group N= 238 (157)</b>				
Total saving/ disposable income	19.2 (22.7)		-1000.9 (-1000.9)	1666.8 (496.7)
Repayment saving (mort.incl.)/disposable income	-14.9 (-10.0)		-630.5 (-426.3)	496.2 (316.12)
Repayment saving (mort excl.)/disposable income	-3.6 (-2.7)		-315.3 (-154.4)	213.0(50.1)
Discretionary saving/disposable income	1.0 (4.0)		-856.5 (-611.2)	965.6 (416.1)

Note: Numbers in parentheses are results when respondents with “don't know” answers are excluded from the sample.

Table 6.4 reports the maximum and minimum values of total, contractual (with and without mortgage payments included) and discretionary savings ratios. Statistics are reported for both the total sample, as well as for three income groups that will be defined in Section 6.4. The statistics reported in Table 6.4 show that the range of the savings ratios is far too wide. Although very high or low saving ratios might be expected with regards to contractual or discretionary saving as a result of major reorganisation of a household's finances, the range of the total saving ratio, which should include all types of saving, is also too wide. There seems to be a large portion of households with saving ratios much higher or lower than what we normally would expect. One reason for the extreme values might be that respondents reported the value of a major asset in one year but not in another. The measure is also very volatile for typographical errors. Separate analyses were therefore conducted for the part of the sample

that had no “don't know” answers. As can be seen in Table 6.4, for some of the saving ratio measures, this resulted in less extreme maximum and minimum values. The mean saving ratio was also changed in some cases. However, the range of the saving ratios is still too large, which means that many extreme values are also caused by typographical errors or otherwise erroneous answers. Taking into account that the measure is constructed from up to 32 assets components as well as many different income items from both heads of the households and spouses, it is clear that the chance of typographical errors and respondent fatigue is quite high.

Since it is difficult to determine which saving ratio estimate might be correct and which might be wrong, the analyses will be carried out for a trimmed sample. Table 6.5 shows the statistics when the sample is trimmed by 10% of each tail of the distribution of the total savings ratio.

Table 6.5  
Statistics of trimmed sample

Trimmed sample	Mean	Median	Minimum	Maximum
Total saving/ disposable income	16.9	10.6	-109.8	143.3
Repayment saving (mort.incl.)/disposable income	-6.4	.0	-452.5	496.5
Repayment saving (mort excl.)/disposable income	.7	.0	-255.9	213.0
Discretionary saving/disposable income	.4	.7	-205.0	894.8

N=951

### 6.3 HOUSEHOLD INCOME

The questions about income from work are found in the part of the questionnaire called INC, which included questions about health and income. Based on these data, a variable called “household disposable income” is constructed. “Household disposable income” is defined as the income available to the household after payment of income taxes, National Insurance contributions, and down payments on mortgages.

In the interview, the respondents were first asked about the sources of their personal income in 1994: if they were self-employed, received any benefits or pensions, had a paid job on a contractual basis or any other sources of income. Responses to these questions were used for routing the respondents to the questions that were relevant for them. The respondents were then asked to specify the yearly income received through the reported sources of income (see for example Questions 32 to 38, Appendix 3). They were also asked about transfers to children or other family members, the costs of medical insurance, fringe benefits, inheritances, and gifts.

The income questionnaire does not contain questions about interest and dividend income. Respondents report the amount of interest received for their savings account during the last fiscal year as well as dividends for the same period. This information is not used when constructing the variable Household Disposable Income because the income questionnaire also contains a question about “other income not mentioned earlier”. It is assumed that answers to this question involve interest and dividend income, as most respondents indicated either interest or dividend income as source. If we also add capital income to the income estimate, we might doubly count this type of income.

The exact operational definition of household disposable income (HDISPINC) used for this study is described in Appendix 5. Household income is found by adding the reported incomes

of HH and spouse/partner. Appendix 5 also shows that the questionnaires contained many different income questions. Answers to these questions were used for filling in missing observations of household disposable income. The remaining missing observations of income were estimated by using Maximum Likelihood. The correlation between the calculated disposable income and answers to the question "Do you know how much your taxable income was for 1994?" was .93. The correlation (Spearman's rho) coefficient between income values found by adding different income types and the mid-value of the eleven brackets used when answering the question "Do you know, approximately, how much the net income of your household would amount to over 1994?" was .872. This can be interpreted as a rather high reliability with respect to the income data.

Table 6.6 shows some statistics for household disposable income (HDI) in the full sample and in the two sub-panels respectively. 22 of the households in the high-income panel seem to have a rather low disposable income, since these households had a gross income above Dfl. 110000 at the time they were recruited for the panel. These data were checked more specifically. With the exception of three households, the income information seemed to be consistent in the sense that gross income and net income derived from information about different sources of income corresponded well to the chosen bracket for household net income for the same period. The reason for why their disposable income is so much lower than the gross income they had when they were recruited in 1993, could be that one partner stopped working due to child bearing, payment of alimonies or support to children that are students etc. For one household, a rather low estimate of the sum of income sources was substituted with the much higher mid-value of the income bracket chosen by the same respondent, as this estimate seemed more probable.

Table 6.6  
Household disposable income

	Total sample	Representative panel	High-income panel
N	1212	754	458
Mean	64876	45434	96884
Median	59228	42115	91040
HDI < 29999	180	179	1
30000 < HDI < 59999	436	415	21
60000 < HDI < 89999	344	144	200
90000 < HDI < 119999	178	10	168
120000 < HDI	74	6	68

#### The discretionary income groups

When testing whether the importance of psychological variables increases with the level of discretionary income), it would be helpful to be able to distinguish between those with and without discretionary income. Katona (1975) distinguished between four groups:

- 1) *The wealthy*, which he defined as the top 5% of the income distribution. This group would have discretionary income, but have a much greater degree to which they may indulge in discretionary expenditures.
- 2) *The discretionary income group*, which is defined less accurately as "those families who are not 'wealthy' and yet are in possession of income they may use

for discretionary expenditures. Their income exceeds what is needed for minimum necessities so that they can, to a smaller or larger extent, engage in spending not only on what they need but also on what they want.” (Katona, 1975: page 23). Katona suggested a lower limit of income for this group, which placed close to one half of all family units in the 1960s and early 1970s in the discretionary income group.

- 3) *The lower-middle income group*, which is defined as having no discretionary income but does not fall into the poverty group.
- 4) *The poor*, which Katona defined as households with income less than the minimum budgetary requirements for a family.

For the analyses of the effect of increase in discretionary income, we are interested in groups 1 and 2. Per definition, groups 3 and 4 will have no saving, since the lack of saving is not caused by unwillingness to save, but inability. The psychological variables should have little impact on the saving behaviour of this group.

There are two possible ways of identifying those with discretionary income:

- 1) Exclude those who answer 1, 2 or 3 to Questions 42 and 43 in Appendix 3.
- or
- 2) Exclude those with an income below a certain level.

There are problems with both methods. The first method is problematic since an answer like “we can just manage” does not necessarily mean that the household has no discretionary income in the sense that they can buy things beyond necessities. As demonstrated by Alessie et al. (1997), people’s perception of what it takes to make ends meet increases with the income of the reference group. They still might have income that exceeds necessities as defined in a more objective way, but they might not perceive it as such. This is illustrated in Table 6.7. Table 6.7 shows the frequencies (in percent) of responses to Questions 42 and 43 (Appendix 3) across each quartile of the distribution of disposable income. The average response of spouses to the financial situation-questions (in 1994) is used for this purpose, and scores with decimals (which occurred when spouses did not agree) have been rounded off to the lower number. The table shows that the tendency to report that it is easy to manage on the household income and that the household is able to save increases with income. Nevertheless, there are still people in the high-income group that think that they can hardly manage and there are people in the lowest income group who think it is easy to manage.

Table 6.7  
Perception of economic situation across household income groups

Household Disp. Income (I)	How well can you manage?					How is your financial situation?				
	Very hard 1	Hard 2	Neithe 3	Easy 4	Very easy 5	Debt 1	Use saving 2	Just manag 3	Save some 4	Save a lot 5
I<38036	6.0	23.3	44.1	23.9	2.7	6.4	13.8	45.5	32.0	2.4
38036<I<59022	1.7	8.1	38.6	41.6	10.1	3.4	9.7	24.9	51.3	10.7
59022<I<85235	.3	4.7	27.6	53.5	13.8	1.6	6.4	17.2	53.5	21.2
I>85235	0	3.0	23.6	47.8	25.6	2.0	2.7	16.5	52.9	25.9

(N=1189 households)

One possible reason for a lack of a more direct relationship between household income and perception of the financial situation might be that the figures do not take the number of family

members into account. Table 6.8 shows the distribution of answers about the economic situation of the household when the disposable income is divided by the number of family members. The transformation of household income to income per family member did not change the pattern of response much.

**Table 6.8**  
Perception of economic situation across levels of income pr. family member

Disp. Income (I) pr. family member	How well can you manage?					How is your financial situation?				
	Very hard 1	Hard 2	Neithe 3	Easy 4	Very easy 5	Debt 1	Use saving 2	Just manag 3	Save some 4	Save a lot 5
I<18083	5.7	20.6	49.8	22.9	1.0	4.4	12.5	46.1	33.7	3.4
18083<I<27638	1.6	10.4	39.9	39.9	8.1	4.1	8.7	28.2	48.0	11.1
27638<I<39755	.3	6.8	27.9	49.5	15.5	3.7	7.1	18.8	53.6	16.8
I>39755	.3	1.4	16.2	54.6	27.6	1.3	4.4	10.7	54.5	29.0

(N=1189 households)

Tables 6.7 and 6.8 indicate that there is discretionary income also in the lower 25% of the income distribution in the sample. It is difficult to identify the threshold that would separate the poor and lower-middle income group from the discretionary income group. For the purpose of this study, we use every 10<sup>th</sup> percentile of the disposable income per household member to divide the sample into three income groups (see Table 6.9). These groups will not correspond to the groups of Katona, as households are likely to have discretionary income even in the lowest income group. Yet, we can use them for testing whether the effect of psychological variables increases with discretionary income. The responses displayed in Tables 6.7 and 6.8 indicate that the discretionary income increases for each income group, since the tendency to think it is hard to manage decreases with income. The effect of psychological variables should therefore increase monotonically with the three income groups as defined in Table 6.8.

**Table 6.9**  
Definition of income groups

Percent ile	Disposable income/ No. of fam. members	Income groups
0		
1	<b>11901</b>	Low income group
2	<b>16587</b>	
3	<b>19876</b>	
4	23843	Middle income group
5	27637	
6	31800	
7		
8	<b>37250</b>	High income group
9	<b>43159</b>	
10	<b>53005</b>	

Table 6.10 shows some descriptive statistics of the full sample and the three income groups defined by the income brackets shown in Table 6.9. The largest difference between the groups is family size. There are more households with both spouse/partner in the low-income group than in the other groups and the ratio of households belonging to the high-income panel is higher the higher the income group, as expected.

Table 6.10  
Description of the three income groups

	Full sample	Low income	Middle income	High income
N	1189	238	238	238
Mean age (range)	47.3 (18-87)	47.0 (22-77)	50.1 (22-84)	48.1 (24-87)
Family size				
1	306 (25.7%)	25 (10.5%)	71 (29.8%)	82 (34.5%)
2	458 (38.5%)	64 (26.9%)	92 (38.7%)	141 (59.2%)
3	138 (11.6%)	41 (17.2%)	40 (16.8%)	10 (4.2%)
4	196 (16.5%)	75 (31.5%)	31 (13.0%)	4 (1.7%)
5	75 (6.3%)	26 (10.9%)	4 (1.7%)	1 (.4%)
6	13 (1.1%)	7 (2.9%)	2 (.4%)	
7	2 (.2%)			
9	1 (.1%)			
Living with partner	844 (71.0%)	194 (81.5%)	165 (69.3%)	154 (64.7%)
Representative p.	745 (62.7%)	177 (74.4%)	155 (66.4%)	117 (49.2%)

#### 6.4 EDUCATION LEVEL

All respondents are asked to indicate their highest level of education using thirteen categories, from primary to University education. Two questions were asked: one concerned highest level of education attended while the other concerned highest level completed. These were recoded into high, medium and low education, according to the following rule:

Kindergarten/primary education, continued primary education or elementary secondary education, continued special (low-level education and secondary education, junior vocational training, special (low-level) education and vocational training through the apprentice system, and “other sort of education/training” are coded as low education, pre-university education, and senior vocational training are coded as middle education, while vocational colleges and university education are coded as high education.

Before recoding the education level, several consistency checks of the reported education levels were carried out. Answers given to the question about highest level of education attended in the second and third wave of data collection were compared. 1852 of the 2033 respondents gave the same answer across the two waves. 113 of the 181 respondents who did not give the same answer across the two years would be assigned to different education group when following the rule outlined above. Moreover, answers given to the question about highest level of education attended and the highest level of education completed in the second wave of data collection were compared. In all, 1608 of the 2033 respondents gave the same answer to these two questions. In 268 of the cases, where the respondents had not reported the same answer to the “education attained” question and “education completed” question, were assigned to a different education group when following the rule specified above.

The procedure used when assigning respondents to the three education groups was therefore as follows:

First, the variable “highest education completed” from the second wave of data collection was recoded according to the described rule. In cases where the “highest education attended” was

one group higher than “highest education completed” (108 cases), the new code was kept. In the cases where the “highest education attended” was lower than “highest education completed” (99 cases), and when the highest education attended was two groups higher than highest education completed (14 cases), information from the third wave of data collection was used to assess which education level was correct. When comparing the answers to “highest education completed” collected for the second wave and “highest education attended” collected in the third wave, the education group was the same for 89 of the 113 cases that were checked, and only for 18 respondents the reported completed education was higher than reported attended education or the assigned education levels differed by two groups. For the remaining 18 cases, the highest attended education group for 1994 matched the highest education group reported in the first wave, so for these cases the education level reported in 1993 was used. As there was a perfect match between the completed education group in the first wave of data collection and the reported highest attended education group in the second wave of data collection, the 49 missing values for education level were replaced with the values for highest attended education group from 1994. In the sample of 2033 respondents, 713 are assigned to the low education group, 516 to the middle education group, and 804 to the high education group.

## 6.5 TIME PREFERENCE

Time preference is defined as the subjective value of present goods relative to future goods of equal quantity and quality. In empirical research, a frequently used operational definition of time preference is the discount rate people implicitly use when they make intertemporal decisions, after controlling for the effect of risk (e.g. Loewenstein, 1987; Thaler, 1981). This discount rate is called the “Subjective Discount Rate” (SDR) or the “rate of time preference”. The usual way of measuring the rate of time preference follows the instructions provided by Fisher himself:

“...we obtain the rate of time preference for a present dollar over a dollar one year hence by the following process:

- (a) take the present want for one more present dollar; and
- (b) the present want for one more dollar due one year hence;
- (c) and(c) subtract (b) from (a); and finally
- (d) measure the result (c) as a percentage of (b).” (Fisher, 1930; page 62).

Laboratory studies have shown that characteristics of the questions used to measure SDR affect the responses. The SDRs observed in previous studies have been sensitive to the size of the alternatives in the choice-sets, the time delay, framing in terms of losses and gains (e.g. Benzion et al, 1989; Nyhus, 1999; Shelley, 1993; Thaler, 1981) and framing in terms of speeding up and delaying events (e.g. Loewenstein, 1988; Nyhus, 1999; Shelley, 1993). Measurement of time preference is therefore not as straightforward as proposed by Fisher (1930) and practised by many of his successors. Nyhus (1997) analysed responses to twelve different questions used to elicit the rate of time preference (collected in the third wave of data collection of the CSS) and found that the correlation between the responses to these questions were high within scenarios, while it was low between responses when the scenarios were different. She suggested to use scenarios in the questions used for measuring time preference that correspond to the behaviour subject to observation. A delay-payment scenario should be used when measuring time preference in studies of borrowing behaviour or

contractual saving, while delay-receipt scenarios should be used in studies of discretionary saving.

In the first wave of data collection for the CSS, time preference was measured using nine questions with varying time horizon, size of amounts and different framing (delay receipt, speed-up receipt and delay payment). An overview is given in Appendix 3 (Questions 95-112). Because delayed consequences often are associated with risk, it is stressed in the instructions to the respondents that delaying the reception of a gain or postponement of a payment are without any risk. The organisation that pays the prizes is financially trustworthy, while the organisations that claim the payments are state offices unlikely to change or forget their claims. The questions involved periods no longer than one year. For this reason, the following linear formula (as opposed to a compound formula) was used when eliciting the discount rates from the responses to these questions:

$$r = ((V_F / V_P) - 1) \times 12/t$$

where  $V_P$  is present value of the cash flow,  $V_F$  is the future value of the cash flow,  $t$  is the time period to be waited (in months) and  $r$  denotes the discount rate used in the decision. All discount rates were converted to annual discount rates. In the questions, respondents are given  $t$  and either  $V_F$  or  $V_P$ , and they are asked to fill in the missing value necessary to calculate  $r$ .

A Principal Component Analysis (PCA) was used in order to explore the data further. The purpose of PCA is to transform the original set of items into a smaller set of linear combinations that account for most of the variance in the original set. The principal components are extracted so that the first principal component accounts for the largest amount of the total variation in the data. The second principal component is the weighted linear combination of the observed variables that are uncorrelated with the first component and that account for the maximum amount of the remaining total variation. Table 6.11 shows the results, when the correlation matrix was used as input, and with oblique rotation. The pattern matrix shows the loadings that represent the unique contribution of each variable to the factor. The three components which obtained an Eigenvalue greater than 1 are easily interpreted according to the scenario of the questions: Component 1: Delay Receipt score, Component 2: Speed-up receipt score, and Component 3: Delay payment score. These components explained 57.0% of the total variation. The correlation between the first and second component was .116, between the first and third component .09 and between the second and third component .159.

Table 6.11  
Pattern Matrix for 9 time preference questions

Variables	Components		
	Delay receipt	Speed-up receipt	Delay payment
Delay payment of low amount 1 year	.008	.026	.772
Delay payment of low amount 3 months	.008	-.001	.813
Delay receipt of high amount 1 year.	.840	.097	-.083
Delay receipt of high amount 3 months	.889	-.009	-.070
Delay receipt of low amount 3 months	.713	.069	.148
Speed-up receipt of high amount 3 months	.041	.739	.070
Speed-up receipt of low amount 12 months	-.005	.749	-.203
Speed-up receipt of high amount 12 months	-.084	.533	.170
Speed-up receipt of low amount 3 months	.095	.537	.202



Extraction Method: PrincipalComponent Analysis. Rotation Method: Oblimin with Kaiser Normalization.  
N=2033. Pairwise deletion of missing.

Based on the results displayed in Table 6.11, three measures of time preference were used in the subsequent study. A delay-receipt rate was derived by calculating the average of the responses to the three delay-receipt questions. A delay payment rate was derived by calculating the average response to the two delay payment questions, while a speed-up-receipt rate was derived by computing the average score of the four speed-up receipt questions.

## 6.6 EXPECTATIONS AND UNCERTAINTY

The economic psychology part of the questionnaire contains data about people's expectations concerning future income and how certain there were about the expected changes (see Appendix 3, Questions 44-58). The measure of expectations will be limited to income expectations because the data set does not include expectations towards expenditures. Income expectations were measured by asking the respondents whether they expected their income to increase, remain the same or decrease the next year and the next five years. If they expected a change, they were asked to indicate the percentage change they expected. The answers to these questions were used to construct two measures of income change (the next year and the next 5 years). The correlation between the two measures is significant at the .01 level ( $r = .35$ ). The correlation coefficients between the income expectations of spouses are relatively high and significant at the .01 level (expectations for 1 year ahead:  $r = 0.66$  and expectations for 5 years ahead:  $r = 0.55$ ).

Income uncertainty was measured by asking respondents how likely (on a seven-point scale where 1= highly unlikely and 7 = highly likely) seven possible changes in income in the next 12 months were (see Appendix 3, Questions 48 - 54). These changes were a rise/fall in income of more than 15%, a rise/fall in income between 10 and 15%, a rise/fall in income between 5 and 10%, and no significant change in income. Responses to these questions are not straightforward to use, and at least two approaches of how to construct a scale from them have been used in previous research (Das & Donkers, 1999; Webley & Nyhus, 2001). In this study, the approach applied by Webley and Nyhus (2001) is used.

The seven questions  $I_j$  (Questions 48 - 54, Appendix 3) were assigned numbers ( $j= 1, \dots, 7$ ). This assumes that the income changes are equivalent. The answering categories for each of the questions ( $f_j$ ) were subtracted by one so that the answers to each of the questions range from 0 to 6 ( $f_j = 0, \dots, 6$ ).

For each individual, each rating ( $f_j$ ) was divided with the total sum of the ratings ( $\alpha_j = f_j / \sum f_j$ ) in order to adjust for any individual differences when using the scales.

Mean income change is given by the formula 
$$\bar{I}_{(a)} = \sum_{j=1}^7 \alpha_j,$$

the variance is given by 
$$S^2_{I(a)} = \sum (I_j - \bar{I}_{(a)})^2 * \alpha_j,$$

and the standard deviation is 
$$S_{I(a)} = \text{square root of } S^2_{I(a)}.$$

This standard deviation is a measure of the spread of people's ratings to the seven uncertainty questions. It is used here as an index of uncertainty. For example, a person who has given the

answers 0 0 0 6 0 0 0 is quite certain that his/her income will not change more than 5% and gets an uncertainty index of 0. A person who answers 0 0 0 6 1 0 0 is slightly more uncertain about a positive change and gets an uncertainty index of 0.35. Persons answering 2 2 2 2 2 2 or 0 0 0 0 0 0 get a score of 2. The highest scores are obtained for persons answering 6 6 6 0 6 6 6 ( $s = 2.16$ ) and 5 5 3 2 3 5 5 ( $s = 2.20$ ), as this indicates that the persons expect a change in income, but that they do not know whether it will be positive or negative and regard both direction of changes as equally probable. In the following, this index is labelled "perceived income variability".

In addition to the described index, two simpler measures of income uncertainty were included in the questionnaire (Questions 47 and 58, Appendix 3). One measure concerns how confident the respondents feel about their own estimates of increases and decreases of income for the next year the other measure regards confidence in estimates for the next five years. Scores of the uncertainty index and the two simpler measures correlated significantly, and the relationship was weaker between the 1-year uncertainty index described above and the responses about confidence in the 5-year estimate ( $r_s = .16$ ) than the 1-year estimate ( $r_s = .23$ ) as could be expected. The correlation of the uncertainty index of spouses was significant at the .01 level ( $r = .39$ ).

## 6.7 TIME HORIZON

The respondents were asked about their most important as well as least important planning horizon with regards to expenditures (Questions 115 and 116, Appendix 3). The reliability of question 116 about the least important planning period does not seem to be high. Many respondents specified the same time period as both the most and the least important time horizon. No attempt was therefore made to produce an overall scale of time horizon, and question 115 is used as the measure of time horizon. It is not desirable to rely on a single item, but there is no other variable in the data set that will tap this construct.

Table 6.12  
Most important planning horizon

Most important planning horizon with regard to planning expenditures and savings	Frequency	Valid percent
The next couple of months	939	46.2
Next year	475	23.4
The next couple of years	425	20.9
The next 5-10 years	120	5.9
More than 10 years from now	74	3.6
	N= 2033	

The answers given to the question about most important time horizon are displayed in Table 6.12. The answers to this question are not straightforward to interpret. Answering that the "next couple of months" is the most important planning horizon, does not necessarily mean that time beyond this period is considered unimportant. In lack of other measures that can tap the concept of planning horizon, this measure will still be used in the subsequent analyses.

## 6.8 ATTITUDES TOWARDS DEBT AND SAVING

The 21 items used to measure attitudes (Questions 74 - 94, Appendix 3) were analysed previously by Wärneryd (1996b) and Webley and Nyhus (2001). Their results are presented in Table 6.13. Wärneryd identified five orthogonal factors that he labelled “thrift”, “no need to save”, “saving involvement”, “shame of debt”, and “saving habits”. These factors accounted for 47% of the variance. Webley and Nyhus tested the robustness of this solution using two

Table 6.13  
Four factor structures for attitudes towards saving

Item	Label	This study 1993/1994	Wärneryd 1993 & 1994-data	Webley & Nyhus 1994-data	Webley & Nyhus 96- data
<b>Factor 1: Thrift</b>					
STIGB01	I save to create a larger freedom of choice and to be more independent	.47 .37 F2	.49 F1	.40 F1 .52F2	.49 F3
STIGB04	Being careful with money is an important character trait	.57	.68 F1	.70 F1	.60 F2
STIGB05	With financial affairs, I tend to listen carefully to advice by family and friends	.51	.47 F1	.50 F1 .37 F5	.44 F2
STIGB06	To me, the service of a bank is very important	.67	.41 F1	.53 F1	.51 F1
STIGB08	It is important always to save as much money as possible	.56 3.5 F5	.71 F1	.69 F1	.68 F2
STIGB09	I try to have enough money in my bank accounts to be sure that I will be able to meet my financial liabilities	.67	.61F1	.58 F1	.54 F1
STIGB10	It is important to have some money left at the end of the month	.64	.64 F1	.66 F1	.51 F1 .45F2
STIGB16	Saving should be encouraged in today's society	.39	.57 F1	.52 F1 .35F2	.52 F1 .40F2
<b>Factor 2: Saving Involvement</b>					
STIGB02	I always try to pick saving schemes that yield high profits	.61	.59 F3	.64 F2	.73 F3
STIGB12	I am very interested in financial matters	.68	.67 F3	.69 F2	.74 F3
STIGB18	If I compare myself with my friends, I think in general I am (financially) better off	.64	.65 F3	.55 F2	.50 F3 .36F1
<b>Factor 3: Saving habits</b>					
STIGB14	I reserve part of my wages to save	.62	.50 F5	.43 F2 .39F5	.60 F1
STIGB19	For me there is no need to save because my income will rise significantly in the future	-.58	.54 F2	.54 F3 .42F2	.69F4
STIGB20	Most people in my environment are saving money	.59	.68 F5	.73 F5	.65 F1
STIGB21	Because of the social security system in our country there is no need to save	-.59	.60 F2	.64 F3	.65 F4
<b>Factor 4: Shame of debt</b>					
STIGB03	In general it is a good idea to be able to buy a car on instalment	-.72	-.65 F4	-.72 F4	-.70 F5
STIGB11	People who buy on instalment are wasters	.64	.64 F4	.56 F4	.62 F5.37 F2
STIGB13	It is not a good idea to borrow money to go on holiday	.40	.50 F5	.47 F4 .37F5	.47 F5.40 F1
<b>Factor 5: No need to save</b>					
STIGB07	Banks are only appropriate for people who have much money	.69	.59 F2	.59 F3	.43 F2 .35F4
STIGB17	People who are successful in saving are also successful in life	.50	.52 F1	.47 F1 .37F2	.45 F1
STIGB15	I always keep some reserve money because my income varies over the year	.45	.38 F1	-.40F5 .39F2	.50 F4

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

N=2025. Pairwise deletion of missing. 45.9 % of total variance explained. Variation explained after rotation: F1: 13.7, F2: 9.0, F3: 8.3, F4: 7.8, F5: 7.0. Note: loadings smaller than .35 not reported

different samples that differed from the sample used by Wärneryd. The solutions accounted for 49.6% and 48.1% respectively of the variance and confirmed the factor structure found by Wärneryd. In most cases, the same items were grouped in the same factor, although some inconsistencies were found.

Table 6.13 shows the results from the four PCAs carried out on the CSS data. Wärneryd (1996b) conducted a PCA on the attitude data from the first and second wave of data collection. The results from his analyses are shown in column four. Webley and Nyhus (2001) analysed data collected in later waves and conducted a similar analysis to that of Wärneryd in order to test the robustness of the factor structure. The results are shown in two columns: column five shows the results using data from the 1993 and 1994 data, while column six reports the results using the 1996 data. Wärneryd and Webley and Nyhus instructed the program to extract five factors. This was not done in this study, but the optimal solution was still based on five factors (with Eigenvalues greater than 1). The extracted components have been labelled according to Wärneryd's (1996b) suggestions.

Table 6.14  
Attitude factors

Item	Label	Loading
	<b>Factor 1: Thrift</b> Variation explained after rotation: 15.9, Chronbach's alpha: .71	
STIGSB04	Being careful with money is an important character trait	.52
STIGSB05	With financial affairs, I tend to listen carefully to advice by family and friends	.56
STIGSB06	To me, the service of a bank is very important	.63
STIGSB08	It is important always to save as much money as possible	.51
STIGSB09	I try to have enough money in my bank accounts to be sure that I will be able to meet my financial liabilities	.62
STIGSB10	It is important to have some money left at the end of the month	.62
	<b>Factor 2: Shame of debt</b> Variation explained after rotation: 12.2, Chronbach's alpha: .53	
STIGSB03	In general it is a good idea to be able to buy a car on instalment (reversed)	.61
STIGSB11	People who buy on instalment are wasters	.69
STIGSB16	Saving should be encouraged in today's society	.43
STIGSB17	Success in saving = success in life	.57
	<b>Factor 3: Saving Involvement</b> Variation explained after rotation: 11.5, Chronbach's alpha: .60	
STIGSB01	Saving creates freedom/independence	.45
STIGSB02	I always try to pick saving schemes that yield high profits	.75
STIGSB12	I am very interested in financial matters	.79
	<b>Factor 4: Saving habits</b> Variation explained after rotation: 9.4, Chronbach's alpha: .38	
STIGSB14	I reserve part of my wages to save it	.42
STIGSB19	For me there is no need to save because my income will rise significantly in the future (reversed)	.71
STIGSB21	Because of the social security system in our country there is no need to save (rev.)	.66

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. N=2025. Pairwise deletion of missing. Total variance explained: 49.0 %

The results from the analyses reported in Table 6.13 show that in most cases the items group into the same factor. As could be expected, the three analyses on the data from the first two waves did not diverge much. The results from the analysis of data from 1996, however, show that the factor structure used is not robust across different samples. Table 6.14 shows the

factor structure that will be used in this study. Some of the 21 attitude items were excluded from the analysis because they were unstable and loaded on different components across different analyses. Other items were deleted because they reduced the reliability of the scales in terms of the value of Cronbach's alpha. One of the questions (Question 88) was double-barrelled. Question 91 is better used as a measure of perceived position in the reference group (see Section 6.13). Question 93 had an exceptionally high number of missing values (597 of 2025). Excluding Question 93 reduced the number of missing of the derived composite attitude measures from 694 to 271. After removing these items, a solution with four principal components fitted the data most optimally. The factor structure is similar to those reported in Table 6.13, although a higher consistency with the factor structure found when using the 1996 data is desirable. Component scores were computed to represent each of the four components. These will be used in the subsequent regression analyses. A component score represents each individual score on the group of items that load high on a component (Hair, Anderson, Tatham & Black, 1995).

## 6.9 SAVING MOTIVES

The importance of saving motives was measured by Questions 61-73 (Appendix 3). Respondents indicated how important they regarded the different saving motives by choosing a number from 1 to 7 where 1 means "very unimportant" and 7 "very important".

Question 61 relates to the bequest motive. As this was the only question about bequests, the replies to this question were used as a measure of the strength of the bequest motive. Questions 61 and 67 relate to the *inter vivos* transfer motive. A measure of the importance of *inter vivos* transfers was constructed by adding the responses to these questions and dividing the score by two. Questions 63, 64, 72 and 73 relate to the precautionary saving motive. The index of importance for this motive was constructed by adding the responses to the four questions and dividing the total score by four. The same procedure was used when constructing the index for importance of retirement saving (Questions 65 and 66), goal saving (Questions 68 and 70) and the investment motive (Questions 69 and 71).

Table 6.15  
Mean and median scores for importance of saving motives across gender and age groups

	N	Bequest Motive Mean/Median	Inter vivo transf. mot. Mean/Median	Precautionary Motive Mean/Median	Saving for old age Mean/Median	Goal saving motive Mean/Median	Calculation Motive Mean/Median
<b>Men</b>	1039	2.6 / 2.0	3.0 / 3.0	4.4 / 4.5	4.1 / 4.0	3.2 / 3.0	2.5 / 2.5
<b>Women</b>	994	2.6 / 2.0	3.1 / 3.0	4.7 / 4.8	4.3 / 4.5	3.3 / 3.0	2.3 / 2.0
<b>Age: &lt;30</b>	143	2.1 / 2.0	2.9 / 3.0	4.7 / 5.0	3.8 / 4.0	4.4 / 4.5	2.6 / 2.5
<b>Age: 30-44</b>	796	2.9 / 2.0	3.3 / 3.5	4.6 / 4.8	4.2 / 4.5	3.5 / 3.5	2.5 / 2.5
<b>Age: 45-59</b>	670	2.6 / 2.0	3.1 / 3.0	4.5 / 4.8	4.4 / 5.0	2.9 / 3.0	2.4 / 2.5
<b>Age: 60-74</b>	375	2.9 / 2.0	2.7 / 2.5	4.5 / 4.5	3.9 / 4.0	2.8 / 2.5	2.3 / 2.0
<b>Age: &gt;75</b>	49	2.8 / 3.0	2.7 / 2.5	4.1 / 4.0	3.5 / 3.0	3.1 / 3.0	2.3 / 2.0

Table 6.15 shows that the precautionary saving motive is considered the most important saving motive, while the calculation and bequest motives are considered the least important. This is consistent with previous findings (e.g. Katona, 1975). We also see that, with the exception of the calculation and bequest motives, women tend to consider the saving motives

to be slightly more important than do men. In particular, the precautionary and retirement saving motives are considered more important among women. The saving motives also seem to vary with age. The bequest motive is considered more important among the older age groups. The *inter vivos* transfer motive is considered more important among households who are likely to have children living in their household. The importance of the precautionary, calculation and goal saving motive declines with age, while the importance of saving for old age is more important for those who have not yet reached retirement.

## 6.10 PERCEIVED POSITION IN REFERENCE GROUP

Questions 117 - 120 were used to measure perceived position in reference group. As discussed in Section 2.3.2, effects of reference groups can be difficult to measure, because it is problematic to identify the reference group a person uses. Here, we let the respondents choose from a long list of possible reference groups (Questions 117 and 119, Appendix 3), and the respondents were then asked to evaluate their own economic situation with that of their chosen group (Questions 118 and 120). When constructing a composite measure for perceived position in reference group, the answers to these two questions are weighted equally. The composite measure was constructed by adding the responses to the two questions, so that we get an index of relative deprivation ranging from 2 to 14.

Unfortunately, further inspection of the data revealed that many respondents had not answered the questions about perceived position in reference group. Only 883 out of the 2033 respondents (43.4%) in the working data file answered. One reason is that many respondents did not answer the question about who was their most important group for comparison and they were not routed to the question about their financial situation compared to this group. In addition, a routing error contributed to the high ratio of missing data for these variables. The reference group questions were not repeated in the second wave of data collection, which means that we cannot use data from later waves for imputation of missing values.

A different measure that may tap the construct “perceived position in reference group” is Question 91 (Appendix 3). The correlation between the answers to this question and the composite measure described above was significant at the one per cent level ( $r_s = .488$ ). Although a higher correlation between the two measures is desirable, Question 91 will be used as a proxy for perceived position of reference group because of the high number of missing observations for the other reference group questions.

## 6.11 PERSONALITY DIMENSIONS

The CSS includes a personality inventory referred to as the 16PA (personality adjective) scale. Brandstätter (1988) designed the 16PA scale as a short version of Cattell’s personality dimensions. Respondents locate themselves on 16 personality dimensions, each represented by two bipolar scales to achieve a higher reliability of the measures and to allow for internal consistency checks (Questions 121 - 152, Appendix 3). Brandstätter (1988) used data from 228 respondents (a mixture of students and married members of the general public) to demonstrate that four of the five secondary factors (emotional stability, extraversion, conscientiousness or norm-orientation, independence, and tough-mindedness) of the 16PF could be satisfactorily predicted from the secondary factors of the 16PA (the one that could not was tough-mindedness). He further reported four studies using only the 16PA, which

show that the secondary factors relate to other variables in line with theoretical predictions. This provides some evidence that the 16PA is a valid instrument. The scale is constructed to facilitate collection of personality data. Specifically, it is shorter than most other personality indexes and takes only a few minutes for respondents to complete.

Table 6.16  
Factor structure of the 16PA

Item	Label	Loading
<b>Factor 1: Emotional stability</b>		
<b>Explained variance after rotation: 13.7 Cronbach's alpha: .82</b>		
TEG2	Slow thinker - quick thinker (reversed)	.357
TEG3	Easily worried - not easily worried (reversed)	.654
TEG10	Oriented toward reality - dreamer	.469
TEG12	Happy with myself - doubtful	.607
TEG14	Need to be supported - independent (reversed)	.534
TEG16	Well balanced - quick-tempered	.658
TEG1a	Nervous - relaxed (reversed)	.714
TEG13a	Self-controlled - moody	.580
TEG14a	Self-confident - timid	.593
TEG15a	Can handle stress-cannot handle stress	.642
<b>Factor 2: Tough-mindedness</b>		
<b>Explained variance after rotation: 8.7 Cronbach's alpha: .62</b>		
TEG5	Quiet, calm - vivid, vivacious	.645
TEG7	Shy - dominant	.676
TEG11	Direct, straightforward - diplomatic (reversed)	.575
TEG4a	Gentle - rough	.445
TEG7a	Aimed at proving myself - indulgent (reversed)	.497
<b>Factor 3: Conscientiousness</b>		
<b>Explained variance after rotation: 8.0 Cronbach's alpha: .61</b>		
TEG6	Carefree - meticulous	.684
TEG8	Not easily hurt - easily hurt, sensitive	.468
TEG15	Little self-control - disciplined	.479
TEG5a	Always worried - unconcerned (reversed)	.579
TEG9a	Principled - carefree (reversed)	.662
<b>Factor 4: Extraversion</b>		
<b>Explained variance after rotation: 7.9 Cronbach's alpha: .58</b>		
TEG1	Oriented towards things - towards people	.604
TEG4	Flexible - stubborn (reversed)	.367
TEG9	Trusting, credulous - suspicious (reversed)	.477
TEG8a	Friendly - cold (reversed)	.631
TEG10a	Critical - accommodating	.417
TEG11a	Independent - prefer company	.495
TEG12a	Artificial - natural	.438
<b>Factor 5: Inflexibility</b>		
<b>Explained variance after rotation: 7.9 Cronbach's alpha: .62</b>		
TEG13	Creature of habit - open to changes (reversed)	.584
TEG2a	Like to try things - conservative	.702
TEG3a	Trained thinker-untrained thinker	.455
TEG16a	Want new experiences - want quiet life	.696

Alternating halves of the 16PA were included in the CSS each year, which requires that two waves must be merged in order to use the full scale (32 questions). Respondents answered the questions using a 7-point scale. The instructions given to each respondent can be found in

Appendix 3. Using data from multiple waves of the CSS, individual item stability was checked and found to be satisfactory. With the exception of one item, the rank correlation between answers given to the same question by the same person was between .5 and .7 with both one and three years' interval. Due to the merging of the two waves, 285 individuals in 181 households were deleted from the working data file, as they were not members of the panel in both waves.

Table 6.16 shows the factor structures resulting from a PCA of the 16PA followed by a varimax rotation. This factor structure is similar to that reported by Wärneryd (1996a), also based on CSS data from 1993 and 1994. There were seven factors with Eigenvalues greater than 1. The Eigenvalues for the first 12 factors were 5.20, 3.06, 2.42, 2.22, 1.46, 1.17, 1.10, .97, .92, and .85. A scree test (Cattell, 1966) was performed to help identify the optimum number of factors that should be extracted before the amount of unique variance begins to dominate the common variance. The test suggests that five or six factors are appropriate (see Figure 6.1). Given that previous analyses of 16PA have identified five factors, and these factors are readily interpretable, a five-factor solution was selected for this study. These factors have reliabilities ranging from .58 to .82, which is reasonable.

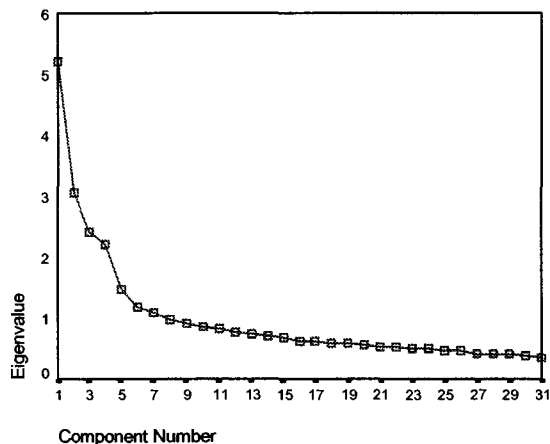


Figure 6.1  
Scree Plot - 16PA

## 6.12 CONSTRUCTION OF HOUSEHOLD MEASURES

Data concerning savings and incomes were collected at the individual level. A composite household measure of these variables can be constructed by simply adding together the responses from spouses. With respect to the psychological variables, an alternative strategy will be followed. The procedure is explained below.

In recent years, there has been a stream of research into how couples choose their system of financial management. It has been acknowledged that income is not distributed evenly



between household members and that the strategies of financial management differ from one household to the other. Using responses from one household member only when doing analyses on the household level is therefore inadequate. Similarly, to give, for example, all the males, heads of the households or “household financial managers” in the sampled households the same weight would therefore be unwise. Pahl (1989) studied the patterns of intra-household allocation of money in Britain and identified very different allocation systems. She devised the following nomenclature:

- 1) *The independent management system*, where both partners have a separate source of income and neither has access to all household funds (Burgoyne, 1998, found that this system is often used among remarried couples - and she reported that less than two percent of couples in Britain use it);
- 2) *The pooling system*, where nearly all household income is shared (Pahl, 1995, reported that equality between husbands and wives is greatest when money is pooled and managed jointly);
- 3) *The housekeeping system*, where the husband gives the wife a fixed sum for housekeeping expenses and retains the rest;
- 4) *The wife whole wage system*, where the husband gives all his wages (minus some personal spending money) to the wife and the wife uses this and her own income (if present) to cover the household expenses (this system is mostly used in low-income households where financial management is more a chore than a source of power);
- 5) *The male whole wage system*, in which the husband manages all household finances and typically leaves the wife with little independent access to money. This system is associated with higher income levels and with male privilege in terms of decision-making and personal spending money (Pahl, 1995).

The described typology concerns management of money, but this does not mean that it also captures the control of money. Although over 50% of the couples studied have a pooling system, this does not mean that spouses have equal financial control. Pahl (1989) found that wives are more likely to have to justify their spending to their partners than were the husbands. Vogler and Pahl (1994) reported that in the pooling system, one partner tends to have a greater role in financial management. Burgoyne (1990) found, through in-depth interviews with husbands and wives that the presence of a joint bank account does not prove that the money is shared in reality, or that it is jointly owned. Burgoyne also reported that changes in financial control tended to track changes in the level and source of income, even if a household applies the pooling system. Pahl reported that husbands were more likely to dominate decision-making when the wife did not have a job, while wives who were dominant in decision-making were usually in paid employment.

The research results suggest that control of money is linked to occupational status and the size of each spouse's financial contribution to the household. Even if all income is put in one account, research shows that the feeling of who owns the money is linked to who earns it. A decision weight has therefore been constructed based on two sources: 1) 'spouses' answers to a question about who has the most influence in financial decisions and 2) 'spouses' relative income. In the cases where income information from one of the spouses was missing, the number of hours worked is used for constructing the weights.

The following question was asked in the third wave of data collection:

“Which of the following four statements provides the best description of the way in which financial decisions are made within your household?”.

The answers to this question are displayed in Table 6.17, which shows that 399 of the 789 couples agreed on having equal influence in financial decisions. These were each given decision weights of .5. A total of 152 of the couples agreed that the husband or male partner had more influence than the wife or female partner, while 39 of the couples agreed that the wife or female partner had more influence. When one of the partners had indicated that he or she left all decisions about financial matters to the partner, the partner with the most influence was given the weight of 1 and the partner 0. In the cases where one of the partners had indicated that the partner had more influence, the most influential spouse was given the weight .75, while the partner with less influence was assigned .25. Overall, 199 of the couples did not agree who has the most influence in financial decisions. For these couples, and for couples where at least one of the partners had not answered the question about decision influence, decision weights were constructed based on relative income, and number of hours worked, when income information from at least one partner was missing. The decision weights will be used when aggregating psychological variables to the household level.

Table 6.17  
Answers about decision influence in financial decisions

Answers by females	I always leave decisions about financial matters to my partner	My partner has more influence on financial decisions than I	My partner and I have equal influence on financ. decisions	I have more influence on financ. decisions than my partner
Answers by males				
I always leave decisions about financial matters to my partner			22	55
My partner has more influence on financial decisions than I	1	7	62	97
My partner and I have equal influence on financial decisions	9	35	399	46
I have more influence on financial decisions than my partner	8	31	16	1

N= 789 (households consisting of couples where both partners had answered the question about decision influence)

### 6.13 RELIABILITY

An important issue to address in surveys like the CSS is data reliability. Some tests of reliability have been reported above. The answers to the various income measures correlated highly, which is an indication of high reliability. In Table 6.18 we can see that the correlation between the income estimates given with a one year interval is quite high. This is also a sign of high reliability because income is relatively stable across years for most households. On the other hand, the correlation between the two different saving measures provided in the same year is not very high. This might be due to people having different opinions about what ‘saving’ is, so that the question about “money put aside” is influenced by such differences. The fact that 17.8% of couples also disagreed on which bracket to choose indicates that the “money put aside” measure might be unreliable.

Alessie, Hochguertel and van Soest (2002) compared the ownership rates and amounts found in the data collected for the CSS with statistics derived from National Accounts and

administrative data in order to provide some external validation of the data. They found some deviations with respect to home ownership, average balance on checking and saving accounts and the ownership rate of stock, bonds and mutual funds. In particular, the CSS data underestimate the wealth holdings of the very rich. They conclude that in comparison with other surveys, the accuracy of the CSS estimates is not worse than other wealth surveys (perhaps with the exception of the American Survey of Consumer Finances). Still, their results indicate that people are not very accurate in their answers about their assets. This might be a problem when calculating differences in wealth because the under- or overestimation is not systematic. If, for example, a household underestimates their wealth one year but not the subsequent year, this might lead to an erroneous conclusion about their saving. We might conclude that the household saved a substantial amount during the year, although the household actually dissaved. We might also find saving ratios that are outside the range of normal possibility. This might explain the rather high number of outliers in the savings ratio distribution. Therefore, the reliability of the income data seems to be high, while it is low with respect to the value of assets and the measures of saving derived from these data.

Table 6.18  
Consistency between answers given to selected questions in the first and third wave of data collection

Questions	R <sub>s</sub>	N
Expected change in income next year (increase, same, decrease)	.234	1947
Percent expected increase in income next year	.611	109
Percent expected decrease in income next year	.510	44
Expected change in income next 5 years (increase, same decrease)	.499	1947
Percent expected increase in income next 5 years	.390	388
Percent expected decrease in income next 5 years	.525	133
How certain about change next 5 years (very, rather, not very, not at all certain)	.322	1947
Total net income of households past 12 months (6 brackets)	.806	1746
How well can you manage on total household income (very hard, hard, neither hard nor easy, easy, very easy)	.716	1947
<b>Personality questions</b>		
Oriented towards things/people	.598	1609
Slow/quick thinker	.655	1637
Not/easily get worried	.621	1640
Flexible -- stubborn	.467	1642
Quiet -- lively	.645	1643
Carefree- meticulous	.597	1638
Shy -- dominant	.654	1638
Not easily hurt/offended	.576	1628
Trusting -- suspicious	.553	1638
Oriented towards reality -- dreamer	.535	1639
Straightforward -- diplomatic	.616	1634
Doubts - happy with myself	.556	1643
Habits /open to changes	.577	1642
Need support -- independent	.559	1644
Little self-control -- disciplined	.505	1634
Stable - quick tempered	.544	1637

Note: All Correlation Coefficients were significant at the .01 level (two-tailed)

Because the data comes from a panel and the same questionnaires are used every year, it is possible to test reliability by comparing the answers given to the same questions. It resembles

a test-retest procedure. Table 6.18 shows the results comparing answers to some of the psychological questions with one-year interval. The number of respondents included in each analysis (N) varies due to routing in the questionnaire. The correlation coefficients vary substantially from one question to another. The first questions in the table concern expectations and perceptions about the household's economic situation. The Spearman's rho between the answers to these questions is high in some cases, while in others it is as low as .234. It is difficult to assess the extent to which this indicates that reliability is low. There is no reason to expect that all people will have stable expectations or have a stable perception of how they manage their economic affairs. Various types of incidents during the period between the measurements, such as unemployment, illness, or the birth of a child, might cause a change in expectations and evaluations with regards to the household's economic situation. It is therefore encouraging that the stability in the answers to the personality questions seems to be quite high. Personality is, per definition, a stable trait, and we should therefore expect a high correlation between answers measured with one-year interval. The correlation coefficients between the answers to these questions are much higher than some of the questions regarding economic situation. If we take into account that the answers to the personality questions might be affected by differences in mood, and so on, at the times of the interviews, we might conclude that the reliability for the psychological variables is reasonable. In the next chapter, the results of the analyses are reported.

# Chapter 7

## Results

### 7.1 INTRODUCTION

This chapter contains the results of the analyses conducted to test the proposed hypotheses. The chapter starts with a presentation of the sample population and the procedures followed when doing the analyses. The results of the analyses are presented in accordance with the order of the research questions presented in Chapter 1. First, the results concerning the contribution of the psychological variables for an increase in the explained variance in saving and borrowing behaviour are reported. Thereafter, the results of tests of the experimental hypotheses are described in a variable-by-variable fashion. Finally, the differences in results for different saving types and different income groups are presented.

### 7.2 DESCRIPTION OF SAMPLE

The working data file was created by aggregating the individual data at the household level. When aggregating couples, the decision weights derived as explained in section 6.12 were used in constructing household scores for the psychological variables age and education level. Household measures of income and assets were constructed by adding the amounts reported by husbands and wives (or partners) respectively. Only households with data from both partners (in households with partners) and households participating in all the three pertinent waves of data collection are present in the data file. As a result, only households present in the first wave of data collection are in the final sample because replies to the first part of the personality index were missing for the households that joined the panel between the first and second round of data collection (182 households). In addition, information from one of the partners was missing in five households. These households were excluded from the file. The final sample consisted of 1000 households.

The households in the sample had the following characteristics: 565 (56.5%) households were in the so-called representative panel, while 434 (43.4%) households were in the high-income panel. The ratio of members of the representative panel has decreased substantially compared to the sample described in section 5.8. This means that the attrition has been higher in the RP than in the HIP, so that the new panel members for the second wave of data collection were primarily recruited for the representative panel. As only the “stayers” are in the present data file, the ratio of HIP members has increased. 734 (73.4%) of the households consisted of a couple, while 266 (26.6%) households consisted of singles or single parents. There were children present in 379 (37.9%) households. The family size ranged from 1 - 9, and the “weighted age” ranged from 22 - 87.

## 7.3 PROCEDURES

Before testing the hypotheses, the data were further examined. As explained in Chapters 5 and 6, the data have already been subject to some 'cleaning'. Still, some issues need further attention. The number and nature of missing observations must be analysed and a decision about how to deal with the missing observations must be made. The data set is also plagued with a high number of large outliers and influential observations, which must be handled in order to conduct the proper analyses. These issues will be discussed below before the procedures followed when performing the analyses are taken into account. Both ordinary least squares (OLS) regression and logistic regression were used in order to test the hypotheses.

### 7.3.1 Missing observations

Table 7.1 displays the number of missing observations with respect to pertinent variables. Variables not listed in the table do not have missing observations in the present data set. Cases with missing values that are systematically different from cases without missing values may obscure the results (Little & Rubin, 1987). It is therefore necessary to investigate whether the missing values are 'missing completely at random' (MCAR). The values of a variable are MCAR if other quantitative variables have roughly the same distribution for cases separated into two groups based on whether the value of the variable is observed or missing. This can be tested by two sample *t* tests.

Separate variance *t* tests showed that missing values for psychological variables were dependent on household characteristics as well as on some psychological variables. This can be seen when comparing, for example, the mean income of those answering the attitude questions with mean income of those who did not. A significantly different mean income in one of the groups indicates that missing observations for attitudes depend on income. Such *t* tests show that the probability of observing psychological variables increases with lower age, presence of children, presence of a partner, larger household size, lower education, higher income, more financial and durable assets, more debt, and higher savings ratios. Observation of psychological variables is also more probable among those who (i) regard the goal saving motive as more important, (ii) are more involved in saving than others and (iii) agree that they are better off than others. This means that the psychological variables are not missing completely at random, which is necessary in order to avoid biased estimates when using listwise or pairwise deletion of data (Little & Rubin, 1987). This is also indicated by Little's Chi-square test for MCAR, which is significant (Chi-square = 3040.46, *df* = 2457, *p* < .01) and agrees with the indicated non-random pattern of missing values.

When a missing value is not MCAR, listwise or pairwise deletion of cases with missing values for income can produce biased estimates. As such, they are not adequate methods for handling missing values (Arbuckle, 1996). A weaker assumption about the missing observations of income is that they are missing at random (MAR) which means that the missing values depend on other variables than the values of the relevant variables. This means, for example, that for each income level, observations of attitudes are missing at random within that level of income. If this assumption holds, the most efficient way of handling missing data is to replace missing observations by estimates provided by expectation-maximisation (EM) or regression. Unfortunately, there is no test that can verify the MAR assumption. However, Little and Rubin (1987) argued that the use of ML will reduce bias even when the MAR condition is not strictly satisfied. This can also be seen from

Table 7.1. Table 7.1 shows the number and percent of missing values for variables that have missing values. The column “mean after listwise deletion” shows the means of the variables with missing values if listwise deletion of cases is used. In most cases, these means deviate more from the means we find when using all observed values for each variable (“mean all values”) than the means obtained when estimating means using the EM method<sup>51</sup>. Inspection of the means calculated using regression (not reported) shows that the estimated means are closest to “mean of all values” when using the EM method (estimated means are shown in Table 7.1). Missing values will therefore be replaced by estimates based on the EM method.

Table 7.1  
Missing values, means and estimated means

Variable	N	No. of missing	Per- cent	Mean all values	Mean after listwise deletion	Estimated mean EM-method
Importance of precaut. motive	974	26	2.6	4.44	4.52	4.44
Imp. of bequest motive	960	40	4.0	2.50	2.56	2.50
Imp. of <i>inter vivos</i> transfers	964	36	3.6	2.93	3.01	2.91
Importance of calc. motive	977	23	2.3	2.39	2.54	2.39
Import. of goal saving motive	978	22	2.2	3.13	3.22	3.12
Imp. of saving for old age	979	21	2.3	4.13	4.26	4.13
Shame of debt	928	72	7.2	.00	.01	.02
Thrift	928	72	7.2	-.05	-.067	-.039
Saving habits	928	72	7.2	-.03	-.086	-.038
Saving involvement	928	72	7.2	.07	.19	.05
Delay payment	982	18	1.8	1.00	1.00	1.00
Delay reward	982	18	1.8	12.31	12.52	12.30
Speed-up reward	982	18	1.8	8.48	8.85	8.47
Expectations 1 year	999	1	.1	-.51	-.38	-.51
Expectations 5 years	997	3	.3	1.94	1.45	1.91
Perceived income variability	951	49	4.9	.50	.52	.50
Ec. sit. compared to others	975	25	2.5	4.05	4.26	4.04
Emotional stability	934	66	6.6	-.13	-.16	-.13
Tough-mindedness	934	66	6.6	-.02	-.04	-.03
Inflexibility	934	66	6.6	-.07	-.10	-.06
Extraversion	934	66	6.6	-.08	-.16	-.08
Conscientiousness	934	66	6.6	-.01	-.01	.00

Note: This table reports the number and percent of missing values for variables that have missing values. The table also shows the means of these variables using all available observations, means when using listwise deletion of cases with missing values and the means following replacement of missing values with estimates produced by the EM procedure.

### 7.3.2 Outliers

Three different ways of measuring saving behaviour were used in the study: wealth and debts at one point in time and saving during a period of time measured both in absolute and relative terms. One potential threat to the validity of the tests concerning saving over a period of time

<sup>51</sup> For the EM procedure, a distribution is assumed for the partially-missing data and inferences are based on the likelihood under that distribution. Each iteration consists of an E step and an M step. The E step finds the conditional expectation of the missing value, given the observed values and current estimates of the parameters. These expectations are then substituted for the missing data. In the M step, maximum likelihood estimates of the parameters are computed as though the missing data had been filled in (SPSS Missing Value Analysis 7.5, MaryAnn Hill/SPSS Inc).

is that saving measured by first difference of wealth can be very noisy, as suggested by the high number of extremely high values displayed in Table 6.4. Measurement error may be severe. One solution is to trim the distribution, which cleans the data of the large positive and negative values that result from incorrect reports.

Obviously, total saving ratios higher than 100 or lower than -100 percent are most likely to be incorrect. This need not be the case with respect to contractual or discretionary saving. Changes in the portfolio of a household's saving might produce extreme savings ratios. The trimming of the sample was therefore conducted on the basis of total saving ratios (further explained in section 6.2.3). The distribution of the total saving ratio was trimmed by 10%. The variation was still large, ranging from -106.5% to 144.9% (see Table 7.2). For each analysis, observations found to have a large influence on the results were therefore excluded from the analyses<sup>52</sup>. Exclusion of the outliers was also necessary in order to bring the distribution of the error terms closer to a normal distribution.

Table 7.2 presents the univariate statistics of the different variables after deleting 10% of each tale of the distribution of the total saving ratio. The table shows the minimum and maximum values, means, standard deviations, skewness and kurtosis for all variables included in the analyses. The table shows that the variables concerning assets and incomes have large ranges and very big standard deviations. The large kurtosis with respect to debt and repayment saving is partly due to many households not having debt, so there are many observations of zero. This is dealt with when analysing these variables.

### 7.3.3 Procedures for the analyses

The results from the data analyses are displayed in Appendix 6 (Tables A6-1 to A6-9). Some results are also presented below in Tables 7.3 to 7.6. Separate OLS regressions were estimated for each dependent variable. A hierarchical form of regression was used that explored the effects of a series of variables in turn. The variables were entered into the analysis in the following order: 1) income and demographic factors and 2) psychological variables. The rationale behind this procedure is to show if psychological factors explain the variance in saving behaviour over and above that explained by economic and demographic variables. The variables were entered in this order to ensure that variance associated with demographic or economic measures was accounted for first, so that any significant psychological variables could not be attributed to such measures. Because age has often been used as a proxy for capturing certain systematic changes over the life cycle, the variables age and the second order term of age are also entered into the regressions. The contribution of the psychological variables towards increasing explained variance in saving is found by comparing the adjusted  $R^2$ s before and after the psychological variables. In the Tables A6-1 to A6-9 and 7.3 to 7.6, the lines "Adjusted  $R^2$  Model 1" contain the results when including socio-economic variables only, while the lines "Adjusted  $R^2$  Model 2" contain the results with the psychological

---

<sup>52</sup> A more appropriate way to deal with the influential observations is to use robust estimators (e.g. Flavin, 1991). Flavin showed how crucial robust estimation can be by comparing estimates generated by conventional, non-robust instrumental variables and robust instrumental variables. She found that the use of a robust estimator reversed the conclusions of the study in question. Use of robust estimators reduces the effect of outliers on the results by placing a bound on the overall influence of any observation. By using this method, we avoid the problem of excluding legitimate observations from our sample. However, as the statistical package used for this study does not support such estimations, this study relies on the more subjective methods for rejection of influential observations.



variables included. The significance levels relate to the changes in the F-value when adding the two blocks of variables. Hence, the first significance level reported relates to increase in the F-value when including the socio-economic variables in the estimation, while the second significance level relates to the change in the F-value when the psychological variables are included.

Table 7.2  
Univariate statistics

	N	Min. value	Max. value	Mean	St. deviation	Skewness	Kurtosis
Value of financial assets December 1994	800	-63194.00	1471434.00	55611.54	108877.45	5.88	53.44
Discretionary saving in 1994	800	-175714.00	182646.00	405.12	30277.12	.24	10.41
Discretionary saving ratio	800	-205.02	894.78	2.0056	50.10	6.86	127.52
Debt December 1994 - mortgages incl.	800	-10000.00	627500.00	104277.97	120282.79	1.19	1.07
Contractual saving in 1994 - incl. mortg.	800	-773100.00	391500.00	-2662.15	56311.97	-3.11	55.65
Contractual savings ratio - incl. mortg.	800	-452.53	496.51	-7.87	64.21	-1.32	17.30
Debt December 1994 - mortgages exc.	800	.00	401606.00	7699.45	25884.08	8.58	100.63
Repayment saving in 1994- excl. mortg.	800	-315000.00	170000.00	812.12	17251.11	-5.55	161.46
Repayment savings ratio - excl. mortg.	800	-255.92	212.98	.4673	21.64	-.34	57.14
Sum of durables, December 1994	800	.00	1913834.00	222201.41	211398.89	1.36	5.63
Saving in durables in 1994	800	-488000.00	814000.00	13021.72	74808.25	.96	29.41
Total savings December 1994	800	-56090.00	1649057.00	173534.98	210387.69	2.59	10.71
Total saving in 1994	800	-343787.00	327125.00	10764.68	50523.91	.19	11.81
Total savings ratio	800	-106.49	144.89	19.39	51.75	.18	-.09
HH Age (weighed mean age of spouses)	800	22.00	87.00	48.08	13.25	.39	-.62
HH Age squared	800	4.84	75.69	24.87	13.57	.87	.14
HH education level (weighted mean)	800	.50	3.00	1.32	.68	1.23	1.10
Dummy 1=children present in HH	800	.00	1.00	.39	.49	.47	-1.78
Log of family size	800	.00	.95	.34	.23	-.07	-.92
Dummy =1 if partner present in HH	800	.00	2.00	1.48	.88	-1.10	-.80
Household total income /1000	800	1.10	344.59	69.82	36.05	1.03	4.19
Dummy = 1 if HH member of HIP	800	.00	1.00	.43	.50	.27	-1.93
Delay-reward rate	800	.00	300.00	12.56	15.27	9.13	158.47
Delay payment rate	800	.00	78.51	1.05	4.52	9.54	127.73
Speed-up reward rate	800	.00	141.51	8.42	12.74	4.09	27.18
Income expectation 1 year	800	-110.00	100.00	-.40	10.30	-.80	47.12
Income expectation 5 years	800	-505.00	400.00	2.25	30.35	-1.69	147.23
Most important time horizon	800	1.00	5.00	1.94	.98	.87	.08
Perceived income variability	800	.00	2.16	.49	.49	.90	.13
Thrift-attitude	800	-2.79	2.33	-.06	.83	-.09	-.02
Saving involvement-attitude	800	-3.11	2.78	.04	.88	-.27	.16
Saving habit attitude	800	-2.95	2.13	-.02	.80	-.44	.60
Debt-attitude	800	-2.57	2.66	-.02	.86	-.10	.14
Importance of bequest motive	800	.00	7.00	2.37	1.54	.94	.09
Importance of <i>inter vivos</i> transfers	800	.38	6.56	2.96	1.49	.21	-.94
Importance of precautionary saving	800	1.00	7.00	4.46	1.20	-.44	-.05
Importance of goal saving	800	.00	7.00	3.17	1.33	.30	-.36
Importance of saving for old-age	800	.50	7.00	4.09	1.77	-.12	-1.02
Importance of calculation motive	800	.00	6.75	2.36	1.14	.69	.17
Ec. situation compared to others	800	.41	7.00	3.99	1.50	-.18	-.46
Factor score, emotional stability	800	-2.95	2.76	-.12	.73	-.07	.96
Factor score, conscientiousness	800	-3.49	2.68	-.02	.80	-.29	1.10
Factor score, tough-mindedness	800	-3.26	3.00	-.04	.80	-.05	1.04
Factor score, inflexibility	800	-2.82	2.35	-.06	.80	-.05	.21
Factor score, extraversion	800	-2.34	2.82	-.07	.78	-.01	.63

In order to study the effects of the psychological variables in greater detail, we also tested the extent to which psychological variables contributed towards distinguishing between savers and dissavers and debtor and non-debtors respectively. The reason for this is that when analysing borrowing behaviour only those having debt or mortgages could be included in the analyses. The results of the OLS regressions could therefore only explain variation among

those who had debt or mortgages in the first place, not between households with debt and households not having debt<sup>53</sup>. Table A6-9 contains the results from the logistic regression analyses. For each analysis, one goodness of fit measure (the -2 log likelihood) and one pseudo  $R^2$  (the Nagelkerke  $R^2$ ), which is similar to the  $R^2$  in regression analysis, are reported. The power of the models is also evident in the percentage of cases that were correctly classified as savers and non-savers, and debtors and non-debtors<sup>54</sup>.

Through Tables 7.3 to 7.6 we can see which psychological variables were important for explaining individual differences in saving and borrowing behaviour, as well as the impact of psychological variables on different saving measures. The analyses were repeated for the three different income groups (low, middle and high) as defined in Chapter 6. The outcome of these estimations can be found in Appendix 6 in Tables A6-5 to A6-8. Due to the rather disappointing results with respect to the explanation of saving during 1994 (see Tables A6-1 - A6-4), the analyses regarding the three income groups were conducted for stock measures only. The results from these analyses give further insight into which psychological variables are important. They also show if the impact of psychological variables increases with income.

Normal probability plots of residuals and plots of studentized residuals against the various dependent variables were used in order to identify influential cases. For most analyses, the number of influential outliers was less than five. These were excluded from the analyses to make the distribution of the error term closer to the normal distribution and to avoid findings that were caused by one or two single cases. Hence, before analysing variation in the sum of financial wealth as of December 1994, observations higher than 400000 Dutch guilders were excluded from the sample as they were found to have a large influence on the regression results. For the analyses of the income groups, the analyses were limited to values below 100000, 200000 and 500000 Dutch guilders for the low, middle and high-income groups respectively. In addition, one income observation above 250000 Dutch guilders was excluded from the analyses due to its large influence on the results. Discretionary saving during 1994 had an unfeasibly high variance (range: -175,714 – 182,646 Dutch guilders). For this reason, the distribution was trimmed by deleting 5% of each tail. This reduced the range of discretionary saving in 1994 from -43,700 to 44,900 Dutch guilders. When analysing the sum of debt and mortgages and repayment/contractual saving, the sample was reduced to those having debt and mortgages. When analysing the contractual saving ratio, only households with a saving ratio between 0 and 100 were included. When analysing debt as of December 1994, the analyses were limited to values below 30000, 40000 and 100000 Dutch guilders for the low-, middle-, and high-income groups respectively. When analysing the full sample, households with debt above 100000 Dutch guilders were excluded from the analyses.

---

<sup>53</sup> Since the debt and mortgage data suffer from sample selection and are truncated at zero, the best way to analyse the data would have been to estimate a 'tobit' model. The structure of the tobit model accommodates sample selection by using two separate models for predicting the dependent variable: one predicts values of the dependent variable that are zero and another predicts nonzero values of Y. Unfortunately, the statistical package available (SPSS) does not support tobit models. For this reason, the less elegant and less precise method of using logistic regression and OLS regression separately was chosen.

<sup>54</sup> The results concerning the percentage correctly classified as savers and non-savers do not come from the full-sample analyses. Before calculating the percentage correctly classified, a sample of savers of comparable size to the non-savers was taken. As the probability of a respondent being a saver is quite high, the percentage of cases correctly classified would otherwise not give an accurate impression of the power of the model.

The data on repayment saving (inclusive mortgages) were not straightforward to analyse; the data seem to have a lot of noise. Negative values for contractual saving were expected for households who had borrowed money in 1994. However, over 50% of the sample had negative values for contractual saving, and this is higher than what may be reasonably expected. For example, Table A5-1 shows that the “total number of ownerships” of the different types of debt and mortgages did not change dramatically between the two years, so the ratio of negative observation of negative repayment saving is clearly too high. Exclusion of the cases with negative contractual saving did not completely remove the problem of noisy data. One indication that the data still are very noisy is that the amount of debt and mortgages was not a significant predictor of yearly repayment. A strong relationship between the size of the loans and mortgages and the loans was expected. The following report from Maarten Ketelaars, who worked on constructing the assets variables from the first wave of data collection, might explain why this noise in the data exists:

“385 respondents didn’t know the current loan of their mortgage while 341 of these respondents knew the initial loan of their mortgage. By using the initial loan to calculate an approximation for the current loan of the mortgage, the number of don’t knows can be reduced. First, the percentiles of the relation current loan/initial loan are given for respondents that answered both questions with a valid answer.

N	10%	25%	50%	75%	90%	Mean
1071	.59	.78	.95	1.00	1.00	.94

I used the median purchase price as an approximation of the current loan of a mortgage.”

Hence, it is possible that this estimation method has produced inaccurate estimates of mortgages. As noted before, good flow measures of saving are highly dependent on reliable estimates of the stock measures used when calculating them.

Collinearity diagnostics revealed that the inclusion of the second order term of age produced high tolerance measures for age and the second order term of age. This is expected because age and age<sup>2</sup> are highly correlated. However, since age<sup>2</sup> is a non-linear function of age, the multicollinearity assumption is not violated. The three variables describing the size and composition of the household also had high VIF-values. Separate analyses were conducted without the size of family variable and this did not alter the finding. Since the two other family composition variables are ‘dummies’, all three variables were included in the analyses despite the high VIF-values. Only when analysing debt was the size of family variable excluded due to collinearity problems. All other variables had acceptable tolerance measures (VIF<5).

## 7.4 RESULTS

### 7.4.1 Contribution of psychological variables towards explaining variance in saving

The second research question asked if psychological variables had any effect on saving. In general, the variables selected for analyses could explain saving at a specific point in time better than saving during a year. Tables 7.3 through 7.6 below are the results of regression analyses when including only the significant predictors from the analyses presented in Tables A6-1 through A6-4 in the analyses. The tables show that the psychological variables significantly increased the explained variance in financial wealth, discretionary saving, the discretionary savings ratio, debt, debt and mortgages, the repayment saving ratio, total wealth

and total saving. The psychological variables also contributed significantly towards improving the prediction of which households have positive financial wealth and which households have debt and mortgages.

Table 7.3  
Overview of significant coefficients for financial wealth and discretionary saving

Dependent variables	Fin. Wealth. Dec. 1994		Discr. Saving 1994		Discr. saving/inc.	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.446		.010		.216
<b>Socio-economic variables</b>						
Disp. Income/1000	.325	.000	.185	.002	.118	.004
Panel	.094	.040	-.155	.009		
Age	-.455	.046				
Age squared/100	.674	.003				
Education level	.098	.002				
<b>Discount rates</b>						
Delay reward rate					-.063	.094
Speed-up reward rate					.079	.039
<b>Future-related variables</b>						
Time horizon	.070	.027				
<b>Attitudes</b>						
Thrift	-.084	.012				
Saving involvement	.122	.001				
Saving habits					-.060	.112
Shame of debt	.141	.000			-.078	.041
<b>Saving motives</b>						
Importance of goal saving			.112	.003	.062	.096
Importance of supporting children	-.077	.035				
Importance of leaving bequest	.100	.007	-.087	.019		
Importance of saving for old age	.086	.012				
Importance of earning interest	.085	.022				
Econ. situation compared to others					-.077	.059
<b>Personality factors</b>						
Inflexibility	.088	.007				
Extraversion	.063	.049				
N	786		711		711	
Adjusted R <sup>2</sup> Model 1	19.6	.000	1.0	.012	1.1	.003
Adjusted R <sup>2</sup> Model 2	29.4	.000	2.5	.001	3.1	.002

Table 7.3 shows the independent variables that contributed significantly towards explaining financial wealth and/or discretionary saving. The model explains wealth at a particular point in time better than saving during a year. Many socio-economic variables can predict financial wealth, but the psychological variables are important for improving the predictions. The inclusion of time horizon, saving attitudes, strength of saving motives and personality factors increased the explained variance in financial wealth from 19.6% to 29.4%. Table A6-5 shows that the psychological variables contribute significantly towards explaining variation in financial wealth in the three income groups as well.

The variables in the model do not succeed in explaining much of the variance in discretionary saving during one year. The socio-economic variables can explain only 1% of the variation in discretionary saving, while the inclusion of strength of the saving motives increase the explained variance by 1.5 percentage points. Although the change in F-value is significant, the total explained variance is disappointing. The model also fails to explain variation in the discretionary saving ratio. Income and panel membership (which also might pick up income effects) explain 1.1 % of the variance in the discretionary saving ratio, while the inclusion of

discount rates, saving motives and perception of economic situation increases the explained variance by 2.0 percentage points. Although this increase is significant, the total explained variance is unsatisfactory.

Table 7.4  
Overview of significant coefficients for debt and contractual saving

Dependent variables	Debt Dec. 1994		Repayment of debt 1994		Log(Repayment /inc.)	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.000		.010		.218
<b>Socio-economic variables</b>						
Size of debt			.534	.000	.179	.007
Disp.income/1000			.292	.000		
Education level					.120	.175
Children present=1			.243	.109		
Log of family size			-.413	.067		
Partner present=1			.166	.250	.077	.398
<b>Discount rates</b>						
Delay reward rate			.094	.104		
<b>Future-related variables</b>						
Expectations 5 years	.127	.027				
Time horizon	.120	.037				
Perceived income variability			-.153	.010		
<b>Attitudes</b>						
Thrift			.098	.134		
Saving involvement			-.229	.000	-.188	.006
Saving habits					-.160	.015
<b>Saving motives</b>						
Imp. of precautionary saving	-.160	.006	.174	.008		
Imp. of goal saving	-.112	.052				
Importance of saving for old age						
<b>Personality factors</b>						
Tough-mindedness			-.141	.027		
N	297		190		218	
Adjusted R <sup>2</sup> Model 1			31.1	.000	3.4	.020
Adjusted R <sup>2</sup> Model 2	5.1	.001	39.1	.126	9.4	.096

Table 7.4 shows the variables that are significant in the analyses of debt and debt repayment when mortgages are excluded from the debt definition (see Table A6-2). The model does not predict debt very well. Only 5.1% of the variation in debt among households having debt is explained by the variables used. None of the socio-economic variables is a significant predictor of debt size. Debt is instead predicted by expectations, time horizon and saving motives. In Table A6-7, we can see that the psychological variables are particularly important for explaining variation in debt in the low- and high-income groups. In the middle-income group, however, the socio-economic variables are important and explained 29.5% of the variation in debt.

Table 7.4 further shows that the model performs better with respect to predicting repayment of debt and the repayment saving ratio than the sum of debt. The socio-economic variables (including the size of debt) can account for 31.1% of the variation in debt repayment, while inclusion of discount rate, perceived income variability, saving attitudes, saving motives and one personality factor increases the explained variance by 8 percentage points. This increase is, however, not significant. The psychological variables are more successful with respect to explaining how large part of income is used for repaying debt. Inclusion of attitudes in the model increases the explained variance in the repayment ratio from 3.4 to 9.4%. This increase is significant at the  $p < .01$  level.

Table 7.5

Overview of significant coefficients for debt and mortgages, and contractual saving

Dependent variables	Debt and mortgages Dec. 1994		Log (Repayment of debt and mortgages in 1994)	
	Beta	Sig.	Beta	Sig.
Constant		.420		.000
<b>Socio-economic variables</b>				
Disp. Income/1000	.504	.000	.349	.000
Panel	.182	.000		
<b>Discount rates</b>				
Delay reward rate	-.058	.068		
Speed-up reward rate	.050	.120		
<b>Future-related variables</b>				
Expectations 5 years			-.140	.023
Time horizon	.073	.024		
<b>Attitudes</b>				
Saving involvement			-.056	.372
Saving habits	-.074	.021		
Shame of debt	-.114	.000		
<b>Saving motives</b>				
Importance of saving for old age	-.075	.027		
Importance of earning interest	-.083	.014		
<b>Personality factors</b>				
Emotional stability	-.076	.015		
Conscientiousness			-.103	.088
Inflexibility	-.055	.080	-.113	.063
Extraversion	-.058	.068		
N	552		248	
Adjusted R <sup>2</sup> Model 1	43.9	.000	12.2	.000
Adjusted R <sup>2</sup> Model 2	48.5	.000	14.1	.055

Table 7.5 shows the results regarding debt and mortgages and the repayment of debt and mortgages when limiting the analyses to the predictors that are found to have a significant effect on these variables (see Table A6-3). The table does not include the results regarding the contractual saving ratio, as none of the psychological variables is a significant predictor for this measure of saving. The table shows that income and panel membership can explain 43.9% of the variance of the sum of debt and mortgages. Inclusion of psychological variables such as discount rates, time horizon, attitudes, motives and personality factors significantly increases the explained variance by 4.6 percentage points. Inclusion of expectations, attitudes and personality factors increases the explained variance in the log of repayment saving from 12.2% to 14.1%.

Table A6-6 shows that the contribution of the psychological variables towards increasing explained variance in debt and mortgages varies across income groups. While the contribution is non-significant in the low- and high-income groups, it is significant at the  $p < .01$  level in the middle-income group. In the middle-income group, the inclusion of the psychological variables increases the explained variance in debt and mortgages from 52.9% to 61.8%.

Table 7.6 shows the results of analyses of total wealth, total saving and the total savings ratio when limiting the analyses to the significant predictors in the "full model" (see Table A6-4). Inclusion of the psychological variables increases the explained variance in total wealth from 24.8 to 39.5%. Table A6-8 shows that the psychological variables also have a substantial and significant contribution with respect to explaining variation in total wealth across the three income groups.

Table 7.6 Overview of significant coefficients for total wealth and total saving

Dependent variable	Tot. Wealth. Dec. 1994		Total Saving 1994		Total saving/inc. 1994	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.044		.006		.102
<b>Socio-economic variables</b>						
Disp. Income/1000	.409	.000	.137	.000	.136	.000
Panel	.093	.036				
Education level	.062	.039				
Children present=1			.059	.100		
<b>Future-related variables</b>						
Time horizon	.097	.001	.098	.006	.076	.043
Perceived income variability	-.123	.000				
<b>Attitudes</b>						
Thrift	.000	.999			-.015	.684
Saving involvement	.089	.010				
Shame of debt	.191	.000				
<b>Saving motives</b>						
Importance of goal saving	-.139	.000				
Importance of leaving bequest	.092	.002				
Importance of earning interest	.155	.000				
<b>Personality factors</b>						
Inflexibility	.097	.001				
Extraversion	.055	.066				
N	770		792		717	
Adjusted R <sup>2</sup> Model 1	<b>24.8</b>	.000	<b>2.9</b>	.000	<b>2.2</b>	.000
Adjusted R <sup>2</sup> Model 2	<b>39.5</b>	.000	<b>3.7</b>	.006	<b>2.5</b>	.121

The contribution of psychological variables for explaining total saving is less, but total saving during 1994 is not well explained by the socio-economic variables either. While the socio-economic variables can account for 2.9% of the variance of total saving, the socio-economic and psychological variables together can explain 3.7%. The psychological variables do not contribute to a significant improvement in explained variance in the total saving ratio.

The overall conclusion concerning the second research question must be that the psychological variables have the largest contribution with respect to explaining different measures of wealth. For some income groups the psychological variables also increase the explained variance in debt substantially. Inclusion of the psychological variables increases the explained variance in saving and debt repayment significantly, but these saving measures are, in general, poorly explained by the applied model.

In the following, each independent variable used in the analyses will be dealt with in turn.

#### 7.4.2.1 Income

A positive relationship between income and saving was expected for all kinds of saving analysed, except with respect to debt and the repayment of debt. The results displayed in Tables A6-1 to A6-9 show that income is a robust predictor of most of the saving measures applied, and often the most influential predictor (having a higher beta-value than other variables). These relationships are also found in bivariate analyses because the Pearson correlation coefficients between income and many saving measures are significant. Income is significantly correlated with financial wealth in 1994 ( $r = .309$ ,  $p < .01$ ), total wealth in 1994 ( $r = .500$ ,  $p < .01$ ), total saving in 1994 ( $r = .222$ ,  $p < .01$ ) and the total saving ratio ( $r = .175$ ,

$p < .01$ ). As could be expected, income is positively related to the size of debt ( $r = .691, p < .01$ ) when mortgages are included in the debt definition, but a somewhat unexpected positive association is found between income and debt ( $r = .234, p < .01$ ) when mortgages are excluded from the debt definition. Income is not correlated with the repayment of debt, but it is negatively correlated with the contractual saving ratio ( $r = -.118, p < .01$ ) when mortgages are included in the debt definition. Income is not significantly correlated with discretionary saving or the discretionary saving ratio.

Through multivariate analyses, it was found that income is positively associated with financial wealth as of December 1994, discretionary saving during 1994 as well as the discretionary savings ratio in 1994 (see Tables 7.3 and A6-1). This means that households with higher income have saved more in the past by depositing money in a bank account or by investing money in more risky financial products than others, and they also continue to save a higher proportion of their income than others so that both their absolute and relative saving during 1994 were higher. The probability that the household has positive saving also increases with saving (Table A6-9). When splitting the sample into income groups, income is not a significant predictor of the discretionary saving measures (Table A6-5). This is probably because the variation in income within each group is small.

We do not find a significant relationship between income and amount of debt, but we find that debt repayment is positively related to income (Table A6-2). The probability that a household has debt increases with income (Table A6-9). When including mortgages in the definition of debt (Table A6-3), income is a significant predictor of the total sum of debt. This is expected because the size of the granted mortgages are based on the main breadwinner's income. Probably for the same reason, the repayment of debt and mortgages in 1994 is also positively associated with income.

Income is positively related with total wealth as of December 1994 as well as total saving during 1994 (Table A6-4). This was expected because saving is positively related to both discretionary saving and debt repayment. In the definition of total saving, the sum of debt and mortgages is counterbalanced by the value of real estate, so that the positive effect between income and total saving was expected in spite of the positive relationship between income and the size of mortgages. The total saving ratio is also associated with income, which means that the part of income a household saves increases with income.

When splitting the sample into income groups, income is not a significant predictor for financial wealth (Table A6-5) or debt (Table A6-7), but it is for total saving in the middle-income group. The variation in income within the groups is probably too small to affect the results. The strong relationship between income level and mortgages is still present (Table A6-6), which, as mentioned before, is likely to be an artefact of the practice of using the size of income to determine the size of the mortgage.

#### 7.4.2.2 Panel membership

In order to control for panel effects, a dummy variable was included that indicates which of the panels the household belongs to. The panel dummy is significant in some of the analyses, and the reasons for this may vary depending on the saving measure being analysed.

At least three possible reasons for the significant effect of this dummy exist. One reason can be that the differences in the data collection as explained in Appendix 2 may produce some differences. The HIP members have a lower total burden with respect to answering



questionnaires throughout the year, which may cause them to be more willing to fill in the questionnaire properly. This, combined with the HIP members being recruited specifically for the savings survey, may also explain the difference in attrition between the two panels. It may also be that household with high income in general is more interested in economic affairs and might produce more accurate answers to the wealth questionnaires for that reason. A second possible reason for the significance of the panel dummy is difference in income level between the panels. Only a small fraction of the representative panel has the same income level as the members of the HIP who were sampled from the upper 10% of the income distribution of the Netherlands. The panel dummy variable may therefore pick up income effects. This is likely in the cases where income is not significant, while the panel dummy variable is. A third explanation for the significance of the panel dummy variable can be found in Appendix 1. The sampling methods used for the HIP might have caused an over-sampling of house-owners. This is because sampling was limited to “wealthy areas” where it is likely that people own their own house. Households in the HIP are therefore more likely to own their own house and to have a mortgage than the rest of the population this sample is drawn from. They might also have more financial wealth than what we would expect from income information alone.

Tables 7.3 and A6-1 show that the panel dummy has a significant relationship with respect to financial wealth when controlling for income level. This can be due to the selection of informants for the HIP from wealthy areas. People who are attracted to such areas might have more wealth than what is typical for their income group. They may also come from wealthy families so that some of their higher wealth is due to inheritance. This is supported by the fact that the panel dummy is only significant with respect to predicting financial wealth in the low-income group, when analysing the income groups separately (see Table A6-5). Further, Tables 7.3 and A6-1 show that the panel dummy is significant in the analysis of discretionary saving. The direction of the relationship is, however, opposite of that of income. This means that when income is controlled for, people in the representative panel save more than people in the high-income panel do. This may be an indication that people in the HIP have more wealth in the first place and therefore little need for further saving. Alternatively, living in “wealthy” areas might involve a pressure to consume in order to “keep up with the Jones”.

Table A6-3 shows that, among those having debt and mortgages, people in the HIP have more debt and mortgages than people in the RP have when controlling for income level. This may be a consequence of the sampling technique used when recruiting members for the HIP, as a large part of the HIP members are likely to own a house and have mortgages. Table A6-6 shows that this effect of panel membership is largest in the high-income group. Table A6-9 shows that households in the HIP are less likely to have debt when mortgages are excluded from the debt definition. In the middle-income group, however, among those having debt, HIP members have higher debt than RP members do.

Table A6-4 shows that the panel dummy variable predicts total wealth. This might be due to a combined effect of members of the HIP having both more financial wealth and more real-estate than what would be predicted by income alone. As for financial wealth, the panel dummy has the largest effect in the low-income group (see Table A6-8). HIP members in the low-income group are likely to be large families (as the income groups are defined in terms of income per family member). The size of the family may also have increased the likelihood of the household owning their own accommodation.

### 7.4.2.3 Age

Age was included as a control variable because the life cycle hypothesis suggests that there is a strong association between saving and borrowing behaviour and age. In this way, speculations about whether the inclusion of age in the analysis would have picked up some of the variation explained by the psychological variables are avoided. Since the relationship is expected to be “hump-shaped”, the second-order term of age was also included in order to account for this non-linearity in the expected relationship between wealth and saving and age.

Bivariate correlations show that there is a positive association between age and financial wealth ( $r = .149, p < .01$ ) and total wealth ( $r = .168, p < .01$ ) and a negative relationship between age and the amount of debt + mortgages ( $r = -.237, p < .01$ ) and debt exclusive mortgages ( $r = -.069, p < .10$ ). Age is not correlated with the other flow measures of saving with the exception of the contractual savings ratio ( $r = .144, p < .01$ ).

The results from the regression analyses also show that there is a significant association between financial wealth and age (see Tables 7.3 and A6-1). The financial wealth decreases with (weighted household) age for young households (younger than 38 in this sample) while it increases with age for households older than 38. This association between age and financial wealth is particularly strong in the high-income and middle-income groups (Table A6-5). In the high-income group, financial wealth is negatively associated with age for households younger than 44, while it is increasing with age for households older than 44.

In the further analyses, we did not find a significant relationship between age and the other saving measures when using the full samples. We did find, however, significant relationships when analysing the different income groups. In the low-income group, age is significantly associated with the sum of debt and mortgages. The size of debt and mortgages is negatively associated with age until the age of 54. For households above 54, the sum of debt and mortgages is slowly increasing with age. In the high-income group, we found age to be associated with the sum of debt. The amount of debt is positively associated with age for households younger than 63, while the amount of debt decreases with age for households older than 63. For the high-income group, age is associated with total wealth. Total wealth is positively related to age until the age of 64, while total wealth decreases with age for households older than 64. This is in line with predictions based on the life cycle model discussed in Chapter 2.

### 7.4.2.4 Level of education

Education level was not significantly correlated with any of the savings measures. Education was instead correlated with some of the family characteristics and psychological variables. There is a negative correlation between education and age ( $r = -.121, p < .01$ ), which is probably due to cohort effects. Higher education is less common among the older part of the population than it is among the younger part. There is also a negative correlation between education and size of the family ( $r = -.444, p < .01$ ) and the dummies indicating whether there are children in the household ( $r = -.186, p < .00$ ) or a partner in the household ( $r = -.586, p < .01$ ). Education is positively correlated with income expectations, both one year hence ( $r = .078, p < .05$ ) and five years hence ( $r = .177, p < .01$ ). Interestingly, there is a negative correlation between education level and three of the attitude factors. Higher education is associated with a less positive attitude towards saving (thrift:  $r = -.114, p < .01$ ), saving habit ( $r = -.115, p < .01$ ) and a more positive attitude towards debt ( $r = -.109, p < .01$ ). Education level is positively associated with thinking it is important to save for a goal ( $r = .102, p < .01$ ).

The multivariate analyses showed that education level has a positive relationship with financial and total wealth as of December 1994 (Tables A6-1 and A6-4). Higher education level also increases the probability of the value of financial assets being positive (Table A6-9). One interpretation of this finding may be that higher education means greater ability to delay gratification, which is positive for saving. Higher educated people may also have a better ability to invest money in risky assets that, over time, may yield higher returns than bank saving. Education level is not a significant predictor of financial or total wealth as of December 1994 when analysing the three income groups separately (Tables A6-5 - A6-8). It may be that the variation in education level also was reduced when reducing the variation in income.

Education level is not significantly associated with the levels of debt and debt +mortgages (Tables 7.4, 7.5, A6-2 and A6.3), except for a negative relationship between education and the level of debt and mortgages in the middle-income group (see Table A6-6). Higher education increased the probability that a household has debt and mortgages (Table A6-9), but it does not increase the probability of a household having debt. This can mean that education increases the tendency to invest in a house (and thereby increasing total saving), and that among those making such a decision, higher education means that the amount borrowed is smaller and that the loans are attempted repaid faster. Table A6-2 shows that higher education is positively associated with repayment of debt in 1994 when using all the variables in the regression analyses. This relationship is not significant, however, when limiting the analyses to the variables that are significant predictors of the log of the repayment saving ratio when using the full model (see Table 7.4).

#### 7.4.2.5 Family composition variables

A *t* test showed that the means of total saving and the total savings ratio are significantly higher for households with children than for childless households. Among those having debt, the mean of the sum of debt and mortgages is also significantly higher for households with children than for households without children. The higher saving therefore seems to be related to investments in real-estate.

The regression analyses showed that the presence of children in the household has a positive relationship with total saving in 1994 (Table A6-4) and debt repayment when mortgages were excluded from the debt definition (Table A6-2) while there is a negative association between the presence of children in the household and the level of debt in the low and middle-income groups (Table A6-7). In particular, in the high-income group the presence of children had a positive effect on total wealth (Table A6-8). This means that the effect of the presence of children is opposite of that expected. It was expected that households with children would have less saving and more debt than others due to the higher costs involved when running a larger household. The results show that this is not the case. The analyses show that households with children are more likely to have positive financial wealth than households without children (Table A6-9) and that, among households having debt, the sum of debt is lower for households with children in the low- and middle-income groups (Table A6-6).

The presence of children therefore seems to have a positive effect on saving behaviour in the sense that their presence increases saving and reduces the amounts borrowed. Similar findings were reported by Livingstone and Lunt (1992). They found that those in debt had fewer children than others. They suggested as an explanation that those with more children may be

forced to adopt more conservative and fixed budgeting strategies because the economic demands on them are salient and constant, and therefore they deliberately avoid debt (Livingstone & Lunt, 1992). Presence of children also causes higher uncertainty with respect to future expenditures, which also may increase the need for precautionary saving. Hence, although having children involves more costs, the need for more control over money may have a positive effect on the overall economic situation of the household. An alternative explanation can be that couples postpone childbearing until they have a solid economic situation.

The size of the family is correlated with some of the “stock” measures of saving. There is a positive correlation between family size and the size of debt and mortgages ( $r = .365, p < .01$ ), the sum of debt ( $r = .100, p < .01$ ) and total wealth ( $r = .170, p < .01$ ). A weak correlation is found between family size and the total savings ratio ( $r = .063, p < .10$ ). These relationships are, however, not significant in the multivariate analyses. The size of the family is related to some of the savings variables. Table A6-9 shows that the larger the family, the smaller the probability that the household has positive financial wealth and the higher the probability that the household has debt and mortgages. When analysing the full samples, no significant relationship between family size and the saving measures are found except for a negative relationship with the repayment of debt when mortgages were excluded from the debt definition (Table A6-2 and 7.4). This means that among households having debt, larger households pay back their loans at a slower rate than smaller households (when the size of the debt is controlled for).

The presence of a partner in the household also has consequences for its economic situation. A *t* test shows that the means of financial wealth and total wealth are higher in households with a partner present than in other households. The means of discretionary saving and contractual saving are also higher in households with a partner. On the other hand, the mean size of debt is also significantly higher for partners than singles, for both definitions of debt.

The effect of presence of a partner appears somewhat different when interpreting the results from the multivariate analyses. The regression analyses show that the presence of a partner has a negative effect on financial wealth in the middle- and high-income group (see Table A6-5). These results were surprising, given the results from the bivariate analyses. Presence of a partner does, however, increase the probability that a household has positive financial wealth (Table A6-9). The presence of a partner is positively related to contractual saving and the contractual savings ratio when mortgages are excluded from the debt definition. In the low-income group, the presence of a partner is associated with a lower amount of debt (mortgages excluded), among the households having debt. In the high-income group, presence of a partner is associated with higher total wealth.

We do not find the expected effects of family composition on the saving measures. The presence of children is positively associated with the economic situation of the household. This is contrary to expectation, but similar results have been reported in other studies. The presence of a partner has an ambiguous relationship with saving, but the results indicate that the presence of a partner increases the tendency to buy a house. This may explain why couples have higher contractual saving and the higher total wealth found in the high-income group, and why we find the presence of a partner to be negatively associated with financial wealth.

We will now turn to the psychological variables included in the analyses. The correlation coefficients between these variables are reported in Table 7.7. The table shows that the different psychological variables are related, but not so strongly that it causes problems for the regression analyses.

Table 7.7  
Correlation coefficients between psychological variables

	Delay payment=0	Delay reward rate	Speed-up reward rate	Income expectation 1 year	Income expectation 5 years	Time horizon	Perceived income variability	Thrift-attitude	Saving involvement-attitude	Saving habit attitude	Debt-aversion	Importance of precautionary saving	Importance of goal saving	Importance of intervieo transfers	Importance of leaving bequest	Importance of saving for old-age	Importance of calculation motive	Economic situation compared to others	Emotional stability	Conscientiousness	Tough-mindedness	Inflexibility	Extraversion
Delay payment=0	Rho sig. 1 .128* .000	.193* .018	.034 .019	.002 .071*	.063* .114*	-.052 .006	.043 .008	-.008 .043	-.008 .040	-.002 .021	-.056 .111	-.141* .030	-.080* .012	-.012 .743									
Delay reward rate	Rho sig. .128* .000	1 .186* .000	-.022 .051	-.061 .147	-.045 .201	-.038 .473	-.097* .285	-.062 .006	-.043 .080	-.015 .219	.027 .873	.020 .445	-.011 .564	-.071* .748	-.040 .044	-.076* .253	.013 .713	-.110* .002	.018 .018	-.054 .124	.016 .854		
Speed-up reward rate	Rho sig. .193* .000	.166* .000	1 .014 .008	.038 .003	-.026 .094	-.151* .003	-.034 .049	.013 .013	-.008 .044	.056 .011	-.037 .070*	-.070* .032	-.089* .034										
Income exp. 1 year	Rho sig. .018 .022	.014 .011	.303* .000	-.071* .043	-.051 .148	-.007 .835	-.017 .837	-.112* .002	-.085* .002	.121* .034	.007 .007	-.035 .019	-.005 .018	-.100* .073*	-.092* .028								
Income exp. 5 years	Rho sig. .034 .051	-.008 .303*	1 .071* .021	-.158* .006	-.092* .084*	-.081 .115*	-.011 .083	-.036 .000	.065 .039	-.105* .036	-.117* .077*												
Time horizon	Rho sig. .019 .045	.038 .071*	-.071* .071*	1 .023 .024	-.023 .069	.057 .105*	.064 .036	.089* .195*	.176* .182*	-.006 .025	.004 .027	-.067 .064											
Perceived income variability	Rho sig. .002 .025	.003 .051	.021 .023	1 .109* .053	.077* .040	.045 .089*	.023 .040	.040 .062*	-.002 .034	-.170* .067	-.034 .013												
Thrift-attitude	Rho sig. .071* .038	-.026 .007	-.158* .024	-.109* .002	1 .026 .028	.038 .387*	.086* .110*	.172* .160*	.123* .011	.035 .241*	-.011 .096*	.105* .003											
Saving involvement-attitude	Rho sig. .083* .097*	-.097* .017	.006 .230*	-.063 .026	1 .032 .006	.187* .187*	.107* .167*	.263* .479*	.396* .152*	.010 .094*	-.101* .197*												
Saving habit attitude	Rho sig. .114* .062	-.151* .112*	-.092* .084	-.077* .028	.032 .037	1 .065 .225*	.014 .045	-.012 .131*	-.026 .077*	.038 .151*	-.088 .124*	.052 .140											
Debt-aversion	Rho sig. .052 .043	-.003 .095*	-.084* .057	-.040 .038	.006 .065	1 .105* .086*	-.029 .132*	.056 .099*	.053 .022	.207* .010	.214* .067												
Importance of precautionary saving	Rho sig. .008 .015	-.034 .002	-.061 .105*	.045 .387*	.187* .225*	.105* .131*	.321* .259*	.492* .338*	.063 .063	.104* .026	.047 .033												
Importance of goal saving	Rho sig. .063 .027	.049 .121*	.115* .004	.089* .086*	.187* .014	-.086* .313*	1 .192*	.036 .135*	.415* .085*	.034 .085	.011 .120*	.005 .881											
Importance of intervieo transfers	Rho sig. .008 .020	.013 .034	.011 .039	.023 .110*	.107* .045	-.029 .321*	.192* .151*	.519* .000	.016 .000	.016 .000	.000 .016	.000 .000											
Importance of leaving bequest	Rho sig. .817 .564	.718 .337	.752 .274	.509 .002	.002 .203	.414 .000	.000 .000	.000 .000	.210 .777	.224 .223	.172 .593												
Importance of saving for old-age	Rho sig. .043 .011	-.008 .007	-.063 .038	.073 .012	.262 .000	.738 .000	.313 .000	.000 .000	.000 .184	.534 .000	.314 .003	.862 .006											
Importance of calculation motive	Rho sig. .040 .071*	.044 .036	-.038 .195*	.040 .160*	.263* .131*	.096 .492*	.135* .187*	.179* .179*	.117* .000	.033 .013	.022 .010												
Economic situation compared to others	Rho sig. .021 .040	.059 .019	.000 .176*	.082 .123*	.479* .026	.099* .338*	.415* .189*	.217* .382*	1 .288*	-.021 .030	.003 .078*	-.107* .003											
Emotional stability	Rho sig. .111 .713	.295 .659	.285 .869	.335 .018	.000 .285	.532 .074	.336 .777	.534 .992	.557 .000	1 .167*	-.029 .062	-.055 .050											
Conscientiousness	Rho sig. .000 .002	.048 .004	.003 .473	.000 .720	.000 .000	.000 .000	.000 .000	.000 .000	.000 .000	.000 .000	.000 .000	.000 .000											
Tough-mindedness	Rho sig. .030 .018	.032 .073*	.036 .004	.067 .001	.084* .068	-.010 .026	.017 .043	.036 .013	.003 .062	-.062 .069*	1 .012	-.003 .942											
Inflexibility	Rho sig. .023 .124	.012 .009	.001 .442	.341 .007	.004 .000	.000 .185	.001 .172	.003 .531	.027 .236	.120 .324	.741 .732												
Extraversion	Rho sig. .012 .018	-.034 .028	-.077* .067	.013 .105*	.105* .062	-.067 .033	-.005 .019	.006 .010	-.128* .050	.031 .003	-.012 .1												

\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

7.4.2.6 Time preference

The subjective discount rates are correlated with different saving types in expected ways, although the correlation coefficients are not as high as expected. The discount rates are significantly correlated with each other, which is expected as the three rates are supposed to measure the same concept. The delay reward rate is negatively correlated with financial wealth as of December 1994 ( $r = -.103, p < .01$ ) and total wealth ( $r = -.102, p < .01$ ). The

speed-up reward rate is positively correlated with the size of the debt when mortgages are included in the debt definition ( $r = .072, p < .05$ ). The speed-up reward rate is also negatively associated with contractual saving which could be expected, but it is positively related to the discretionary saving ratio, which is puzzling.

In the multivariate analyses, time preference is found to have an impact on some types of saving, depending on how time preference was measured. The results are, however, ambiguous and not readily interpretable. The delay reward and delay payment scores are significant predictors of positive financial wealth. The lower the two discount rate factor scores, the more likely the household is to have positive financial saving (Table A6-9). The more people want to be compensated for postponing receiving money or the more they are willing to pay for postponing paying money, the smaller the likelihood that the value of the financial assets of the household is positive. This is in line with what was expected. The three different time preference rates are not found to affect levels of financial wealth (Tables A6-1 and 7.3) or discretionary saving, except for in the middle-income group where a negative relationship between financial wealth and the delay reward rate is found (Table A6-5). We found, however, that the delay reward rate is negatively related to the discretionary savings ratio (Tables A6-1 and 7.3). This is in line with our expectations. Patient people save a larger portion of their income than more impatient people. A more unexpected finding is the significant positive relationship between the discretionary saving ratio and the speed-up reward rate (Tables A6-1 and 7.3). This is the opposite of our expectation that higher discount rates will be associated with a lower saving tendency. Instead, we find that the more the persons in a household who are willing to pay in order to speed-up receipt of money, the higher proportion of their income they save. This indicates that the questions used to measure time preference may capture something other than time preference. The questions used to measure the speed-up reward rate may also measure a need to control the money or a general pleasure of being in charge of money. The relationship between the speed-up reward factor and the discretionary saving ratio is not significant when analysing the three income groups separately (Table A6-5). A low delay reward discount rate is associated with higher total saving in the high-income group (Table A6-8). This is also in line with our expectations.

Time preference is found to be associated with sum of debt as of December 1994. The speed-up reward factor is positively associated with both debt measures (inclusive and exclusive mortgages) as expected. The more people are prepared to pay for speeding up receipt of money to the present, the more they have borrowed (Table A6-2). The analyses of the three income groups reveal that the effect of the speed-up reward discount rates is largest in the low-income group (Tables A6-6 and A6-7). The negative association between level of debt and the delay payment rate (Table A6-7) is contrary to what was expected. The less people are willing to pay in order to postpone a payment, the more debt they have. This may be caused by a lack of willingness to pay for further debt.

A confusing result is that the delay reward factor is negatively associated with debt (mortgages excluded) (Table A6-2) and with the sum of debt and mortgages as of December 1994 in the low-income group (Table A6-6). The less compensation people want in order to delay receiving money, the more debt they have. One possible explanation for this finding can be that people having borrowed the money they need are more patient regarding receiving even more money. Such an explanation depends on a reversal of the causal relationship suggested before and it requires a more dynamic analysis of the relationship between borrowing and time preference than was conducted here.

The relationship between discount rates and economic behaviour should be further investigated. The results presented above suggest that discount rates are important predictors for both saving and borrowing, but there are measurement problems that remain to be solved. The correlation between the three discount rates should have been much higher than was found in the present study, and the opposite signs found for the effect of two of the discount rates respectively suggest that the measures might pick up other preferences than just time preference for consumption. The correlation coefficients between the discount rates, saving motives and saving attitudes (see Table 7.7) suggest that time preference may work through these variables, and this should be a topic for further research.

#### 7.4.2.7 Income expectations

The study included two measures of expectations regarding future income. One was about changes in income the next year, while the other was about changes in income the next five years. The two income expectations measures are significantly correlated with each other ( $r = .303, p < .01$ ). The two expectations measures are not significantly correlated with any of the savings measures except for negative relationships between the one-year expectations and total saving in 1994 ( $r = -.063, p < .10$ ), one year expectations and total wealth ( $r = -.107, p < .01$ ), and five-year expectations and total wealth ( $r = -.080, p < .05$ ). Younger people seem to be more optimistic regarding their future income than older people, as the correlation between age and one-year expectations is  $-.142 (p < .01)$  while it is  $-.245 (p < .01)$  between age and five-year expectations. The correlation coefficients also show a positive relationship between education and one-year ( $r = .078, p < .05$ ) and five-years ( $r = .177, p < .01$ ) expectations. Further, we find that with more pessimistic expectations came positive attitudes towards saving, and with more importance attributed to precautionary saving came less importance attributed towards saving for old age.

Expectations were assumed to influence saving so that positive expectations would reduce saving and increase borrowing while pessimism would increase saving and decrease borrowing. The results from the regression analyses give some support for these hypotheses with respect to borrowing behaviour. Positive expectations concerning income the next five years are associated with higher debt (Tables A6-2 and 7.4). This is also found in the low-income and the high-income groups (Table A6-7). Positive five-year expectations are associated with less debt repayment (Table A6-3). We did not find any significant relationships between the two expectations measures of wealth and saving, but we found that positive expectations towards income next year decrease the probability that the household has positive financial wealth. Positive expectations regarding the next five years, however, increase the probability of the household having positive financial wealth.

The effect of expectations on saving was unexpected due to the large focus on this variable in theories of saving. In this data set, we only find expectations to influence borrowing behaviour and not wealth and saving. It may be that the lack of significant relationships is due to measurement problems. In order to test effects of expectations as defined in the life-cycle hypothesis, people should be asked questions with longer horizon than the next five years. Although people are unlikely to be able to specify expected changes in terms of percentages, they may be able to draw their expected income profile. Some people may expect a flat profile, while others might expect a steeply rising one. Others still might indicate that they expect high income variability.

#### 7.4.2.8 Time horizon

Time horizon correlates significantly with financial wealth ( $r = .190, p < .01$ ), total wealth ( $r = .256, p < .01$ ), debt ( $r = .123, p < .01$ ) and debt and mortgages ( $r = .077, p < .05$ ). Time horizon also correlates significantly with contractual saving in 1994 ( $r = .062, p < .10$ ), total saving ( $r = .091, p < .01$ ) and the total saving ratio ( $r = .120, p < .01$ ). Significant positive correlations are also found between time horizon and size of the family, saving attitudes and saving motives.

Time horizon was expected to have a positive association with saving and a negative association with borrowing. The findings from the regression analyses support these hypotheses to a certain extent, but not all findings are as expected. As predicted, we found that the longer the time horizon, the higher financial wealth and total wealth as of December 1994 (Tables A6-1 and A6-4). The length of the time horizon also has a positive effect on total saving during 1994 and the total saving ratio in 1994 (Tables A6-4 and 7.6). Analyses of the three income groups show that time horizon is most important for the middle-income group (Tables A6-5 and A6-8).

Further, we found that the longer the time horizon, the lower the probability that a household has debt (Table A6-9). This is in line with what we expected. Among those having debt, the association with time horizon is opposite of what was proposed: the longer the time horizon the higher the sum of debt (Table A6-2). In Table A6-7, we can see that this relationship is strongest in the high-income group. The same relationship is found between time horizon and debt when mortgages were included in the debt definition. These findings suggest that longer time horizons make people avoid debt, but when they borrow, they take out larger loans.

Just like Lusardi (2000), we have found time horizon to be important for saving behaviour and wealth accumulation. If the individual differences in time horizon are large and the effects of the time horizon as considerable as the results of this study show, the life cycle hypothesis should be modified to incorporate this. People with a long time horizon may act more in accordance with the life cycle hypothesis than people operating with short time horizons.

#### 7.4.2.9 Perceived income variability

Perceived income variability with respect to future income was only found to be related to a few of the saving measures. Perceived income variability is negatively correlated with total wealth, which is opposite to what we expected ( $r = -.108, p < .01$ ). One reason for this unexpected finding, can be that younger people perceive their incomes to be more variable than older people ( $r = -.279, p < .01$ ), and that younger people usually have less wealth.

The results from the multivariate analyses are not different from what we found when looking at the correlation coefficients. Perceived income variability is not found to have a significant impact on any of the saving measures with the exception of total wealth (Table A6-4) and the repayment saving ratio when mortgages were excluded from the debt definition (Table A6-2). In Table A6-9, we can see that higher perceived income variability decreases the probability that the household has positive financial wealth while it increases the probability for the household having debt (mortgages excluded from the debt definition). All these findings were contrary to what was expected. Since the effect of age is controlled for in these analyses, the findings are not easy to explain. It may be that people expecting high income variability have



experienced variability in the past and have therefore been unable to save and forced to borrow.

#### 7.4.2.10 Attitudes towards saving

The correlation coefficients between the different saving measures and the attitude factor 'thrift' are not significant, with the exception of the correlation between thrift and the sum of debt and mortgages ( $r = -.148, p < .01$ ). The thrift factor is, however, related to other variables used in the analyses. There is a negative correlation between household income and thrift ( $r = -.137, p < .01$ ), which means that households with higher incomes are less positive towards saving. There is a positive relationship between age and thrift, which means that there may be a cohort effect with respect to attitudes towards saving or that people become more positive towards saving as they grow older. There is a rather strong association between thrift attitude and how important the household regard the precautionary saving motive ( $r = .387, p < .01$ ) and thrift correlates significantly with the other saving motive variables (see Table 7.7). Thrift also correlates significantly with emotional stability ( $r = .083, p < .05$ ), conscientiousness ( $r = .241, p < .01$ ), inflexibility ( $r = .096, p < .01$ ), and extraversion ( $r = .105, p < .003$ ).

The regression analyses show that thrift is significantly related to both financial and total wealth, but the signs of the relationships are opposite to what was expected. The higher the score on the thrift factor, the lower financial and total wealth (Tables A6-1 and A6-4). The negative significant relationship is also found between financial wealth and thrift in the low-income group (Table A6-5). Further, the thrift factor is negatively associated with the total saving ratio (Table A6-4). These findings, which contradict expectations, give rise to speculations about the direction of causality. It seems as though it is the households that have been unable to save in the past that are the most positive towards future saving. Those who already managed to save are less positive towards (further) saving. The thrift factor score is constructed from answers to statements such as "it is important to have some money left at the end of the month", and "it is important always to save as much money as possible" (see Table 6.14). It may be people with problems related to saving money who will agree with such statements. Another possible explanation for the anomalous finding, is that the result is a product of an interaction effect between the thrift factor score and one of the other variables. Table 7.6 shows that the thrift factor is not a significant predictor of total wealth when the number of variables in the regression is limited to those with a significant coefficient in the first analyses (Table A6-4). As shown above, thrift is not correlated with any of the savings measures. The relationship between the thrift factor and the different saving measures is ambiguous and should be studied in a dynamic model in order to establish the causal relationships.

Thrift is found to be positively related to the repayment of debt when mortgages are excluded from the debt definition (Tables A6-2 and 7.4). This is the only significant finding with the expected direction, and it means that households with debt holding a positive attitude toward saving repay more of their debt than others (size of debt was controlled for). Apart from this finding, thrift is not found to be important for borrowing or debt repayment (Tables A6-2 and A6-3), which might be due to none of the items forming the thrift factor being about debt or borrowing behaviour.

The attitude factor called saving involvement is positively correlated with financial wealth ( $r = .266, p < .01$ ) and total wealth ( $r = .315, p < .01$ ). Saving involvement is also correlated with debt when mortgages are included in the debt definition ( $r = .243, p < .01$ ). With respect

to the saving variables, saving involvement correlates positively with total saving ( $r = .103, p < .01$ ) and the total savings ratio ( $r = .082, p < .05$ ), while there is a negative correlation between saving involvement and the contractual savings ratio when debt is included in the debt definition ( $r = -.077, p < .05$ ). There is a positive correlation between saving involvement and income ( $r = .351, p < .01$ ) which means that the attitude towards saving becomes more positive as income increases. Saving involvement is positively correlated with all the saving motive variables (see Table 7.7). The strongest correlation is between saving involvement and importance of earning interest ( $r = .479, p < .01$ ). Saving involvement is also highly correlated with the measure of economic situation compared to “others”. Households believing that they are better off than others are more involved with saving ( $r = .396, p < .01$ ). The saving involvement factor is negatively associated with age ( $r = -.108, p < .01$ ) while it is positively associated with family size ( $r = .147, p < .01$ ) and presence of a partner ( $r = .255, p < .01$ ). Saving involvement is positively associated with time horizon ( $r = .230, p < .01$ ), which means that the longer people think into the future, the more involved they are with saving. There are also significant correlations between personality factors and saving involvement. There is a negative correlation between saving involvement and emotional stability, which is unexpected due to the positive relationship found between thrift and emotional stability. Saving involvement and tough-mindedness correlates positively ( $r = .094, p < .01$ ), while there are negative relationships between saving involvement and inflexibility ( $r = -.101, p < .01$ ) and extraversion ( $r = -.197, p < .01$ ).

The regression analyses show that a high score on the saving involvement factor is associated with higher financial wealth (A6-1) and higher total wealth (A6-4). The relationship with total wealth seems to be particularly strong in the low-income group (Table A6-8). In Table A6-9, we can see that the probability that the value of a household’s financial wealth is above zero increases with a high score on the saving involvement factor. Saving involvement does not seem to be related to saving, but saving involvement is associated with debt repayment. Saving involvement is negatively related to repayment of debt and mortgages (see Table A6-3) and the contractual savings ratio (mortgages excluded) (Table A6-2). These relationships are opposite to what we expected. People involved with saving were expected to repay their debts as soon as possible.

The saving habit attitude factor does not correlate with any of the saving measures with the exception of a negative correlation between saving habit and debt and mortgages. The saving habit factor correlates negatively with the three discount rate factors, the two income expectations factors and the income uncertainty factor (see Table 7.7). The saving habit factor correlates positively with the importance attributed to precautionary saving ( $r = .225, p < .01$ ) and saving for old age ( $r = .131, p < .01$ ). The saving habit attitude factor is also related to personality factors. Saving habit is significantly correlated with conscientiousness ( $r = .151, p < .01$ ), tough-mindedness ( $r = -.068, p < .05$ ) and inflexibility ( $r = .124, p < .004$ ).

Results from the multivariate analyses indicate that the factor called saving habit is more strongly related to saving than to wealth and debt, but the direction of the relationships are opposite to what was expected. The saving habits factor is negatively related to the discretionary savings ratio (Tables A6-1 and 7.3), the repayment of debt and the contractual savings ratio when mortgages are excluded from the debt definition (Tables A6-2 and 7.4). This means that people scoring high on the saving habits factor save a smaller portion of their income than those with a low score. Although this is contrary to what was expected, it is not as surprising when we look closer at the items defining the saving habits factor. Two of the items are about needs to save. It is likely that those expressing that they need to save, are less

able to save money than others. Among the households having debt and mortgages, saving habits were negatively related to the sum of debt and mortgages (Table A6-3), and this relationship is particularly strong in the high-income group (Table A6- 6). This result is in line with our expectations.

The results suggest that people do vary in their attitudes towards saving and that these attitudes are associated with saving and borrowing behaviour. It is necessary to continue investigating whether attitudes influence saving or whether the attitudes are a result of previous saving. Some of the results reported above are difficult to interpret without reversing the direction of the proposed relationships. It is likely that attitudes towards further saving are partly influenced by previous saving and partly by factors such as personality and education. It requires a dynamic model to test the predictive power of attitudes properly.

#### 7.4.2.11 Attitudes towards debt

Shame of debt or debt aversion is correlated with the saving measures as predicted. The larger the debt aversion, the more financial ( $r = .163, p < .01$ ) and total ( $r = .186, p < .01$ ) wealth and the less debt ( $r = -.081, p < .05$ ) and debt +mortgages ( $r = -.239, p < .01$ ). Debt aversion seems to be less associated with saving as it is weakly correlated with repayment of debt ( $r = -.077, p < .05$ ) the discretionary savings ratio ( $r = -.070, p < .05$ ) and the contractual savings ratio ( $r = -.139, p < .01$ ). The stronger the debt aversion, the smaller part of the income is used for saving and the larger part of income is used for paying back loans.

Results from the regression analyses show that the attitude towards debt factor has a robust relationship with both saving and borrowing behaviour. A negative attitude towards debt increases the likelihood that a household has positive financial savings while it decreases the likelihood of a household having debt and mortgages (Table A6-9). Thinking that debt is negative is associated with higher financial (Tables A6-1 and 7.3) and total (Tables A6-4 and 7.6) wealth. In particular, in the low-income group, differences in attitudes towards debt seem to affect levels of wealth (Tables A6-5 and A6-8). Among households having debt, a negative attitude towards debt is associated with lower levels of debt and mortgages (Tables A6-3 and 7.). This relationship seems to be particularly strong in the middle-income group (Table A6-7).

A surprising result is that the attitude towards debt factor is negatively associated with the discretionary savings ratio. This means that being negative towards debt is associated with saving a smaller part of their income than people having a more positive attitude towards debt. With the exception of this relationship, the results suggest that debt aversion is important for both saving and borrowing behaviour in the predicted manner.

#### 7.4.2.12 Saving motives

The degree of importance attributed to precautionary saving has less impact on saving behaviour than expected. Precautionary saving is not correlated with any of the saving measures except the sum of debt and mortgages ( $r = -.082, p < .05$ ). Thinking that precautionary saving is important is, however, related with some of the other psychological variables (see Table .7.7). Importance of precautionary saving correlates significantly with time horizon ( $r = .105$ ), thrift ( $r = .387$ ), saving involvement, ( $r = .187$ ), saving habit ( $r = .225$ ), debt aversion ( $r = .105$ ), the importance attributed to the goal saving motive ( $r = .313$ ), importance of *inter vivos* transfers ( $r = .321$ ), importance of bequest ( $r = .259$ ), importance of

saving for old age ( $r = .492$ ) and the importance of the earning interest ( $r = .338$ ). There is also a positive correlation between thinking that precautionary saving is important and the conscientiousness factor ( $r = .104, p < .01$ ).

The results from the regression analyses show that the more important people think it is to save for precautionary reasons, the more they repay of their debt (Tables A6-2 and 7.4). In the low-income group, we also find that the more important saving for precautionary reasons is considered, the higher the sum of debt (mortgages excluded) (Table A6-7). In spite of the precautionary motive being the most frequently mentioned saving motive, the expected relationships between the importance of the precautionary saving motive and wealth and saving were not found. This might be due to some of the effect of having this motive is captured by some of the other variables. It could also be that people differ with respect to how large a buffer they need for precautionary reasons. A third explanation could be that there is an interaction effect between wealth and motives. Households that have not been able to save in the past (having low wealth) may regard saving for precaution very important. Likewise, households with low income and high debt probably do not have a buffer and regard this as an important reason for trying to save.

The goal saving motive correlates with several of the dependent variables, but the relationships are not as expected. There are negative correlations between the strength of the goal saving motive and total wealth ( $r = -.122, p < .01$ ). The goal saving motive correlates negatively with the sum of debt (mortgages excluded) ( $r = -.102, p < .01$ ) and both measures of contractual saving. There is also a negative relationship between the goal saving motive and the contractual savings ratio.

The results from the regression analyses show that the goal saving motive is positively associated with discretionary saving and the discretionary savings ratio (Tables A6-1 and 7.3). The more importance the household members think it is to save for a goal, the more they save and the larger part of their income is saved. Among households with debt, those thinking it is important to save for a particular goal also have lower debt (Tables A6-2 and 7.4). The goal saving motive is, however, negatively associated with total wealth as of December 1994 (Tables A6-4). This suggests that households having saved already and therefore are able to buy a desired product, do not regard goal saving as important.

Thinking it is important to support children is positively correlated with several of the dependent variables, such as the sum of debt and mortgages ( $r = .140, p < .01$ ) and total wealth ( $r = .082, p < .05$ ). Households attributing importance to helping their children also have higher discretionary saving ( $r = .091, p < .05$ ). Again, we find strong positive relationships between saving motives and saving attitudes (thrift and saving involvement) (see Table 7.7). The highest correlation is found between the motive for helping children and the bequest motive ( $r = .519, p < .01$ ).

The results from the regression analyses show that households who think it is important to support their children have less financial wealth (Table A6-1), and this relationship is particularly strong in the middle-income group (Table A6-5). In the middle-income group, we also find that there is a significant negative relationship between how important the household think it is to support their children and total wealth (Table A6-8). Thinking that it is important to support children seems to have a negative effect on the household wealth as it also decreases the likelihood of a household having positive financial wealth (Table A6-9). This

might be due to these households already having given the money to their children or that they are unable to support their children, but would like to do so.

The bequest motive also deals with support for children, but this concerns wealth that will be transferred after the death of the parents. Thinking that bequest is important is positively correlated with both financial ( $r = .245, p < .01$ ) and total ( $r = .263, p < .01$ ) wealth. There is also a positive relationship between the bequest motive and the sum of debt and mortgages ( $r = .092, p < .01$ ). There are no significant correlations between the bequest motive and the saving variables, but as can be seen in Table 7.7, bequest correlates with some of the psychological variables.

Results from the regression analyses, show that a strong bequest motive is associated with higher financial wealth (Table A6-1) and higher total wealth (Table A6-4). This relationship is particularly important in the low- and middle-income groups (Tables A6-5 and A6-8). Thinking it is important to leave bequest also increases the likelihood of a household having positive financial wealth (Table A6-9). Moreover, it increases the likelihood of a household having debt, although it does not seem to affect the level of debt. Hence, in spite of being the saving motive with the lowest score with respect to mean importance (see Table 6.15), the bequest motive affects saving.

Thinking it is important to save for old-age is correlated positively with financial ( $r = .102, p < .01$ ) and total ( $r = .122, p < .01$ ) wealth as well as with total saving ( $r = .074, p < .05$ ) and the total savings ratio ( $r = .088, p < .05$ ). As can be seen in Table 7.7, people thinking it is important to save for old age, have a lower delay reward rate, a longer time horizon, feel they are better off than others and have positive attitudes towards saving.

The results from the regression analyses show a somewhat different pattern concerning the retirement saving motive and saving variables. A significant relationship was found between the strength of the retirement saving motive and financial wealth when analysing the full sample (Tables A6-1 and 7.3). This relationship seems to be particularly strong in the low-income and high-income group (Table A6-5). However, no significant relationship was found between the old-age saving motive and total wealth and total saving. Instead, we found that a strong motive for saving for old age reduces the likelihood of a household having debt and mortgages (A6-9) and, among households having debt and mortgages, it reduces the size of debt (Tables A6-2 and 7.4) and debt and mortgages (Tables A6-3 and 7.5).

A strong "calculation motive", or thinking that earning interest is important, is positively associated with financial ( $r = .226, p < .01$ ) and total ( $r = .279, p < .01$ ) wealth, and with total saving ( $r = .072, p < .05$ ). As shown in Table 7.7, the calculation motive is also associated with having a longer time horizon, higher income variability, perceived economic situation compared to others, saving attitudes, and the other saving motives.

The results from the regression analyses show a positive association between the calculation motive and the level of financial wealth (Table A6-1) and the level of total wealth (Table A6-4) and a negative association between the calculation motive and the level of debt and mortgages among the households having borrowed (Tables A6-3 and A6-6). The relationship between total wealth and the calculation motive is particularly strong in the high-income group. This is in line with what was expected. It is not certain what the direction of causality is here. Thinking it is important to earn interest may be an effect of having money to invest instead of being the reason for further saving.

The overall conclusion from the results concerning saving motives is that the importance attributed to them affects saving behaviour. The link with attitudes should be further explored, as the correlation coefficients suggest that attitudes and motives are related to each other, even though they have independent effects on saving and borrowing behaviour.

#### 7.4.2.13 Economic situation compared to “others”

Bivariate analyses indicate that perceived economic situation compared to “others” is related to saving behaviour. Thinking one is better off is positively correlated with financial ( $r = .182$ ,  $p < .01$ ) and total ( $r = .279$ ,  $p < .01$ ) wealth. It is also correlated with the amount of debt ( $r = .295$ ,  $p < .01$ ) and the sum of debt and mortgages ( $r = .076$ ,  $p < .05$ ). Feeling better off is positively related to total saving, but negatively related to the discretionary and contractual saving ratio.

The same relationships were not found in the multivariate analyses. This might be due to the fact that feeling better off is related to the level of income ( $r = .372$ ,  $p < .01$ ). When the effect of income level is controlled for, the variable seems to lose some of its effect.

A significant relationship between perceived relative economic situation and financial wealth is not found when analysing the full sample, but the relationship is significant in the low-income and middle-income group (Table A6-5). A positive association between perceived economic situation and total wealth is found in the high-income group (Table A6-8). A problem with these results is that it is difficult to conclude whether people save more because they feel better off than others and therefore do not feel a pressure to consume or whether they feel better off because they do have higher wealth than others. In most of the analyses, there are no significant links between perceived economic situation and saving and saving ratios with the exception of two instances. Households that agree that they are better off than others have a lower discretionary savings ratio than others (Tables A6-1 and 7.3). Agreeing that the household is better off than others increases the probability that the household has debt and mortgages (Table A6-9). These findings indicate that people compare their own consumption with that of others when answering the question, and not the general economic situation. In that case, people having borrowed money in order to buy their own house and spending most of their income instead of saving it, may think they are better off than others. Alternatively, people feeling that they are better-off than others think that they do not need to save.

The lack of results concerning the effects of economic situation compared to “others” is somewhat disappointing, but it is important to remember that the measurement of this variable is not optimal. One statement, originally meant to measure saving attitudes, had to be used as a proxy for this concept due to a routing error which caused an unacceptably high number of missing observations of the measurement instrument that was intended to be used. This variable may also have larger effect in countries with larger income inequalities than what is found in the Netherlands.

#### 7.4.2.14 Personality structure

A simple bivariate analysis showed that personality factors might be related to saving behaviour, although the direction of the relationships is not always as expected. Emotional stability was expected to be positively related to wealth and saving. Instead, we found emotional stability to be negatively correlated with both financial ( $r = -.074$ ,  $p < .05$ ) and total

( $r = -.127, p < .01$ ) wealth. This is contrary to what was expected. In line with our expectations, however, we found that emotional stability is negatively correlated with debt and mortgages ( $r = -.178, p < .01$ ).

The results from the regression analyses reverse some of the indicated relationships. Emotional stability is still associated with lower levels of debt and mortgages (Tables A6-3 and 7.5). In the low-income and high-income groups, emotional stability is also associated with lower levels of debt (Table A6-7). Emotional stability does not have any significant relationship with the level of financial wealth when analysing the full sample (Table A6-1). Emotional stability is, however, *positively* associated with the level of financial saving in the high-income group (Table A6-5). A significant association between emotional stability and total wealth and saving is not found (Tables A6-4 and A6-8).

Conscientiousness is positively correlated with financial ( $r = .084, p < .05$ ) and total wealth ( $r = .125, p < .01$ ), as expected. There is also a significant negative relationship between conscientiousness and contractual saving. Conscientiousness is positively associated with age ( $r = .285, p < .01$ ), and correlates significantly with the three time preference rates and the income expectation variables (see Table 7.7). Conscientiousness is also associated with having positive attitudes towards saving and thinking it is important to leave bequests.

We do not find the same relationships between conscientiousness and the saving variables in the regression analyses. A high score on the conscientiousness factor decreases the probability that a household has debt (Table A6-9). Unexpectedly, we also find that conscientiousness decreases the probability of the household having positive financial wealth. Among those having debt, conscientiousness is associated with having lower amounts of debt. In the multivariate analyses, we do not find conscientiousness to be related to financial or total wealth, saving measures or saving ratio.

Tough-mindedness is not significantly correlated with any of the saving measures. The regression analyses do not reveal any results that indicate that tough-mindedness is important for saving behaviour. Tough-mindedness is associated with having a higher probability of having debt (Table A6-9) and, among those having debt, tough-mindedness is associated with repaying less debt (controlling for the size of debt) (Table A6-2).

Inflexibility is associated with some of the saving variables. Inflexibility is negatively associated with the amount of debt and mortgages ( $r = .177, p < .01$ ) and with total saving ( $r = -.088, p < .05$ ). In spite of the negative association between inflexibility and the level of debt and mortgages, there is a positive correlation between inflexibility and the contractual savings ratio ( $r = .077, p < .05$ ). There is also a negative correlation between inflexibility and total saving ( $r = -.88, p < .05$ ).

The regression analyses revealed that inflexibility is associated with higher financial wealth (Tables A6-1 and 7.3) and total wealth (Tables A6-4 and 7.6), and lower amounts of debt and mortgages among the households having borrowed (Tables A6-3 and 7.5). This is in line with our expectations. Analysing the income groups separately, we can see that the relationship between inflexibility and financial wealth is particularly strong in the middle-income group (Table A6-5), while the relationship between total saving and inflexibility is strongest in the low-income group (Table A6-8). The relationship between inflexibility and the size of debt is significant in the middle-income group (Table A6-6). Inflexibility is also found to be

associated with lower repayment of debt and mortgages among the households having such loans (Table A6-3).

The results concerning extraversion are, in most cases, opposite to what was expected. Bivariate analyses suggest that extraversion is associated with less saving, as expected. The correlation between extraversion and total saving is  $-.081$  ( $p < .05$ ). The regression analyses, on the other hand, uncover a positive association between extraversion and levels of financial wealth (Tables A6-1 and 7.3) and total wealth (Tables A6-4 and 7.6). These relationships are particularly strong in the high-income group (Tables A6-5 and A6-8). There is also a negative correlation between extraversion and levels of debt + mortgages ( $r = -.136$ ,  $r < .01$ ). This relationship is found in the multivariate analyses when analysing the full sample (Tables A6-3 and 7.5). However, when analysing the income groups separately, the relationships is not found to be significant. Extraversion is not found to be related to any of the saving variables.

The results regarding extraversion contradict those reported by Nyhus and Webley (2001) using later waves of the CSS data, and the effect of extraversion on economic behaviour should therefore be subject to further investigation.

Brandstätter (1996) proposed that personality would influence saving indirectly through a person's attitudes. This research has shown that at least some of the personality factors have an independent effect on saving in spite of also being significantly related to saving attitudes and motives. These factors are extraversion and inflexibility. Conscientiousness, on the other hand, was not significant in the regression analyses except in one case. The correlation coefficients in Table 7.7 tells us that conscientiousness is associated with both positive attitudes towards saving as well as strong saving motives, which means that Brandstätter may be right with respect to this personality trait. Further research should focus on the interaction effect between personality factors and between personality factors and motives and attitudes.

Table 7.8 summarises the expected relationships and results from analyses on the full sample. The predicted relationships are indicated in parentheses.

### 7.4.3 Discretionary vs. contractual saving

The third research question asked whether the psychological variables influence the various types of saving differently. The psychological variables of interest and their expected relationship with wealth and debt measures, and repayment and discretionary saving were specified in Chapter 4. Tables A6-1 through A6-9 report the results from multiple regressions carried out in order to establish the impact of psychological factors on the two types of saving, and a summary is provided in Table 7.8.

We do not find that the psychological variables have opposite effects on the various stock measures of saving. Variables that have a positive relationship with wealth also have a negative relationship with the sum of debt and mortgages, so that they influence total wealth in a consistent manner.

The same conclusion must be drawn for the flow measures of saving. We do not, in this data set, find that a psychological variable that has a positive relationship with discretionary saving has the opposite relationship with repayment saving. We must keep in mind, though, that the



study may be affected by measurement problem with respect to the flow measures, so that further studies are required in order to obtain results that are more conclusive.

Table 7.8  
Comparison of expected relationship and findings

Independent variables	Dependent variables											
	Wealth/Debt				Saving				Saving ratio			
	Fin. wealth	Debt mortg Incl.	Debt mortg. Excl.	Total wealth	Discr. Sav.	Cont. Sav. mortg Incl	Cont. Sav. mortg Excl.	Total sav.	Discr. Sav. ratio	Contrs av. ratio mortg Incl	Contr Sav. ratio mortg Excl.	Total saving ratio
HH disposable income	+(+)	+(+)	ns(-)	+(+)	+(+)	+(+)	+(-)	+(+)	+(+)	-(+)	ns(-)	+(+)
Level of education	+(+)	ns(+)	ns(+)	+	ns(+)	ns(+)	ns(+)	ns	ns(+)	ns(+)	+(+)	ns
Presence of children	ns(-)	ns(+)	ns(+)	ns(-)	ns(-)	ns(+)	+(+)	+	ns(-)	ns(+)	ns(+)	ns
Family size	ns(-)	ns(+)	ns(+)	ns(-)	ns(-)	ns(+)	-(+)	ns	ns(-)	ns(+)	ns(+)	ns
Presence of partner	ns(+)	ns(+)	ns(-)	ns(+)	ns(+)	ns(+)	+(-)	ns(+)	ns(+)	ns(+)	+(-)	ns(+)
Time preference	ns(-)	+/-(-)	ns(+)	ns(-)	ns(-)	ns(-)	+(+)	ns(-)	+/-(-)	ns(-)	ns(+)	ns(-)
Income expectations	ns(-)	ns(+)	+(+)	ns(-)	ns(-)	-(+)	ns(+)	ns	ns(-)	ns(+)	ns(+)	ns
Time horizon	+(+)	+(+)	+(-)	+(+)	ns(+)	ns(+)	ns(-)	+(+)	ns(+)	ns(+)	ns(-)	+(+)
Income variability	ns(+)	ns(-)	ns(-)	-(+)	ns(+)	ns(-)	-(-)	ns	ns(+)	ns(-)	ns(-)	ns
Attitude towards saving	+/-(+)	-(-)	ns(-)	+(+)	ns(+)	+/-(-)	-(-)	ns	-(+)	ns(-)	-(-)	-
Debt aversion	+(+)	-(-)	ns(-)	+(+)	ns(+)	ns(-)	ns(-)	ns	-(+)	ns(-)	ns(-)	ns
Imp. of prec. saving	ns(+)	ns(-)	ns(-)	ns(+)	ns(+)	ns(-)	+(-)	ns	ns(+)	ns(-)	ns(-)	ns
Imp. of leaving bequest	+(+)	ns(-)	ns(-)	+(+)	-(+)	ns(-)	ns(-)	ns	ns(+)	ns(-)	ns(-)	ns
Imp. of helping childr	-(+)	ns(-)	ns(-)	ns(+)	ns(+)	ns(-)	ns(-)	ns	ns(+)	ns(-)	ns(-)	ns
Imp. of retirement sav.	+(+)	ns(-)	-(-)	ns(+)	ns(+)	ns(-)	ns(-)	ns	ns(+)	ns(-)	ns(-)	ns
Imp. of goal saving	ns(+)	ns(-)	-(-)	-(+)	+(+)	ns(-)	ns(-)	ns	+(+)	ns(-)	ns(-)	ns
Imp. of profit making	+(+)	ns(-)	ns(-)	+(+)	-(+)	ns(-)	ns(-)	ns	ns(+)	ns(-)	ns(-)	ns
Relative economic sit.	ns(+)	ns(-)	ns(-)	ns(+)	ns(+)	ns(-)	ns(-)	ns	-(+)	ns(-)	ns(-)	ns
Emotional stability	ns(+)	ns(-)	ns(-)	ns(+)	ns(+)	ns(-)	ns(-)	ns	ns(+)	ns(-)	ns(-)	ns
Conscientiousness	ns(+)	ns(-)	ns(-)	ns(+)	ns(+)	-(-)	ns(-)	ns	ns(+)	ns(-)	ns(-)	ns
Tough-mindedness	ns(-)	ns(+)	ns(+)	ns(-)	ns(-)	ns(+)	-(+)	ns	ns(-)	ns(+)	ns(+)	ns
Inflexibility	+(-)	ns(+)	ns(+)	+(-)	ns(-)	-(+)	ns(+)	ns	ns(-)	ns(+)	ns(+)	ns
Extraversion	+(-)	ns(+)	ns(+)	+(-)	ns(-)	ns(+)	ns(+)	ns	ns(-)	ns(+)	ns(+)	ns

7.4.4 Effects of psychological variables at different income levels

The last research question addressed is whether the psychological variables have more effect of saving in households with high discretionary incomes than in households with lower discretionary income. The answer to this question can be found in Tables A6-5 through A6-8.

With respect to financial wealth (Table A6-5), the results are opposite of Katona's proposition. The psychological variables increase the explained variance in financial wealth by 10.8, 9.7 and 6.8 percentage points for the low, middle and high-income groups respectively. Hence, the importance of the psychological variables is less in the high-income group than in the middle- and low-income group. This means that the psychological variables do not increase their importance as discretionary income increases. A similar conclusion must be drawn with respect to the importance of psychological variables for total wealth (Table A6-8). The increase in explained variance of total wealth when including the psychological variables in the model is larger in the low-income group (17.4 percentage points) than in the

middle-income group (11.0 percentage points) and than in the high-income group (4.1 percentage points).

When analysing the sum of debt and mortgages (Table A6-6), the introduction of the psychological variables has a negative effect on adjusted  $R^2$  in the low- and high-income group. The adjusted  $R^2$  increases significantly when including the psychological variables when analysing the debt and mortgages of the middle-income group. Still, we cannot conclude that the importance of psychological variables increases with higher discretionary income. Table A6-7 reports the changes in explained variance when analysing debt levels in the three income groups respectively. In this table, we can see that the increases in adjusted  $R^2$  are largest in the low and high-income groups, while it is low in the middle-income group. Hence, we do not find an indication of psychological variables being more important in the high-income group than in the groups with lower discretionary income.

# Chapter 8

## Conclusions

### 8.1 INTRODUCTION

Kotlikoff (1989) described the question about what determines saving as a jigsaw puzzle with missing pieces where even the known pieces are hard to put together. This study has attempted to identify some of the pieces that might have been missing in previous attempts to solve the saving puzzle and to explore how the pieces might relate to each other. The underlying motivation has been the need for a deeper understanding of the psychological mechanisms governing saving behaviour so that we may improve existing saving models. In particular, we need to identify the psychological variables that are likely to affect the majority of a household's spending decisions.

The first part of this study consists of a review of the saving literature. The purpose of the review was to identify psychology-based theories in the saving literature and to evaluate their empirical support. Contributions from economics, economic psychology and sociology were examined. The second part of this study is empirical in nature. It is designed to test the relationship between selected psychological variables and various measures of saving behaviour. Data collected from a large Dutch household panel were analysed. Some of the methodological problems found in other psychological studies of saving were sought solved.

In this chapter, the answers to the four research questions are presented. We proceed by evaluating the empirical study, which is important when drawing conclusions from the results. Finally, the theoretical and practical implications of the study are discussed.

### 8.2 ANSWERS TO THE RESEARCH QUESTIONS

#### 8.2.1 Research Question 1

The first research question asked which of the psychological explanations for saving found in the existing economic and economic psychological literature on household saving are supported by empirical findings. This was achieved through an interdisciplinary literature review. The review revealed three different - but not necessarily opposing - psychological processes that have been proposed as important for saving. The first process considers saving as a result of a choice between pleasure now as opposed to pleasure in the future. This choice may be difficult to make if the short-term preferences conflict with the long-term preferences. The potential conflict between short-term and long-term preferences has been described in the saving literature throughout history. Long-term saving goals may be hard for people who are frequently exposed to spending temptations. Central variables in these theories are time preference and self-control. Time preference expresses the degree of impatience to experience pleasure or the intensity of the wish to postpone unpleasant events. Self-control includes the strategies people use in order to fight their impatience so that they stick to their long-term plans and goals. Despite the acknowledged existence of such intertemporal conflicts, it has seldom been incorporated in the more formal saving models. One reason for this is that the

process of prioritising present and future pleasures is hard to codify in a model because many situational factors may influence the outcome. The model is also hard to test empirically because adequate measurement instruments have not yet been developed.

Many variables that may influence time preference have been proposed and, in many cases, these variables are similar to variables included in the more recent saving theories where income is the central variable. The variables that are expected to be associated with time preference are income, expected income, income uncertainty, the length of the time horizon, consumption habits and self-control, stage in the life cycle, expected remaining life-time, upbringing and dependence on fashion. Few of these propositions have been tested empirically.

The second process proposed as underlying saving behaviour involves the idea that people rationally distribute their income over their expected lifetime in order to maximise the utility derived from their available resources. People are described as forward-looking, sometimes having a time horizon exceeding their own expected lifetime, and able to distribute income throughout their remaining lifetime without being tempted to overspend in the present. This framework includes the two well-known models called the Life-Cycle Hypothesis (LCH) and the Permanent Income Hypothesis (PIH) respectively. Some controversies about the definition of income are found. There is also a disagreement about the time horizon that should be used when testing the LCH, and about the existence and impact of various saving motives. For example, economists dispute whether people want to deplete all their assets before they die or whether they want to bequeath. Several psychological concepts have been added to the model to better account for observed behaviour. These include saving motives, uncertainty and subjective expectations. There has also been an attempt to add the notion of self-control to the life-cycle models. The LCH can explain some of the variation in individual saving behaviour, but an unacceptably large part of the variation is still left unexplained.

A third proposed process involves social comparison. The idea is that people do not make their saving decisions in a social vacuum. Instead, they compare their own consumption (which is conspicuous) with that of their "reference group" and decide to spend or save based on whether they feel better or worse off than others. This perspective implies a theory about how people choose their reference group and the function this reference group may have for the consumers. So far, this part of the theory is underdeveloped and under-researched.

Hence, the economic literature on saving is rich on assumptions and theories based on psychological thinking. The psychological variables frequently regarded as important are time preference, degree of self-control, expectations, uncertainty, time horizon, social comparison mechanisms and various saving motives. Psychologists have added attitudes and personality structure to the list of possible predictors of saving. So far, the empirical research on the effect of these variables has been limited and the results are inconclusive.

The measures of time preference used hitherto have not been found to be associated with saving behaviour in empirical saving studies, except for a few weak indications of the a link. Several attempts to measure time preference have been carried out, but the results demonstrate that time preference is a complex entity that may be heavily influenced by the decision context. If this is the case, time preference can be important in unique spending decisions but fail to have a consistent effect across the majority of spending decisions, which, in turn, will influence saving over longer time spans. In addition, variables that might capture self-monitoring behaviour have often been omitted despite the fact that the combined effect of

time preference and self-control is assumed to explain saving. This implies that one important predictor for intertemporal decisions may be missing from previous analyses.

The concept of self-control has been linked to saving since Adam Smith included the concept in the Theory of Moral sentiments (as cited in Wärneryd, 1999). The existence of saving clubs has been interpreted as evidence for the necessity of self-controlling devices. The role of self-control has also been studied empirically by asking people if they use certain strategies to help refrain from spending. People admit to the use of such strategies and we may infer from this that being able to develop and implement self-controlling strategies is important for the overall level of saving. Still, further empirical research is needed in order to establish the effect of self-control on saving and spending behaviour over an extended period. Measures of will-power, which might make the use of self-controlling techniques superfluous, must be incorporated in these studies.

Expectations about future income and economic situation have been subject to a great deal of empirical research. The findings of these studies are encouraging. Most studies, conducted by both economists and psychologists, have found that optimism is associated with lower saving, while pessimism encourages saving. Uncertainty regarding future income (or expenditures) is expected to have a depressing effect on saving and may mediate the effect of expectations. Uncertainty has been found to increase saving in empirical studies. As saving has consequences for future well being in most cases, the time horizon used by the decision maker is likely to be important. The longer the time horizon, the more future there is to be concerned about, which may in turn increase the tendency to save and reduce the tendency to borrow. This has also been supported empirically.

Market research indicates that social comparison mechanisms are important for purchasing behaviour. People who belong to the same social group, which may be determined by various criteria, tend to favour the same products and brands. It is therefore a plausible idea that peer-group influence will be important for the level of consumption and saving. Although social comparison mechanisms, or "interdependent preferences" in economic parlance, have received little attention from economists, some empirical studies support the role of social comparison in saving behaviour.

Many saving studies have included various saving motives as determinants of saving. Psychologists see motives as an intermediate variable, so that people who hold different motives or vary in how important they regard the motives will respond differently to economic stimuli. Only one study has tested such a S-O-R model explicitly (Wahlund & Wärneryd, 1987), and support for such a model was found. Economists have studied the effect of motives using structural analyses of saving by incorporating the precautionary saving motive and the bequest motive into the life cycle model of saving. The results concerning the effect of the motives on levels of saving vary from one study to another, but, in most cases, researchers agree that an element of aggregate wealth can be attributed to these motives. In other studies, people have been asked whether they think various saving motives are important, in order to establish which motive is the most significant. The precautionary saving motive is mentioned most frequently, but the effect of the variation in the strength of these motives on saving and borrowing behaviour has not been further explored.

The results concerning the relationship between attitudes and saving are mixed. Some studies conclude that there is a relationship, while other studies have not found any significant associations. The question of causality has been addressed in a small number of studies, and

there is reason to believe that the direction of causality is the opposite to that initially proposed, or that there exists an interactive process where previous saving influences attitudes influence future saving.

Finally, there is a line of research within the economic-psychological literature on saving that focuses on the link between personality structure and saving behaviour. Conscientiousness is the personality dimension that corresponds mostly with the notion of will-power and self-control. Some studies have found indications of this personality trait being important for both saving and borrowing behaviour, while other studies find no support for such a relationship. Other personality traits are also likely to influence saving, and a couple of studies report that introversion, inflexibility, emotional stability and autonomy may affect both levels of saving and portfolio choice. Hence, the empirical studies have found support for the notion that personality factors can explain individual differences in saving and spending behaviour.

We may conclude that psychology has a lot to offer with respect to increasing our understanding of individual saving behaviour. Many empirical studies have shown that the inclusion of psychological variables in saving models increases the explained variance in saving. Psychological variables also contribute towards a deeper understanding of the cognitive processes underlying saving behaviour. However, only a few of the psychological theories about saving behaviour have been subject to direct empirical testing. As shown in Table 2.2, a large amount of empirical work is required in order to test all the proposed ideas. More problems remain than have been satisfactorily answered.

### 8.2.2 Research Question 2

The next research question concerned the contribution of psychological variables towards explaining variation in household saving. Based on our empirical study, we can conclude that psychological variables significantly increase explained variance in individual differences in saving and wealth beyond that explained by socio-economic variables. In particular, with respect to financial and total wealth and the sum of debt and mortgages, the psychological variables account for a relatively large increase in the explained variance. The flow-measures of saving were, in general, poorly explained by the variables in the model. This may be due to problems in the measurement of these dependent variables. There is also a chance that the accounting period used in the study of flow measures (saving during one year) is too short for the effect of psychological variables coming to realization. Nevertheless, adding psychological variables to the models of saving improved their ability to predict saving behaviour.

One weakness associated with many previous tests of psychological theories of saving is that "saving" is not consistently defined, which make the results of the studies difficult to compare. In order to investigate whether the saving definition used matters for the conclusions regarding effects of psychological variables, several different measures of saving were used as dependent variables. Both flow and stock measures of saving were analysed. We also carried out independent test of discretionary and contractual saving. Finally, we analysed the probabilities of having wealth and debt. All psychological variables included in the regressions are significant in one or more of the analyses. The most robust variables - in terms of being significant across many analyses with different dependent variables or samples - are time horizon and debt aversion. The other variables, being time preference, income variability, attitudes towards saving, perceived relative economic situation, personality, and saving motives, are significant in some analyses but not in others, and they do not always relate to saving the way we expected. This indicates that it is necessary to study certain types

of saving separately when assessing the effect of psychological variables on saving. For example, there may be different psychological mechanisms underlying bank saving, insurance saving, and investment saving respectively and the psychological variables may influence these different types of saving in different ways.

### 8.2.3 Research Question 3

The third research question asked if psychological variables have a different impact on discretionary and repayment saving respectively. Our study did not find any evidence for this. In general, the model explained little of the variance in the flow measures of saving. The few variables found to be significantly associated with the saving variables worked in the same direction with respect to discretionary saving and contractual saving.

One issue that should be considered is the operationalization of discretionary saving (see Chapter 6). First, we could not distinguish between discretionary saving and residual saving in the data set. This might have produced some noise in the discretionary saving measure, because some part of the saving defined as discretionary may have been accidental, in the sense that it was not a result of a decision to save. Secondly, it is questionable if saving achieved as part of a contractual obligation (like, for example, an automatic transfer of money to a savings account) should count as discretionary saving (as in this study) or contractual saving. There is a possibility that alternative ways of measuring discretionary and contractual saving respectively would alter the results.

### 8.2.4 Research Question 4

Finally, we set out to test a conjecture put forward by Katona (1975). He argued that the explanatory power of psychological variables rises as discretionary income increases and spreads among families in Western economies. Although we did not have an accurate measure of discretionary saving and could not disentangle households with and without discretionary income, the proposition could be tested by comparing the contribution of psychological variables with respect to explaining variance in saving variables for three different (discretionary) income groups. It is reasonable to expect that psychological variables have little effect for households that do not have any discretionary income, but the results do not indicate that an *increase* in discretionary income increases the importance of psychological variables for saving behaviour. Rather, the results show that psychological variables can explain differences in wealth just as well in the low- (discretionary) income group as in the high- (discretionary) income group. This study therefore found no foundations for the assertion that psychological variables will increase their predictive power as discretionary income in a country increases. Rather, the psychological variables are also important determinants of saving for households with little discretionary income.

Some reservations with respect to these results should be observed. As pointed out in Chapter 6, it is not a straightforward business to define discretionary income. Discretionary income means that a household has an option to choose whether to spend or save. That means that discretionary income is disposable income with necessities subtracted. The question is how to define a necessity. The definition of needs can both be based on pure physical consideration of how much food, clothes and shelter people need in order to stay alive, as well as social reference group considerations that will define what people need in order to function within social group. The definition used here is based on a definition of physical needs as the division of the disposable income of the household by the number of household members. As

shown in Tables 6.7 and 6.8, this is not consistent with a definition based on perceived needs. If we had used perceived economic situation when defining the income groups, the results may have been different.

### 8.3 EVALUATION OF THE STUDY

All empirical investigations have strengths and weaknesses that need to be considered when evaluating their results and implications. In this section, some of these will be addressed.

#### Strengths

This research is interdisciplinary, drawing on research from three fields. This has provided a rich pool of psychological theories from which to choose. As some of the theories on saving and consumption used within one field of research have been tested within other fields, interdisciplinary research gives a better foundation for evaluating the theories or assumptions underlying them.

The data set used in this study is unique in that it contains information about both economic and psychological variables. Usually, large surveys designed for economic research are limited to socio-economic variables for economic and practical reasons. Psychologists having studied saving have often used questionnaires and with limited potential to adequately measure the economic variables. The special data collection technique used for the CentER Saving Survey has overcome the problems caused by using long questionnaires by splitting the questionnaires into smaller parts, using advanced routing techniques and spreading the data collection over an extended period. Although we know little about how this special form of data collection technique may influence responses through panel effects, respondent fatigue, etc, the method of computer assisted interviewing has some features that clearly will improve data quality. These are the possibilities for routing and consistency checks during the interview as explained in Appendix 2.

In the empirical work, some of the problems associated with studying the effect of psychological variables on economic behaviour have been improved. Psychological theories usually concern individual behaviour. When studying “individual” economic behaviour, the appropriate level of analysis is often the household, since household members tend to make economic decisions and possess assets together. In this study, we developed weights reflecting the household members' decision influence. These weights were used to calculate household measures in households containing couples. This is assumed to be better than a reliance on the answers from one of the spouses or to use the average of responses from spouses, because the distribution of decision influence between spouses is likely to vary from one household to another.

This study has used several different saving measures. This has revealed the importance of analysing asset components and different types of saving separately. The findings show that different saving types (for example, stock measures versus flow measures, debt versus financial wealth) may require different models to be explained and predicted adequately. For example, repayment of loans is determined by factors other than discretionary saving. If the study had focussed on total saving and total wealth in isolation, wrong conclusions about the relationships between psychological variables and saving would have been drawn.



The effect of the psychological variables was tested both on the full sample, as well as on sub-groups of the sample that differed with respect to income level. The findings show that some of the psychological variables may be more important for saving behaviour in one income group than in another. Therefore, it is important to ensure (i) that all income levels are represented in the sample when investigating the relationship between psychological variables and saving behaviour and (ii) that different income groups are analysed separately.

### Weaknesses

The empirical study has not covered all the theories found to be of potential importance for saving behaviour in the literature review. For example, the theories concerning dynamic inconsistent behaviour, in which conflicts between short-term and long-term preferences are central, are found worthy of consideration. In this study, variables that may represent this phenomenon have not been included. The time preference variables may have captured, to a limited extent, the intensity of a household's wish to spend money, but strategies for controlling urges to spend have not been incorporated in the model. The reason for this stems from the problems with measuring self-control. The data set contains data about the extent to which a household tries to limit spending through the use of certain strategies. The problem is that we do not know whether a failure to use the strategies is due to a lack of self-control or is due to an ability to control spending by internal will power that renders the self-controlling strategies are superfluous. In addition, the questionnaire's list of possible self-controlling techniques is not complete. The variable "self-control" was therefore not included in the analyses. For this reason, there is a chance of an "omitted variable bias" in the results. This may also explain why we did not find the expected relationships between time preference and the dependent variables. This relationship may be moderated by the use of self-control or will-power.

Despite the efforts made to get good estimates of all variables, problems with measurement still seem to threaten the validity of the results. Little of the variation of the flow measures is explained by the variables included in the regression analyses. This may be an indication of considerable noise in the data. In particular, a stronger association between income and discretionary saving was expected. The measurement of the independent variables should also be improved. Tests show that the factor structures of saving attitudes and personality are not robust across the different waves of data collection. More work should be put into improving these indexes.

As concluded in Chapter 5 and Appendix 1, the sample used is not representative of the Dutch population. Only a part of the full sample was eventually used in the analyses and this limits the generalizability of the results. Attrition between the two waves of data collection was responsible for a large drop in the sample size. Nonresponse with respect to parts of the questionnaire also caused a reduction of the sample. Finally, because some influential observations were excluded from the analyses, this means that the reported results only may be used to say something about the larger bulk of cases, and not, for example, about "the rich", "the very poor" or the "lottery-millionaires". As it might be the saving of these "influential observations", which in this case are households with much larger wealth and saving than most people, that constitute a large part of aggregate saving, the results presented here cannot be used for predicting aggregate wealth or saving. Rather, it is the sign of the coefficients as well as their relative influence on the dependent variables that should be interpreted and used in further research.

More sophisticated statistical analyses could have improved the empirical part of the study. Particularly in respect to the debt and mortgage data, data analyses that can account for the censoring present in these data might have improved the validity of the study. Better methods for dealing with influential observations also exist, and the validity of the results may improve with the use of such methods.

With the exception of the personality variables, the reported findings do not increase our knowledge about causes of saving; rather we know more about which variables are likely to have a positive or negative association with the saving variables. Regression analyses are merely correlational and firm statements cannot be made about the direction of causation. As was suggested when reporting the results in Chapter 7, some of the findings are hard to explain without reversing the direction of causality assumed when proposing the hypotheses. It is necessary to test the psychological variables in dynamic models in order to assess whether, for example, the time horizon changes when it becomes more pleasant to think about the future, or whether attitudes towards saving change with wealth. We should also test whether a hierarchical model of saving motives should be used, as the precautionary motive seems to be more important among the relatively poor while the investment motive is more important among the rich. Only when the question of causality is resolved, it is possible to give good and credible advice about how to influence saving.

## 8.4 IMPLICATIONS

### Practical implications

One important issue concerning saving is whether there are ways to stimulate saving at the macro level. The results from this study show that debt attitude and time horizon are particularly important variables with respect to explaining differences in saving and borrowing behaviour. These may be influenced through educational training. For example, Bernheim et al. (2001) found that participation in courses about personal economics and budgeting has an effect on levels of wealth. They found that people having been subject to such educational programs save more than people not having been exposed to them. Education about the risk and costs of various types of debt, may influence the attitudes towards debt which in turn may influence both saving and borrowing behaviour. Lusardi (2000) reported that “thinking about retirement” was an important predictor for wealth levels of people nearing their retirement. This means that measures that make people start thinking about retirement and thereby stretching their time horizon, may have a positive effect on saving. Finally, the findings concerning how delay of gratification behaviour can be changed by exposure to models (Bandura & Mischel, 1965), also indicate that saving can be influenced through education.

Distinguishing between people who are savers and people who are not and between different types of savers, is important for policy makers who are interested in predicting saving in general as well as predicting responses to policy measures within segments of the population. The psychological variables increase our understanding of the decision processes underlying saving decisions, and this knowledge may be used to improve our predictions about how people will react to stimuli. For example, it seems like the strength of different saving motives varies between income groups and wealth classes, and this may influence people's reaction to changes in their economic environment. The effect of differences in time horizons on saving, should be taken into account, when discussing whether retirement saving should be

compulsory or not. The households with a long time horizon may succeed in saving adequately for their retirement and may benefit from a higher return on their savings that what is usually offered through compulsory arrangements. The households with a short time horizon, on the other hand, may not achieve to save enough for maintaining their standard of living after retirement, and may live their last years in poverty.

The results also confirm the usefulness of segmenting the population for financial institutions. They are interested in tailoring their products and marketing campaigns so that they will reach the most profitable costumers. Research has shown that households with different wealth levels are likely to require different financial products. People with more wealth, tend to have longer time horizons and think that earning interest is important. They may prefer products with high interest and may accept some risk. People with short time horizons and problems with sticking to their saving plans, may appreciate products that force them to save or that do not allow them to withdraw money they have already saved. The psychological variables are important criteria for the segmentation of financial markets. In addition, knowledge about a particular segment's motives, attitudes and preferences may give insights about how to design good marketing campaigns.

The results from this study may also be of importance for marketers who want to make people spend more on their products. For example, the motive for precautionary saving may be weakened by credit limits or different types of insurance. People with strong debt aversion, may react positively towards products that are combined with a saving plan. For example, travel agents can offer saving schemes that will help people to save up for a specific holiday. People less debt averse, on the other hand, may be responding positively towards the possibility of going on holiday before paying. Acknowledging that people do not only make a purchase decision, but also take their saving plans into consideration, can generate ideas about how to combine product offers with financial services in order to maximise sales.

#### Implications for research

The reported results have implications for future research on household saving behaviour. These will be discussed below.

Our findings challenge some of the assumptions used in economic models of saving. For example, the results cast doubt on the importance of time preference in saving behaviour. Consistent with previous studies, we did not find strong support for the importance of this variable for saving. Before a conclusion can be reached, we need to replicate the study with better measures of time preference. The interaction between self-control and will power should also be further explored. Moreover, the common practice of assuming a constant rate of time preference is also questionable. The data show large individual variation in the discount rates used by the respondents when answering the time preference questions. In addition, the patterns in the data suggest that the framing of the intertemporal decisions in terms of present gains or losses influences the results. This means that it is inadequate to assume that the rate of time preference is a constant, equal for all individuals and equal in all situations. Situational factors seem to determine the size of the discount rate. More research is necessary in order to establish whether also personality traits influence rates of time preference, as proposed by Fisher (1930). The correlation coefficients presented in Table 7.7, suggest that they do.

One of the most robust predictors of wealth and saving in this study is the time horizon. Two issues are important to consider here. Firstly, many people respond that their time horizon is shorter than their expected remaining lifetime. Secondly, there are individual differences in how far into the future people think and plan. This means that the LCH is based on assumptions that do not hold. Because people do not plan until their expected time of death, but has much shorter time horizons, they are likely to react more strongly to income changes than what the LCH predicts. The reaction to income changes is likely to vary with the length of the time horizon. The model should be changed in this respect.

Previous research on saving motives has identified the most frequently mentioned motives. Based on these results, the precautionary motive has been regarded as the most important saving motive, while bequest and the profit-making motive have been regarded as less important. This study has shown that it is not the most frequently mentioned motives that are the best predictors of wealth levels. Instead, it is the saving motives that are mentioned by a smaller part of the samples, such as the bequest motive and the profit-seeking motive, that are the best predictors of individual differences in wealth and saving.

The presented findings suggest that it is useful to take the heterogeneity of savers into account in studies of saving and financial behaviour. Carroll et al (1998), Gunnarsson (1999) Weil (1991) and Wärneryd (1999) have advocated segmenting the population into groups based on wealth classes, forward-looking behaviour, country of origin, financial strategies, saving motives and age. They all point to the likely condition that different saving models might be necessary for different segments of the population. This study divided the sample into groups based on disposable income divided by the number of household members that are supposed to live on that income. Analysing these groups separately, we found that different variables were important for the saving behaviour of the three groups respectively. Further research is needed in order to establish which criteria are the most useful ones. This study has shown that discretionary income may be one important criterion, but there may be better or additional criteria such as wealth-class, house-owner or renters, rural or urban and so on.

This study has used a new approach to overcome the problem of level of analysis in studies of the impact of psychological variables on economic behaviour. The individual responses from spouses have been aggregated to the household level by using decision influence weights. Pahl (1989) has demonstrated that it is highly unlikely that decision influence is distributed in the same way across all households. The use of decision weights for each household seems therefore to be sensible. Although Burgoyne (1990) reports that income may be a useful indicator of influence in economic affairs, more research on how to develop good indicators of decision influence within the household is required.

It may be necessary to use longer periods than one year to study effects of psychological variables on saving. The disappointing results with regards to the flow variables may be attributed to the period involved in the study being too short. In a study of repetitiousness of consumer behaviour, Katona (1975) reported that the most frequent behavioural pattern was to dissave every third or fourth year in sequences such as SSDSSD (where the S and D denote yearly saving or dissaving respectively). Using a time span of one year might therefore capture only a part of this cyclic behaviour where the full effect of differences in psychological variables are not likely to be fully visible. One problem with using a longer time span is that panel attrition will reduce the number of households available for analyses; another is that the noise in the savings data may increase.

Within economic psychology, an integrated model of saving that incorporates psychological and economic variables and any possible interaction between them has not yet been proposed. This study has shown that it is premature to propose such a model, because the empirical foundation is still weak. We have also pointed towards methodological challenges that have to be solved in order to produce the necessary reliable and valid results. These challenges comprise better measurement of psychological and economic variables and realistic methods for aggregating individual data to the household level. The results of the literature review and the empirical study have identified some psychological variables that contribute towards improving predictions of wealth and saving. We have also identified variables that are likely to have an effect of saving, in spite of not being found important in this study. Better measurement of these variables may alter these results.

Future economic psychological research on saving behaviour should study the links between psychological variables and saving behaviour more systematically than has been commonly the case so far. It is particularly important that we are clear about what kind of saving that is subject to study, so that it is possible to compare the results with outcomes of other studies. It is also important to be clear about which psychological concept is subject to investigation. Only in this way we will acquire enough knowledge to build an economic-psychological model of saving. It is also important to analyse different saving and asset components separately, and to test if the results found when analysing representative samples can also be found within segments of the population. It might be the case that no single model can explain all types of saving behaviour, and that we, in reality, need to develop many models in order to capture this complex behaviour appropriately.



## REFERENCES

- Aaron, H.J. (1999). *Behavioral Dimensions of Retirement Economics*. Washington D.C.: The Brookings Institution.
- Abdul-Muhmmim, A. G., Nyhus E.K., & Rönqvist, M. (1993). What is the residual: Saving or consumption? In S.V. Malakhov (Ed.), *The 18<sup>th</sup> International Association for Research in Economic Psychology Annual Colloquium, Economic psychology & behavioral economics* (pp. 287-296). Moscow: Academy of National Economy.
- Ainslie, G. (1975). Specious reward: A behavioral theory of impulsiveness and impulse control. *Psychological Bulletin*, 82, 463 – 496.
- Ainslie, G. (1992). *Picoeconomics. The strategic interaction of successive motivational states within the person*. New York: Cambridge University Press.
- Ainslie, G. (1993). *Picoeconomics. A bargaining model of the will and its lapses*. Paper presented at the Marcus Wallenberg Symposium, Will and Economic Behavior, Stockholm School of Economics, Stockholm, Sweden.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Alessie, R. J. M., & Kapteyn, A. (1991). Habit formation, interdependent preferences and demographic effects in the almost ideal demand system. *The Economic Journal*, 101, 404 – 419.
- Alessie, R.J.M., Camphuis, H., & A. Kapteyn (1990). *Een simulatiemodel ter berekening van het sociale risico: eindverslag*, Tilburg: Economisch Instituut Tilburg.
- Alessie, R.J.M., Hochguertel, S., & van Soest, A. (2002). Household portfolios in the Netherlands (pp 340-388). In M.Haliassos, L. Jappelli & L. Guiso (Eds.), *Household portfolios*. Cambridge, MA: MIT Press.
- Alessie R.J.M., Kapteyn, A. & Melenberg, B. (1997). *Subjective poverty definitions and reference groups*. Unpublished manuscript, Tilburg, the Netherlands: CentER for Economic Research.
- Alessie, R.J.M., & Lusardi, A. (1997). Saving and income smoothing: Evidence from panel data. *European Economic Review*. 41, 1251-1279.
- Alessie, R., Lusardi, A., & Aldershof, T. (1997). Income and wealth over the life-cycle: Evidence from panel data. *Review of Income and Wealth*, 43, 1-31.
- Alessie, R.J.M., Lusardi, A., & Kapteyn, A. (1995). Saving and wealth holdings of the elderly. *Ricerche Economiche*, 49, 293 – 315.
- Alessie, R.J.M., Lusardi, A., & Kapteyn, A. (1999). *Saving after retirement: Evidence based on three different measures*. *Labour Economics*, 6, 277-310.
- Ando, A., Guiso, L. Terlizzese, D., & Dorsainvil D. (1992). Saving among young households. Evidence from Japan and Italy. *Scandinavian Journal of Economics*, 94, 233-250.
- Antonides, G. (1988). *Scrapping a durable consumption good*. Unpublished doctoral dissertation. Erasmus University, Rotterdam, The Netherlands.
- Arbuckle, J. L. (1996). Full information estimation in the presence of incomplete data. In G.A. Marcoulides & R. E. Schumacker (Eds.), *Advanced equation modeling. Issues and techniques* (pp. 243-277). Mahwah, NJ: Lawrence Erlbaum.
- Arndt, J. (1976). Reflections on research in consumer behavior. In B.B. Anderson (Ed.), *Advances in consumer research Vol. 3* (pp. 213-221). Chicago: Association for Consumer Research.
- Arnould, E., Price, L., & Zinkhan, G. (2002). *Consumers*. Boston: McGrawhill.
- Attanasio, O. P. (1998). *Consumption demand*. (NBER Working paper No. 6466). Cambridge, MA: National Bureau of Economic Research.

- Attanasio, O. P., Banks, J., Meghir, C., & Weber, G. (1996). *Humps and bumps in lifetime consumption*. (NBER Working Paper No. 5350). Cambridge, MA: National Bureau of Economic Research.
- Attanasio, O. P. & Browning, M. (1993). *Consumption over the life cycle and over the business cycle* (VSB-CentER Savings Project Progress Report No. 6). Tilburg, The Netherlands: CentER for Economic Research.
- Ballinger, T.P., Palumbo, M.G., & Wilcox, N.T. (1998). *Precautionary saving in the laboratory*. Paper presented at the TMR conference "Saving, pensions and portfolio choice", CentER for Economic Research, Tilburg, The Netherlands.
- Bandura, A., & Mischel W. (1965). Modification of self-imposed delay of reward through exposure to live and symbolic models. *Journal of Personality and Social Psychology*, 2, 698 – 705.
- Banks, J., Blundell, R., & Brugiavini, A. (1995). Income uncertainty and consumption growth. IFS working paper (ifsewp: 95-13). London: Institute for Fiscal Studies.
- Barlow, R. H., Brazer, E., & Morgan, J.N. (1966). *Economic Behavior of the Affluent*. Washington D.C.: The Brookings Institution.
- Barro, R. J. (1974). Are government bonds net wealth? *Journal of Political Economy*, 81, 1095 – 1117.
- Baxter, J.L. (1988). *Social and Psychological Foundation of Economic Analysis*. New York: Harvester Wheatsheaf.
- Bearden, W. O., & Etzel, M.J. (1982). Reference group influence on product and brand purchase decisions. *Journal of Consumer Research*, 9, 183 –194.
- Benzion, U., Rapoport A., & Yagil, J. (1989). Discount rates inferred from decisions: An experimental study. *Management Science*, 35, 270 –284.
- Bernheim, B. D. (1986). Dissaving after retirement: Testing the pure life cycle hypothesis. In Z. Bodie, J. Shoven, & D. Wise (Eds), *Issues in Pension Economics* (pp.237-274), NBER - University of Chicago Press: Chicago.
- Bernheim, B.D. (1991). *The vanishing nest egg: Reflections of savings in America*. New York: Twentieth Century Fund/Priority Press.
- Bernheim, B.D. (1995). Do households appreciate their financial vulnerabilities? An analysis of actions, perceptions, and public policy. In *Tax Policy and Economic Growth* (pp. 1-30). Washington DC: American Council for Capital Formation.
- Bernheim, B.D., Garrett, D.M., & Maki, D.M. (2001). Education and saving: the long-term effects of high school financial curriculum mandates. *Journal of Public Economics*, 80, 435-465.
- Bernheim, B.D., Shleifer, A., & Summers, L.H. (1985). The strategic bequest motive. *Journal of Political Economy*, 93, 1045 – 1076.
- Bernheim, B.D., & Severinov, S. (in press). Bequests as signals: An explanation for the equal division puzzle. *Journal of Political Economy*.
- Berthoud, R., & Kempson, E. (1992). *Credit and debt: The PSI report*. London: Policy Studies Institute.
- Bloem, J. G., & Groenland, E. A. G. (1995). The prototypicality of the saving concept for consumers. In G. Antonides, & W.F.van Raaij (Eds.), *Integrating views on economic behaviour. Proceedings of the IAREP/SABE conference in Rotterdam* (pp. 30-43). Rotterdam, the Netherlands: Erasmus University.
- Brady, D. S., & Friedman, R.D. (1947). Savings and the income distribution. *Studies in Income and Wealth*, 10, 247-265.



- Brandstätter, H. (1988). Sechzehn Persönlichkeits-Adjektivskalen (16PA) als Forschungsinstrument anstelle des 16PF [Sixteen personality adjective scales as a substitute of the 16PF]. *Zeitschrift für Experimentelle und Angewandte Psychologie*, 13, 53 – 63.
- Brandstätter, H. (1996). *Saving, income and emotional climate of households related to personality structure* (VSB-CentER Savings Project Progress Report No. 38). Tilburg, The Netherlands: CentER for Economic Research, Tilburg University.
- Brown, T.M. (1952). Habit persistence and lags in consumer behaviour. *Econometrica*, 20, 355 – 371.
- Browning, M., & Lusardi, A. (1996). Household savings: Micro theories and micro facts. *Journal of Economic Literature*, 34, 1797 – 1855.
- Burbridge, J.B., & Robb, A.L. (1985). Evidence of wealth-age profiles in Canadian cross-section data. *Canadian Journal of Economics*, 18, 854-875.
- Burgoyne, C. (1990). Money in marriage: How patterns of control both reflect and conceal power. *The Sociological Review*, 38, 634-665.
- Burgoyne, C. (1998). *Financial organisation in marriage*. Paper presented at the IAREP Workshop 'Implications of new knowledge about household economic decision making for economic theories and empirical research', CentER for Economic Research, Tilburg University, The Netherlands.
- Burtless, G. (1999). An economic view of retirement. In H.J. Aaron (Ed), *Behavioral Dimensions of Retirement Economics* (pp 7-43). Washington D.C.: The Brookings Institution.
- Böhm-Bawerk, E. von. (1889/1959). *Capital and Interest*, South-Holland: IL: Libertarian Press.
- Börsch-Supan, A. (1992). Saving and consumption patterns of the elderly. The German case. *Journal of Population Economics*, 5, 289 –303.
- Börsch-Supan, A., & Stahl, S. (1991). Life cycle saving and consumption constraints. Theory, empirical evidence and fiscal implications. *Journal of Population Economics*, 4, 233-255.
- Camphuis, H., & M. Ketelaars (1995). *Variable Documentation VSB panel 1993*, CentER, Tilburg University, The Netherlands.
- Canner, G.B., & Luckett, C.A. (1991). Payment of household debts, *Federal Reserve Bulletin*, 77, 218-229.
- Caplovitz, D. (1963). *The poor pay more: consumer practices of low-income families*. New York: Free Press of Glencoe.
- Carroll, Ch.D. (1994). How does future income affect current consumption? *Quarterly Journal of Economics*, 109, 111-147.
- Carroll, Ch. D. (1997). Buffer-stock saving and the life cycle/permanent income hypothesis. *Quarterly Journal of Economics*, 112, 1-56.
- Carroll, Ch. D. (1998). *Why do the rich save so much?* (NBER Working Paper No. 6568). Cambridge, MA: National Bureau of Economic Research.
- Carroll CH. D. & Fuhrer, J.C., & Wilcox, D.W. (1994). Does consumer sentiment forecast household spending? If so, why? *American Economic Review*, 84, 1397 – 1408.
- Carroll, Ch.D., Rhee, B.-K., & Rhee C. (1999). Does cultural origin affect saving behavior? Evidence from immigrants. *Economic development and cultural change*, 48, 33-50.
- Carroll, Ch. D., & Samwick, A.A. (1995). *How important is precautionary saving?* (NBER Working Paper No. 5194). Cambridge, Mass.: National Bureau of Economic Research.
- Carroll, Ch. D., & Samwick, A.A. (1997). The nature of precautionary wealth. *Journal of Monetary Economics*, 40, 41-71.

- Carroll, Ch.D., & Summers, L.H. (1991). Consumption growth parallels income growth: some new evidence. In B.D. Bernheim, & J.B. Shoven (Eds.), *National Saving and Economic Performance* (pp 305 - 343), Chicago University Press for NBER, Chicago.
- Cattell, R.B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, 1, 245-276.
- Chao, A., & Schor, J.B. (1998). Empirical tests of status consumption: Evidence from women's cosmetics. *Journal of Economic Psychology*, 19, 1 - 30.
- Coleman, R. P. (1983). The continuing significance of social class to marketing. *Journal of Consumer Research*, 10, 265 - 280.
- Cole, H.L., Mailath, G.J., & Postelwaite, A. (1992). Social norms, saving behavior, and growth. *Journal of Political Economy*, 100, 1092-1125.
- Courant, P., Gramlich, E.M., & Laitner, J.M. (1986). A dynamic microeconomic estimate of the life-cycle model. In H.J. Aaron & G. Burtless (Eds.), *Retirement and economic behavior. Studies in social economics*. The Brookings Institution, Washington D.C.
- Crosby, F. (1976). A model of egoistic relative deprivation. *Psychological Review*, 83, 85 - 113.
- Dahlbäck, O. (1991). Saving and risk taking. *Journal of Economic Psychology*, 12, 479 - 500.
- Daniel, T. R. (1994). Time preference and saving: An analysis of panel data (VSB-CenterER Savings Project Progress Report No. 2). Tilburg, The Netherlands: Tilburg University, CenterER for Economic Research.
- Daniel, T. R. (1997). The economic psychology of saving: the role of individual differences associated with intertemporal choice. *The proceedings of the 22th IAREP colloquium* (pp. 127-155). Valencia: PROMOLIBRO. University of Valencia.
- Dardanoni, V. (1991). Precautionary saving under income uncertainty: A cross-sectional analysis. *Applied Econometrics*, 23, 153 - 160.
- Das, M. (1998). *On income expectations and other subjective data: A micro-econometric analysis*. Unpublished doctoral dissertation. Tilburg University, Tilburg, The Netherlands.
- Das, M., Dominitz, J., & van Soest, A. (1999). Comparing predictions and outcomes: Theory and application to income changes. *Journal of the American Statistical Association*, 94, 75-85.
- Das, M., & Donkers, B. (1999). How certain are Dutch households about future income? An empirical analysis. *Review of Income and Wealth*, 45, 325-38.
- Das, M., & van Soest, A. (1997). Expected and realised income changes: Evidence from the Dutch Socio-Economic Panel. *Journal of Economic Behavior and Organization*, 32, 137-154.
- Davies, J. B., (1981). Uncertain Lifetimes, Consumption and Dissaving in Retirement. *Journal of Political Economy*, 89, 561 - 578.
- Davies, E., & Lea, S. E.G. (1995). Student attitudes to student debt. *Journal of Economic Psychology*, 16, 663 - 679.
- Deaton, A. S. (1992). *Understanding Consumption*, Oxford: Clarendon Press.
- Dessart, W., & Kuylen, A. (1986). The nature, extent, causes and consequences of problematic debt. *Journal of Consumer Policy*, 9, 311-334.
- Diamond, P., & Hausman, J. (1984). Individual retirement and saving behavior. *Journal of Public Economics*, 23, 81 - 114.
- Digman, J.M. (1990). Personality structure: Emergence of the Five-Factor model. *Annual Review of Psychology*, 41, 417 - 440.
- Disney, R. (1996). Ageing and saving. *Fiscal Studies*, 17, 83-101.

- Dominitz, J. (2001). Estimation of income expectations models using expectations and realization data. *Journal of Econometrics*, 102, 165- 195.
- Dominitz, J., & Manski, J.D. (1997). Using Expectations Data to Study Subjective Income Expectations. *Journal of the American Statistical Association*, 92, 855-867.
- Donkers B., & van Soest, A. (1999). Subjective measures of household preferences and financial decisions. *Journal of Economic Psychology*, 20, 613-642.
- Douglas, M., & Isherwood, B. (1996). *The world of goods. Towards an anthropology of consumption*. London: Routledge.
- Duesenberry, J. S. (1949). *Income, saving and the theory of consumer behavior*. Cambridge, MA: Harvard University Press.
- Dynan, K. E. (1993). How prudent are consumers? *Journal of Political Economy*, 101, 1104 - 1113.
- Dynan, K.E., Skinner, J. S., & Zeldes, S.P. (2000). *Do the rich save more?* (NBER Working Paper No. 7906). Cambridge, MA: National Bureau of Economic Research.
- Elster, J. (1979). *Ulysses and the sirens. Studies in rationality and irrationality*. New York: Cambridge University Press.
- Engel, J. F., Blackwell, R.D., & Miniard, P.W. (1993). *Consumer Behavior*, New York: Dryden.
- Faber, R.J., & O'Guinn, T.C. (1988). Compulsive consumption and credit abuse. *Journal of Consumer Policy*, 11, 109-21.
- Ferber, R. (1966). *The reliability of consumer reports of financial assets and debts* (Studies in Consumer Savings, No. 6). Bureau of Economic and Business Research, University of Illinois, Urbana.
- Ferber, R. A. (1973). Family decision making and economic behavior. In E.B. Sheldon (Ed.), *Family Economic Behavior: Problems and Prospects*. Philadelphia PA: Lippincott.
- Festinger, L. (1954). A theory of social comparisons processes. *Human Relations*, 7, 117-140.
- Fishburn P.C., & Rubinstein, A. (1982). Time preference. *International Economic Review*, 23, 677 – 694.
- Fisher, I. (1930). *The theory of interest as determined by impatience to spend income and opportunity to invest it*. New York: The Macmillan Company.
- Flavin, M. (1991). *The joint consumption/asset demand decisions: A case study in robust estimation* (NBER Working Paper No.w3802). Cambridge, MA: National Bureau of Economic Research.
- Franklin, B. (1834/1993). *Veien til rikdom* [The way to wealth]. Oslo: Ex Libris.
- Friedman, M. (1953). *Essays in positive economics*. Chicago IL: University of Chicago Press.
- Friedman, M. (1957). *A theory of the consumption function*. Princeton NJ: Princeton University Press.
- Furnham, A. (1985). Why do people save? Attitudes to, and habits of, saving money in Britain. *Journal of Applied Psychology*, 15, 354-373.
- Furnham, A., & Lewis, A. (1986). *The economic mind: the social psychology of economic behaviour*. Brighton: Wheatsheaf Books.
- Futagami, K., & Shibata, A. (1998). Keeping one step ahead of the Joneses: Status, the distribution of wealth, and long run growth. *Journal of Economic Behavior & Organization*, 36, 109 -126.
- Galenson, M. (1972). Do blacks save more? *The American Economic Review*, 62, 211-216.
- Gately, D. (1980). Individual discount rates and the purchase and utilization of energy-using durables: Comment. *The Bell Journal of Economics*, 11, 373 – 374.
- Gaertner, W. (1974). A dynamic model of interdependent consumer behaviour. *Zeitschrift für Nationalökonomie*, 34, 327 – 344.

- Gentry, W.M. & Hubbard, R.G. (1998). *Why do the wealthy save so much? Saving and investment decisions of entrepreneurs* (NBER Working Paper No. 1708). Cambridge, MA: National Bureau of Economic Research.
- Gini, C., & Galvini, L. (1929). *Annali di Statistica*, Ser.VI, Vol. IV. p. 1
- Gianotten, H.J., & van Raaij, W.F. (1982). *Consumer credit and saving as a function of income and confidence* (Papers on Economic Psychology, No. 17). Rotterdam: Erasmus University.
- Gourinchas, P.-O. & Parker, J. (1999). *Consumption over the lifecycle* (NBER Working Paper No. 7271). Cambridge, MA: National Bureau of Economic Research.
- Gredal, K. (1966). Purchasing behaviour in households. In M. Kjaer-Hansen (Ed.), *Readings in Danish Theory of Marketing* (pp. 84-100) Copenhagen: Einar Harcks Forlag.
- Groenland, E., & Nyhus, E. K. (1994). Determinants of time preference, saving and economic behaviour. A comparison between Norway and The Netherlands. In Antonides, G. and van Raaij, W. F. (Eds.), *Integrating views on economic behaviour. Proceedings of the IAREP/SABE conference in Rotterdam* (pp. 357-378). Rotterdam: Erasmus University.
- Grondil, C., & Michaud, S. (1994). Data quality of Income Data Using Computer Assisted Interviewing: the Experience of the Canadian Survey of Labour and Income Dynamics. In *Proceedings of the Section of Survey Research Methods, American Statistical Association* (pp 839-44).
- Grønhaug, K., Kleppe, I.A., & Haukedal, W. (1987). Observation of a strategic household purchase decision. *Psychology and Marketing*, 4, 243 - 257.
- Guiso L., Jappelli, T., & Terlizzese, D. (1992a). Earnings uncertainty and precautionary saving. *Journal of Monetary Economics*, 30, 307-337.
- Guiso L., Jappelli, T., & Terlizzese, D. (1992b). Saving and capital market imperfections: The Italian experience. *Scandinavian Journal of Economics*, 94, 197 – 213.
- Gunnarsson, J. (1999). *Portfoliobased segmentation and consumer behavior. Empirical evidence and methodological issues*. Unpublished doctoral dissertation, The Economic Research Institute, Stockholm School of Economics, Stockholm, Sweden.
- Hair, J.F., Anderson, R.E., Tatham, R.L., & Black, W.C. (1995). *Multivariate data analysis: with readings (4<sup>th</sup> edition)*. New York: Prentice Hall
- Hausman, J. A. (1979). Individual discount rates and the purchase and utilization of energy-using durables. *The Bell Journal of Economics*, 10, 33 – 54.
- Heath, T. B., Chatterjee, S., & France, K.R. (1995). Mental accounting and changes in price: The frame dependence of reference dependence. *Journal of Consumer Research*, 22, 90 – 97.
- Heath, T. B., & Soll, J.B. (1996). Mental accounting and consumer decisions. *Journal of Consumer Research*, 23, 40 - 52.
- Hendriks, A.A.J., Hofstee, W.K.B., de Raad B., & Angeleitner, A. (1999). The Five-Factor Personality Inventory (FFPI). *Personality and individual differences*, 27, 307-325.
- Hoch S. J., & Loewenstein, G.F. (1991). Time-inconsistent preferences and consumer self-control. *Journal of Consumer Research*, 17, 492 – 507.
- Hochguertel, S., Alessie, R., & van Soest, A. (1997). Household portfolio allocation in the Netherlands: Saving accounts versus stocks and bonds. *Scandinavian Journal of Economics*, 99, 81-97.
- Hochguertel, S., & Ohlsson, H. (2000). *Compensatory inter vivos gifts*. (Working papers in economics No. 31). Göteborg, Sweden: Department of Economics, Göteborg University.
- Houston, D. A. (1983). Implicit discount rates and the purchase of untried, energy-saving durable goods. *Journal of Consumer Research*. 10, 236 – 246.

- Hubbard, R. G., Skinner, J., & Zeldes, S.P. (1995). Precautionary saving and social insurance. *Journal of Political Economy*, 103, 360–399.
- Hurd, M. D. (1987). Saving of the elderly and desired bequests. *American Economic Review*, 77, 298-312.
- Hurd, M. D. (1990). Research on the elderly: Economic status, retirement, and consumption and saving. *Journal of Economic Literature*, 28, 565-637.
- Hurd, M.D., & Smith, J.P. (1999). Anticipated and accidental bequest. (NBER Working Paper No. 7380). Cambridge, MA: National Bureau of Economic Research.
- Hyman, H. (1942). The psychology of status. *Archives of Psychology*, No 269, New York.
- Hymans, S. H. (1970). *Consumer durable spending* (Brookings Papers on Economic Activity). Washington: Brookings.
- Johnson, S., Kotlikoff, L.J., & Samuelson, W. (1987). *Can people compute? An experimental test of the life cycle consumption model* (NBER Working Paper No. 2183). Cambridge, MA: National Bureau of Economic Research.
- Julander, C.-R. (1975). *Sparande och effekter av ökad kunskap om inkomstens användning* [Saving behaviour and the effects of increased knowledge of income use]. Unpublished doctoral dissertation, The Stockholm School of Economics: Stockholm, Sweden.
- Juster, F.T. (1981). An expectational view of consumer spending prospects. *Journal of Economic Psychology*, 1, 87 - 103
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk, *Econometrica*, 47, 363–391.
- Karlsson, N., Gärling, T., & Selart, M. (1997). Explanations of effects of prior outcomes on intertemporal choices. In N. Karlsson, *Influences of prior outcomes on intertemporal choices*. Unpublished licentiate thesis. Department of Psychology, Göteborg University, Sweden.
- Kapteyn, A. (1977). A theory of preference formation. *Unpublished doctoral dissertation*, Leyden University, Leyden, The Netherlands.
- Kapteyn, A. (2000). Saving and reference groups. Mimeo. Tilburg University.
- Kapteyn, A., Geer, S. v.d., Stadt, H.v.d., & Wansbeek, T. (1997). Interdependent preferences: An econometric analyses. *Journal of Applied Econometrics*, 12, 665–686.
- Kapteyn, A. & Van Herwaarden, F.G. (1980). Interdependent welfare functions and optimal income distribution. *Journal of Public Economics*, 14, 375–397.
- Katona, G. (1975). *Psychological Economics*. New York: Elsevier.
- Kelley, H.H. (1952). The two functions of reference groups. In G.E. Swanson, T.M. Newcomb & E.L. Hartley (Eds.), *Readings in social psychology* (pp.410-114). New York: Holt.
- Kennickell, A.B. & McManus, D.A. (1993). *Sampling for household financial characteristics using frame information on past income*. Paper presented at the 1993 Joint Statistical Meetings, Atlanta, GA.
- Keynes, J. M. (1936). *The General Theory of Employment Interest and Money*. London: Macmillan Press Ltd.
- Kimball, M.S. (1990). Precautionary saving in the small and in the large. *Econometrica*, 58, 53-73.
- King, M. (1985). The economics of saving. A survey of recent contributions. In K.J. Arrow & S. Honkapohja (Eds.), *Frontiers in Economics*, New York: Basil Blackwell Ltd.
- Kish, L. (1965). *Survey Sampling*. Wiley & Sons: New York.
- Knetsch, J. L. (1997). *A reinterpretation of time preference findings: some implications and evidence*. Paper presented at the TMR/Savings Workshop, CentER for Economic Research, Tilburg University, The Netherlands.
- Koopmans, T. (1960). Stationary ordinal utility and impatience. *Econometrica*, 28, 287 - 309.

- Kotlikoff, L. J. (1988). Intergenerational transfers and savings. *Journal of Economic Perspectives*, 2, 41-58.
- Kotlikoff, L. J. (1989). *What determines savings?* The MIT Press, Cambridge, London.
- Kotlikoff, L.J. & Auerbach, A.J. (1991). *Life insurance inadequacy. Evidence from sample of older Widows* (NBER Working Paper No. 3765). Cambridge, MA: National Bureau of Economic Research.
- Kotlikoff, L. J. & Spivak, A. (1981). The family as an incomplete annuities market. *Journal of Political Economy*, 89, 372 – 391.
- Kotlikoff, L. J., Shoven, J., & Spivak, A. (1989). Annuity Insurance, Savings, and Inequality. |In L.J. Kotlikoff (Ed.), *What determines savings?*(pp. 109-140). The MIT Press, Cambridge, London.
- Kotlikoff, L. J. & Summers, L.H. (1981). The role of intergenerational transfers in aggregate capital accumulation. *Journal of Political Economy*, 89, 706 – 32.
- Köhler, J. (1996). *Making saving easy: An experimental analysis of savings decision*. Paper presented at the TMR/Saving workshop, Tilburg University, Tilburg, The Netherlands.
- Lancaster, K. (1963). An axiomatic theory of consumer time preference. *International Economic Review*, 4, 221- 231.
- Landsberger, M. (1971). Consumer Discount Rate and the Horizon: New Evidence. *Journal of Political Economics*, 79, 1346 – 1359.
- Lansing, J.B.(1954). Concepts used in survey. In G. Katona, L.R. Klein, J.B. Lansing, & J.N. Morgan (Eds), *Contributions of survey methods to economics* (pp. 9-48). New York: Columbia University Press.
- Lawrance, E. C. (1991). Poverty and the rate of time preference: Evidence from panel data. *Journal of Political Economy*, 99, 54 – 77.
- Lea, S.E.G. (1998). *Credit, debt and problem debt*. In P. Earle, & S. Kemp (Eds.), *The Elgar companion to consumer research and economic psychology* (pp. 139-144). Cheltenham: Edward Elgar.
- Lea, S.E.G., Webley, P. & Levine, R. M. (1993). The economic psychology of consumer debt. *Journal of Economic Psychology*, 14, 85-119.
- Lea, S.E.G., Webley, P., & Walker, C.M. (1995). Psychological factors in consumer debt: money management, time horizons and consumer behaviour. *Journal of Economic Psychology*, 16, 681-701.
- Lepkowski, J.M. (1988). Telephone Sampling Methods in the United States. In R.M Groves, P.P. Biemer, L.E. Lyberg, J.T. Massey, W.L. Nicholls II, J. Waksberg (Eds.), *Telephone Survey Methodology*, John Wiley & Sons, New York.
- Levin, L. (1998). Are assets fungible? Testing the behavioral theory of life-cycle savings. *Journal of Economic Behavior & Organization*, 36, 59-83.
- Lewis, A., Webely, P., & Furnham, A. (1995). *The new economic mind: the social psychology of economic behaviour*. New York : Harvester Wheatsheaf.
- Lindqvist, A. (1980) *Hushållens sparande och sparbeteende. Utveckling av beteendevetenskapliga indikatorer på sparande* [Household saving and the saving behaviour of households. Development of subjective indicators on saving]. (Rapport nr. 3. Sparande och sparbeteende). Stockholm, Sweden: Handelshögskolan i Stockholm, Ekonomiska forskningsinstitutet.
- Lindqvist, A. (1981). *Hushållens sparande. Beteendevetenskapliga mätningar av hushållens sparbeteende* [The Saving Behaviour of Households. Subjective measures of households' saving behaviour]. Stockholm, Unpublished doctoral dissertation, The Stockholm School of Economics, Stockholm, Sweden.

- Lindqvist, A. (1983). *On the measurement of indebtedness in surveys: Validation of interview responses by mail interviews* (Research Paper 6263). Stockholm, Sweden: Economic Research Institute, The Stockholm School of Economics.
- Lindqvist, A., Julander, C.-R., & Fjæstad, B. (1978). *Utveckling av beteendevetenskapliga indikatorer på sparande*. [Development of subjective indicators of saving] (Rapport nr. 2. Sparande och sparbetende). Stockholm, Sweden: Handelshögskolan i Stockholm, Ekonomiska forskningsinstitutet.
- Little, R.J.A., & Rubin, D.B. (1987). *Statistical analyses with missing data*. New York: John Wiley and Sons.
- Livingstone, S. M., & Lunt, P. (1992). Predicting personal debt and debt repayment: Psychological, social and economic determinants. *Journal of Economic Psychology*, 13, 111-134.
- Loewenstein, G. F. (1987). Anticipation and the valuation of delayed consumption. *Economic Journal*, 97, 666-684.
- Loewenstein, G. F. (1988). Frames of mind in intertemporal choice. *Management Science*, 34, 200 - 214.
- Loewenstein, G. F. (1992). The fall and rise of psychological explanations in the economics of intertemporal choice. In G.F. Loewenstein, & J. Elster (Eds.), *Choice Over Time* (3-34). New York: Russell Sage Foundation.
- Loewenstein, G. (1996). Out of control: visceral influences on behavior. *Organizational Behavior and Human Decision Processes*, 65, 272-92.
- Loewenstein, G. F., & Prelec, D. (1991). Negative time preference. *American Economic Review, Papers and proceedings*, 81, 347 - 352.
- Loewenstein, G. F., & Sicherman, N. (1991). Do workers prefer increasing wage profiles? *Journal of Labor Economics*, 9, 67-85.
- Lunde, T. K., & Poppe, Ch. (1991). *Nyfattigdom i velferdsstaten. Gjeldsproblemer og betalingsvansker i levekårsperspektiv* [New poverty in the welfare state: debt problems and payment problems in the perspective of living conditions] (Rapport nr. 3-1991). Lysaker, Norway: Statens Institutt for Forbruksforskning.
- Lunt, P. K., & Livingstone, S. M. (1991). Psychological, social and economic determinants of saving: Comparing recurrent and total savings. *Journal of Economic Psychology*, 12, 621-631
- Lunt, P. K. & Livingstone, S.M. (1992). *Mass consumption and personal identity. A study of everyday economic experiences*. Ballmoor: Open University Press.
- Lusardi, A. (1993). *Precautionary saving and subjective earnings variance* (VSB- CentER savings project progress report No.16). Tilburg, The Netherlands: Tilburg University, CentER for Economic Research.
- Lusardi, A. (1998). On the importance of the precautionary saving motive. *AEA papers and proceedings*, 88, 449 - 453.
- Lusardi, A. (2000). *Explaining why so many households do not save*. Working paper. Dartmouth College.
- Lyck, L. (1992). *Considerations on saving concepts and behavior*. Paper presented at the workshop 'Economic Psychological Perspectives on Saving', CentER for Economic Research, Tilburg University, Tilburg, The Netherlands.
- Maital, S. (1982). *Minds, Markets and Money: Psychological Foundations of Economic Behavior*. New York: Basic Book.

- Maital, S. & Maital, S. (1977). Time preference, delay and gratification and the intergenerational transmission of economic inequality: A behavioral theory of income distribution. In O.C. Ashenfelter & W.E. Oates (Eds.), *Essays in Labor Market Analysis in Memory of Yochanan Peter Comay* (pp.179-199). New York: Wiley & Sons.
- Maital, S., & Maital, S. L. (1993). *Economics and Psychology*. Aldershot: Edward Elgar.
- Maital, S., & Maital, S.L. (1994). Is the future what it used to be? A behavioral theory of the decline of saving in the West. *Journal of Socio-Economics*, 23, 1 - 32.
- Martin, J. (1981). Relative deprivation: A theory of distributive injustice for an era of shrinking resources. *Research in Organizational Behavior*, 3, 53-107.
- Maynes, E.S. (1965). The anatomy of response errors: Consumer saving. *Journal of Marketing Research*, 2, 378-387.
- McLeod, P.B. & Ellis, J.R. (1983). Alternative approaches to the family life cycle in the analysis of housing consumption. *Journal of Marriage and the Family*, 45, 699 - 708.
- Mischel, W. (1958). Preference for delayed reinforcement: An experimental study of a cultural observation. *Journal of Abnormal Psychology*, 56, 57-61.
- Mischel, W. (1961). Father-absence and delay of gratification: Cross-cultural comparisons. *Journal of Abnormal and Social Psychology*. 63, 116 - 124.
- Mischel, W., & Ebbesen, E.B. (1970). Attention in delay of gratification. *Journal of Personality and Social Psychology*, 16, 329-337.
- Mischel, W., Shoda, Y., & Rodriguez, M.L. (1992). Delay of gratification in children. In G.Loewenstein & J.Elster (Eds.), *Choice over time* (pp.147-164). New York: Russell Sage Foundation.
- Modigliani, F. (1949). Fluctuations in the saving-income ratio: A problem in economic forecasting. *Studies in Income and Wealth*, 11, 371 - 438.
- Modigliani, F. (1975). The life cycle hypothesis of saving twenty years later. In M. Parkin (Ed.): *Contemporary Issues in Economics* (pp. 2-36). Manchester University Press.
- Modigliani, F. (1986). Life cycle, individual thrift and the wealth of nations. *American Economic Review*, 76, 297 - 313.
- Modigliani, F. (1988). The role of intergenerational transfer and life cycle saving in the accumulation of wealth. *Journal of Economic Perspectives*, 2, 15 - 40.
- Modigliani, F., & Brumberg, R. (1954). Utility analysis and the consumption Function: An interpretation of cross-section Data. (pp. 388 - 438). In K. K.Kurihara (Ed.), *Post - Keynesian Economics*, New Brunswick, NJ: Rutgers University Press,.
- Mueller, E. (1963). Ten years of consumer attitude surveys: Their forecasting record. *Journal of the American Statistical Association*, 58, 899 - 917.
- Muthen, B., Kaplan, D., & Hollis, M. (1987). On structural equation modeling with data that are not missing completely at random. *Psychometrica*, 52, 431-462.
- Neumark, D., & Postlewaite, A. (1998). Relative income concerns and the rise in married women's employment. *Journal of Public Economics*, 70, 157 - 183.
- Neyman, J. (1934). On the two different aspects of the representative method: The method of stratified sampling and the method of purposive selection. *Journal of the Royal Statistical Society*, A97, 558-606.
- Ng, Y.-K. (1992). Do individuals optimize in intertemporal consumption/savings decisions? A liberal method to encourage savings. *Journal of Economic Behavior and Organization*, 17, 101-114.
- Nyhus, E. K. (1996). *The VSB-CentER savings project: Data collection methods, questionnaires, and sampling procedures*. (VSB-CentER Savings Project Progress Report, No. 42). Tilburg, The Netherlands: Tilburg University, CentER for Economic Research.



- Nyhus, E. K. (1997). On the measurement of time preferences and subjective discount rates. (pp.1095 - 1111). *Proceedings of the XXII International Colloquium of Economic Psychology*, Valencia: University of Valencia.
- Nyhus, E.K. (1999). Determinants of subjective discount rates and indifference thresholds (TMR progress report on savings and pensions, No. 4). Tilburg, The Netherlands: Tilburg University, CentER for Economic Research.
- Nyhus, E.K., & Webley, P. (2001). The role of personality in household saving and borrowing behaviour, *European Journal of Personality*, 15, s85 - s103.
- Ölander, F., & Seipel, C.M. (1970). *Psychological approaches to saving*. (Studies in Consumer Savings, No. 7). Urbana IL: University of Illinois, The Bureau of Economic and Business Research.
- Olshavsky, R.W., & Granbois, D.H. (1979). Consumer decision making – fact or fiction? *Journal of Consumer Research*, 6, 93-100.
- Pahl, J. (1989). Money and marriage. London: Macmillan.
- Pahl, J. (1995). His money, her money: Recent research on financial organisation in marriage. *Journal of Economic Psychology*, 16, 361 - 376.
- Parker, G. (1988). Indebtedness. In R. Walker, & G. Parker, (Eds.), *Money Matters*. London: Sage.
- Pollak, R.A., (1976). Interdependent preferences. *The American Economic Review*, 66, 309-320.
- Poterba, J. M., Venti, S.F., & Wise, D.A. (1994). Targeted retirement saving and the net worth of elderly Americans. *American Economic Review*, 84/2, 180 - 185.
- Poterba, J. M., Venti, S.F., & Wise, D.A. (1995). The effects of special saving programs on saving and wealth (NBER Working Paper No. 5287). Cambridge, MA: National Bureau of Economic Research.
- Prelec D. & Loewenstein, G.F. (1998). The red and the black: Mental accounting of savings and debt. *Marketing Science*, 17, 4-28.
- Ritzema, J. (1992). *An extended behavioural life-cycle model*. Unpublished manuscript. Department of Economic Sociology and Economic Psychology, Erasmus University, Rotterdam, The Netherlands.
- Ritzema, H.J. & Homan, M.E. (1991). Schulden en bezittingen in Nederland. Determinanten van schuldbelasting bij Nederlandse huishoudens [Household liabilities and assets in the Netherlands. Determinants of the distribution of debt of Dutch households] (Onderzoeksrapporten, 109/1991). Rotterdam, the Netherlands: SWOKA.
- Rogers, E.M., & Shoemaker, F. F. (1971). *Communication of Innovations*. New York: The Free Press.
- Routh, D. A., & Burgoyne, C. B. (1991). *Money and the five-factor model of personality structure*. Paper presented at the IAREP/SAS conference, Stockholm, Sweden.
- Runciman, W.G. (1966). *Relative deprivation and social justice: A study of attitudes to social inequality in twentieth-century England*. London: Routledge and Kegan Paul.
- Samuelson, Paul A. (1937). A note on measurement of utility. *Review of Economic Studies*, 4, 155-161.
- Samwick, A. A. (1998). Discount rate heterogeneity and social security reform. *Journal of Development Economics*, 57, 117 - 147.
- Saris, W.E. (1991). *Computer-Assisted Interviewing*. (Quantitative Applications in the Social Sciences, 80), Newbury Park: Sage.
- Schelling, T. C. (1978). Egonomics or the art of self-management. *American Economic Review*, 68, 290-294.
- Schelling, T. C. (1984). Self-command in practice, in policy and in a theory of rational choice. *American Economic Review, Papers and proceedings*, 74, 1-11.

- Scherhorn, G. (1990). The addictive trait in buying behaviour: *Journal of Consumer Policy*, 13, 33-51.
- Scherhorn, G. & Fricke, D. (1961). Hängt die spartätigkeit vom einkommen ab? [Is the propensity to save related to income?]. *Blätter für Genossenschaftswesen (Bonn)*, 107, 277 - 283.
- Schmölders, G. (1966). *Psychologie des Geldes* [The psychology of money]. Hamburg, Germany: Rowohlt.
- Schmölders, G. (1969). *Der Umgang mit Geld in privaten Haushalt*. [Dealing with money in the private household.] Berlin, Germany: Duncker & Humblot.
- Schneewind, K.A., Schröder, G., & Cattell, R.B. (1983). *Der 16-Persönlichkeits-Factoren-Test*. [The 16-personality-factor-test]. Bern:Huber.
- Schor, J.B. (1998). *The overspent American*. New York: Basic Books
- Schumpeter, J.A. (1954). *History of Economic Analysis*. New York: Oxford University Press.
- Selart, M., Karlsson, N., & Garling, T. (1997). Self-control and loss aversion in intertemporal choice. *Journal of Socio-Economics*, 26, 513 - 524.
- Shafer, J. R., Elmeskov, J. & Tease, W. (1992). Saving Trends and Measurement Issues. *Scandinavian Journal of Economics*, 94, 155-157.
- Sharpio, H. T. (1972). The index of consumer sentiment and economic forecasting: A reappraisal. In B. Strumpel, J. N. Morgan, & E. Zahn (Eds), *Human behavior in economic affairs. Essays in honour of George Katona* (pp. 373 - 396). Amsterdam: North Holland.
- Shefrin, H. M., & Thaler, R.H. (1988). The behavioral life-cycle hypotheses. *Economic Inquiry*, 26, 609 -643.
- Shelley, M.K. (1993). Outcome signs, question frames, and discount rates. *Management Science*, 39, 806 - 815.
- Sikkel, D. (1988). *Quality aspects of statistical data collection*. Unpublished doctoral dissertation. University of Amsterdam, Amsterdam, The Netherlands.
- Simon, H. A. (1986). Preface. In B. Gilad & S. Kaish (Eds.), *Handbook of behavioral economics*, Vol. A (pp xv-xvi). JAI Press: Greenwich CT.
- Snijkers, G. J.M.E. (1992). Computer assisted interviewing: Telephone or personal? A literature study. In A. Westlade, R.Banks, C. Payne, & T. Orchard (Eds.): *Survey and Statistical Computing*. Amsterdam, The Netherlands: Elsevier.
- Solnick, S.J., & Hemenway, D. (1998). Is more always better? A survey on positional concerns. *Journal of Economic Behavior & Organization*, 37, 373-383.
- Souleles, N. S. (2001). *Consumer Sentiment: Its rationality and usefulness in forecasting expenditure - Evidence from the Michigan micro data* (NBER Working Paper No.8410). Cambridge, MA: National Bureau of Economic Research.
- Strotz, R. H. (1955-56). Myopia and Inconsistency in Dynamic Utility Maximization. *Review of Economic Studies*, 23, 163 - 180.
- Stouffer, S. A., Suchman E.A., Devinney, L.C., Star, S.A., & Williams, R.M. (1949). *The American soldier: Adjustment during army life*. Vol. 1, Princeton, NJ: Princeton University Press.
- Stumphauzer, J. S. (1972). Increased delay of gratification in young prison inmates through imitation of high-delay peer models. *Journal of Personality and Social Psychology*, 21,10 - 17.
- Sussman, M.B., Cates, J.J., & Smith, O.T. (1970). *Inheritance and the Family*. New York Sage.
- Thaler, R. H. (1981). Some empirical evidence on dynamic inconsistency. *Economic Letters*, 8, 201 - 207.

- Thaler, R. H. (1985). Mental accounting and consumer choice. *Marketing Science*, 4, 199 – 214.
- Thaler, R. H. (1990). Saving, Fungibility, and Mental Accounts. *Journal of Economic Perspectives*, 4, 193 – 205.
- Thaler, R. H. (1992). *The winner's curse. Paradoxes and anomalies of economic life*. New York: The Free Press.
- Thaler, R. H. (1994). Psychology and saving policies. *American Economic Review (Papers and Proceedings)*, 84, 186 – 192.
- Thaler, R. H. (1997). Irving Fisher: Modern behavioral economist. *American Economic Review, (Papers and Proceedings)*, 87, 439 - 441.
- Thaler, R. H. & Shefrin, H.M. (1981). An economic theory of self-control. *Journal of Political Economy*. 89, 392 –406.
- Tobin, J. (1951). Relative income, absolute income and savings. In *Money, trade and economic growth* (pp. 135-156). New York.
- Trewin, D. & Lee, G. (1988). International comparison of telephone coverage. In R.M Groves, P.P. Biemer, L.E. Lyberg, J.T. Massey, W.L. Nicholls II, & J. Waksberg (Eds.), *Telephone Survey Methodology*, John Wiley & Sons, New York.
- Tucker, D. M. (1991). *The decline of thrift in America. Our cultural shift from saving to spending*. New York: Praeger.
- Vanden Abeele, P. (1983). The Index of consumer sentiment: Predictability and predictive power in the EEC. *Journal of Economic Psychology*, 3, 1 - 17.
- Van Raaij, W.F. & Gianotten, H.J. (1990). Consumer confidence, expenditure saving and credit. *Journal of Economic Psychology*, 11, 269 - 290.
- Veblen, T. (1899/1967). *The theory of the leisure class*. New York: Viking.
- Venti, S.F., & Wise, D.A. (2000). *Choice, chance and wealth dispersion at retirement* (NBER Working Paper No. 7521). Cambridge, MA: National Bureau of Economic Research.
- Veldhoven, G. M. Van, & Groenland E.A.G. (1993). Exploring saving behaviour: A framework and a research agenda. *Journal of Economic Psychology*, 14, 507 – 522.
- Vogler, C., & Pahl, J. (1994). Money, power and inequality within marriage. *Sociological Review*, 42, 263-288.
- Wahlund, R. (1991). *Skattar och ekonomiska beteenden. En studie i ekonomisk psykologi om främst skattefusk sparande utifran 1982 års skatteomläggning*, [Taxes and economic behaviour. An economic psychological study on tax evasion and saving with emphasis on the Swedish tax system change in 1982]. Unpublished doctoral dissertation. The Economic Research Institute, the Stockholm School of Economics, Stockholm, Sweden.
- Wahlund, R., & Wärneryd, K.E. (1987). Det totale sparandet och sparbeteenden hos olika grupper av sparare. [Total saving and saving behaviour among different groups of savers] |*Skandinaviska Enskilda Banken Kvartalskrift*, 3, 52-64.
- Wärneryd, K.-E. (1989). On the psychology of saving: An essay on economic behaviour. *Journal of Economic Psychology*, 4, 297 - 317.
- Wärneryd, K.-E. (1995). *A study of saving behavior towards the end of the life cycle* (VSB-CentER savings project progress report No.28). Tilburg, The Netherlands: Tilburg University, CentER for Economic Research.
- Wärneryd, K.-E. (1996a). Personality and saving (VSB-CentER savings project progress report No.39). Tilburg, The Netherlands: Tilburg University, CentER for Economic Research.
- Wärneryd, K.-E. (1996b). Saving attitudes and saving behavior. In C. Roland-Levy (Ed.): *Proceedings of the 21th IAREP Colloquium: Social and Economic Representations* (pp. 798-811). Paris: Universite Rene Descartes, Institut de Psychologie.

- Wärneryd, K.-E. (1997). Demystifying rational expectations theory through an economic-psychological model. In G. Antonides, W.F. van Raaij, & S. Maital (Eds.), *Advances in economic psychology* (pp. 211-236). Chichester: Wiley and Sons.
- Wärneryd, K.-E. (1999). *The Psychology of Saving. A study on Economic Psychology*. Cheltenham, UK: Edward Elgar.
- Wärneryd, K.-E. (2000). *Personality: future-orientation, self-control and saving*. Paper presented at the XXVII International Congress of Psychology, Stockholm, Sweden.
- Webley, P. (1992). *Debt, borrowing and ... saving*. Paper presented at the workshop 'Economic psychological perspectives on saving'. CentER for Economic Research, Tilburg University, Tilburg, The Netherlands.
- Webley, P., & Nyhus, E.K. (2001). Life-cycle and dispositional routes into problem debt. *British Journal of Psychology*, 92, 423-446.
- Weil, D. (1991). What determines saving: A review essay. *Journal of Monetary Economics*, 28, 161-170.
- Wentland, E. with Smith, K.W. (1993). *Survey responses. An evaluation of their validity*. San Diego: Academic Press, Inc.
- Williams, R.A., & Defris, L.V. (1981). The roles of inflation and consumer sentiment in explaining Australian consumption and savings patterns. *Journal of Economic Psychology*, 1, 105 - 120.
- Woittiez, I., & Kapteyn, A. (1998). Social interactions and habit formation in a model of female labour supply. *Journal of Public Economics*, 70, 185 - 205.
- Zelizer, V.A. (1993). Making multiple monies. In R. Swedberg (Ed.), *Explorations in Economic Sociology*. Sage, New York.

## APPENDIX 1: SAMPLING TECHNIQUES FOR THE CSS

The methods used for recruiting members for the two sub-samples constituting the CSS, and the representative panel and the high-income panel respectively, are described below. Possible sampling biases are also discussed.

### A1.1 The Representative Panel (RP)

The RP is intended to be representative of the Dutch population with respect to socio-economic variables like region, political preference, housing, income, degree of urbanisation, and age of the head of household. This panel was a part of the ordinary panel originally used by Stichting TelePanel (the TelePanel Foundation). The members of this panel are not recruited specifically for the savings project, but they are members of a permanent panel and serve as informants for a variety of research projects. The RP was set up in 1991, which means that the members of this panel had participated in the panel for 4 years or less when the data collected for this study took place.

The sampling was carried out using telephone directories as the sampling frame. Drawn telephone numbers were used as basis for creating so-called 100-banks of telephone numbers. This was done by randomising the two last digits of every drawn number. Telephone numbers were thereafter drawn from the 100-banks. Because of this, new lines and nonlisted numbers also had a chance of being selected.

An Equal Probability Selection Method (EPSEM) sample design was used for the selection of the telephone numbers. EPSEM is a widely-used sample design and refers any sample in which the population elements have equal probability of selection (the sample fraction is held constant). It is a probability sample that “often leads to self-weighting samples, where the simple mean of the sample is a good estimate of the population mean” (Kish, 1965: page 21). In order to obtain a sample representative with respect to region and urbanisation, a four-step stratified sampling procedure was applied:

- 1) Selection of primary sampling areas (communities within The Netherlands)
- 2) Selection of secondary sampling units (100-banks of telephone numbers within the communities)
- 3) Selection of telephone numbers within 100-banks
- 4) Selection of households

#### Selection of primary sampling areas

A sample of communities was selected before the telephone numbers were drawn. In total, there are 703 communities in The Netherlands, all differing in size. When the clusters have large size variation and the sample fraction should be held constant, it is not recommended to select clusters by using uncontrolled random sampling (Kish, 1965). This might result in difficulties with controlling the sample size. If only relatively large clusters are drawn, the sample size will be large. If only relatively small clusters are drawn, the sample size will be small. The communities were therefore selected proportional to size in order to control the sample size.

The sampling design used for the RP also involves some stratification in order to secure representation of all regions and larger cities. Communities were sorted according to region, and within regions according to degree of urbanisation. Stratification of communities instead of telephone numbers is easier because the units are fewer and more information will be available for a community than a telephone number.

In order to reduce costs when introducing the expected 3500 households to the computerised interviewing technique, it was decided to visit at least five households within each community. For this reason, there was a minimum number of telephone numbers drawn from each community. The selection of clusters was a two-stage process. First, the largest communities were selected and then a sample of the smaller ones. Large communities were defined as self-representing because these communities had to be represented in order to make the sample representative with respect to degree of urbanisation and region.

#### Selection of secondary sampling units

Telephone numbers drawn within the selected clusters were used to create so-called "100-banks" of telephone numbers. The PTT (Post Telefoon Telegraaf) -phone files were used as a database for the sampling. Within the selected clusters, telephone numbers were drawn. The sub-sampling rate within each cluster had to vary to keep the sampling fraction constant. For the big communities, the numbers of telephone numbers drawn within each cluster was proportional to the cluster's size. For the smaller communities, a fixed number of telephone numbers was drawn. If, for example, the number 0245476267 was drawn, a 100-bank was created by randomising the last two digits in this number. This procedure is called List Assisted Random Digit Dialling (LARDD) or Directory Assisted Selections. LARDD has the advantage that both secret numbers and new lines can be drawn and included in the sample. The disadvantage is that also non-residential numbers (nonexisting numbers or companies) will also be included.

#### Selection of telephone numbers

One number was selected from each 100-bank. The fraction of non-residential numbers was lower than expected. 80% of the drawn numbers turned out to be residential. The low fraction of non-residential numbers was probably due to the fact that the LARDD was used, not the traditional random digit dialling. In USA, residential telephone numbers are often clustered within banks of telephone numbers. Use of listed residential numbers as a basis for randomisation will therefore increase the probability of hitting residential numbers (Lepkowski, 1988). Probably, this is also the case in The Netherlands.

#### Selection of households

The non-response for the next stages in the recruitment process was higher than expected. The households were first contacted by phone. In the first interview, the respondents were asked about background information and whether they were willing to participate in the research project. The response rate for the first recruitment interviews was about 70%. Approximately 50% of the households who took part in the recruitment interviews were prepared to participate in the RP. These households were visited by representatives from the Stichting TelePanel and introduced to computer-aided interviewing. About 53% of the households who were introduced to the computer aided interviewing technique participated in the panel eventually. The overall response rate for the RP is thus 18,5% (see Nyhus, 1996 for further details).

Table A1-1  
Responses for different stages in the recruitment process

	Distribution in the Dutch population	Distribution of respondents to telephone interviews (resp.rate: 68.2%)	Distribution of respondents willing to participate in the panel (50.4% of the interv. househ.)	Distribution of respondents selected for the telepanel from resp. willing to join. Selections rate =53%	Distribution of selected households that eventually joined the panel
Total	100	100	100	100	100
Singles	27.0	24.0	20.0	32.7	27.3
Family with children	33.2	51.7	56.2	26.0	27.6
Fam., without children	39.8	23.7	23.7	41.3	45.1
< 29 years	18.9	15.2	16.8	31.1	34.6
30 - 39 years	21.5	24.8	30.3	16.8	18.6
40 - 49 years	18.5	21.4	24.8	15.2	17.6
50 - 64 years	21.4	21.3	18.5	20.7	19.7
> 65 years	19.2	17.2	9.5	16.2	9.7

Source: Stichting TelePanel. The figures are from additional sample done to compensate for panel attrition. 4596 households were interviewed by telephone, and 2813 households were willing to participate in the panel.

Random sampling means that the numbers that are to be included in the sample are selected at random and that each unit has an equal chance of inclusion. This was the strategy used for selecting telephone numbers. However, if there is non-response among the sample cases, the unbiased property that random sampling is assumed to provide does not apply to the sample used in the study. Non-response makes it impossible to obtain complete measurements on the survey sample. As shown above, the level of non-response when recruiting members for the RP panel was high (81.5%). Table A1-1 also shows that people who were willing to participate differed from those who refused. This means that if all households willing to participate in the panel were included in the sample, the selective non-response would lead to a sample that was not representative of the Dutch population. This is seen for the variables "composition of household" and "age" in Table A1-1.

Table A1-1 shows that households with older members, one-person households and families without children were less willing to participate in the panel than other households. In order to correct for this non-sampling error, the Stichting TelePanel assigned quotas in an unbiased way for some background data. Quota sampling means that the mix of types of households that can enter the sample, is controlled. For the RP, the selection was carried out so that the sample would be representative with respect to region, political preference, housing, degree of urbanisation, income, and age of head of household. As the sample is made up by selecting households who will presumably give the sample the same characteristics as the population it represents, this procedure has also been called "purposive selection" (Neyman, 1934). The rather low response rate in the last stage of the recruitment process is thus caused by two factors: 1) refusals to co-operate by contacted households, and 2) non-selection of households that were willing to co-operate but did not have the required characteristics.

Because the sampling procedure described above did not result in as many panel members as expected, additional sampling was required. This was done by drawing more numbers from

the 100-banks that were created during the first sampling. In addition, new 100-banks were created following the same procedure as described above. In the end, a panel consisting of 2188 households was established. When the first wave of data collection for the CSS took place, the RP consisted of 4462 persons in 1880 households.

As the RP suffers from a 30% annual attrition rate, the Stichting TelePanel performed continuous surveys to collect new panel members. This was done by drawing numbers from the 100-banks. The telephone interviews of selected households are carried out, which results in a reservoir of households willing to co-operate in the panel. Households who drop out are replaced every week with households with similar characteristics using purposive selection as described above. If some of the households split, the Stichting TelePanel tried to follow both partners in the following periods.

### A1.2 The High Income Panel (HIP)

The members of the HIP were recruited specifically for the CSS because of a wish to study high-income households in more detail. As income and wealth distributions in populations often are skewed, a simple random sample would not provide enough wealthy households to draw conclusions about their behaviour and distributions of many financial variables (Kennickell & McManus, 1993). The high-income households are defined as households with the 10% highest incomes of the Netherlands. These households have a gross income of at least 105,000 guilders a year. According to the Stichting TelePanel, the sample is representative of this part of the Dutch population with respect to income, age, gender and degree of urbanisation.

The goal for the sampling was to recruit 1,000 households. A problem related to this recruitment process was that the target population was much smaller than the sample population (households with a telephone). Hence, the probability for drawing a number for a high-income household was much smaller than for hitting a household that would fit for the RP. If the sampling for the HIP was to be done in the same way as for the RP, 100,000 numbers would have to be drawn and dialled based on the same expected response rates. This would be an expensive and exhausting task. In order to reduce costs by reducing the number of households that would have to be approached, two different sampling schemes were used for selecting households to the HIP. They differed in method and in hitting chance for the target population.

The first procedure was as follows:

- 1) Selection of area postcodes for wealthy areas
- 2) Selection of telephone numbers within the selected wealthy areas.
- 3) Selection of households

#### Selection of area postcodes

A database belonging to a Dutch company called "Geo-Marktprofiel" was used in order to increase the probability of approaching households belonging to the target population. Their database consists of 400,000 postal code areas. Geo-Marktprofiel constructed a variable called "wealth class" based on variables like prices of houses (and rent), presence of gardens and level of prosperity. In this way, it was possible to get an overview of the geographical distribution of Dutch households over wealth categories.



The Stichting TelePanel has information about distributions of household income where the households are obtained via an unbiased sample (the RP). These two sources of information were matched so it was possible to determine the distribution of high-income households over the wealth categories. Based on this information, it was possible to estimate how the 600,000 high-income households in the Netherlands are distributed over wealth categories. The areas were categorised within six different classes of prosperity, where “1” represents the most wealthy area. The areas which were classified as 1 (“high”) or 2 (“above average”) were selected. These areas covered about 55% of the target population.

#### Selection of telephone numbers in wealthy areas

Households were selected within the wealthy areas. The Stichting TelePanel stated how many phone numbers they needed from each wealth class. The numbers were drawn by Geo-Marktprofiel as they had the database with all addresses and listed telephone numbers. Use of Geo-Marktprofiel’s database increased the probability of approaching a high-income household from 10% to 20%. In addition, all the drawn numbers were residential. The disadvantage with this sampling scheme is that it does not include new and unlisted telephone numbers. As 12% of all telephone numbers in the Netherlands are not listed, this might cause a coverage error in the sample. 20,000 households were approached based on this sampling scheme.

In addition, another 10,000 households were approached. These households were selected using the same 4-step sampling scheme as described for the RP. This scheme covers nearly 100% of the households in the target population. The probability for hitting a high-income household using this method was 10%.

#### Selection of households

In total, 30,000 households were approached. In the first interview, they were asked about some characteristics of the household (among them, income). About 66% of the respondents answered the questions about income. Households belonging to the target population were asked if they were willing to participate in the panel. These households were informed about the purpose of the study they were asked to take part in and why they were approached. 50% of the households in the target income group were willing to participate in the panel. More than half of the households who said they were willing to become panel members participated in the high-income panel eventually. In the end, 1011 households participated in the panel.

The chance of selecting a rich household was 20% for the 20,000 households approached using the first sampling scheme, while it was 10% for the 10,000 households approached using the second sampling scheme. This means that about 5,000 households in the target income group were approached. As 1,011 of these households participated in the panel, this corresponds to a response rate of 20.2%. When data for the first wave of the CSS were collected, the HIP consisted of 2,735 people in 910 households. An overview of the response rates for the first wave is given in Table 5.3. Selections of households when replacing the households that drop out is achieved using the 100-banks created for the RP. Unfortunately, more accurate information about the sampling and response rates is not available.

### A1.3 Evaluation of the applied methods

#### Sampling errors

The RP is meant to be the Dutch population in miniature. This goal has also been reflected in the sampling procedures applied when the panel members were recruited. Random selection of telephone numbers has been combined with stratification and quota sampling. Below some possible sampling biases caused by the applied sampling frames and shortcomings of the recruitment procedures will be discussed. These biases might represent possible threats to validity and therefore limit the extent to which the results reported in Chapter 7 can be generalised across populations, situations and times.

#### Bias caused by the sampling frame applied

Interviewing using modems requires that the respondents have a telephone. Since the panel members also are recruited by telephone interviewing, non-telephone households are not included in the sampling frame. The potential for coverage errors in telephone surveys decreases as the percentage of telephone households increases. According to Stichting TelePanel, 97% of the Dutch households have a telephone, so the sampling frame should therefore not represent a serious threat to representativeness. It covers nearly the total target population. However, if there are large differences between telephone and non-telephone household populations, there still might be a chance of a significant non-coverage bias. According to Trevin and Lee (1988), non-coverage in telephone surveys in the Netherlands is higher for single and divorced persons, households where the head is unskilled, households with an unemployed head, households with a young head, large households (more than six people), and it is higher for households living in rental accommodation than owner-occupied accommodation. Relative to other countries, the Netherlands exhibits little differences in telephone coverage across income groups, but a tendency for noncoverage for low income households can still be found (Trevin & Lee, 1988).

Also CBS-studies show that the young, the elderly, the unemployed, divorced people, people with lower education levels and people in lower income groups less frequently have a telephone than others (Snijkers, 1992). The sampling frame used might therefore be the reason why tenants and young and old people are under-represented in the RP. The number of students and unemployed also appears to be low in the RP, although comparable data for the Dutch population are lacking (see Table 5.2). The applied sampling frame also excludes people living in institutions of various kinds, those in military service and transients.

The most important sampling frame used for recruiting members for the HIP covered only 55% of the target population. These were high-income households living in areas that can be categorised as being wealthy (because of high prices of houses, high rent, and presence of gardens). This means that high-income households who choose not to spend so much money on accommodation and therefore live in less prosperous areas have a relatively low probability of being included in the sample. They had a chance of selection due to the second sampling frame applied (which includes all households with a telephone), but their chance of selection is much lower than for households that live in wealthy areas. The HIP is therefore biased with respect to the priorities households make when spending and investing their relatively high income. In this respect, the HIP is not representative of the target population.

Bias caused by refusals to co-operate

The samples suffer from a high level of non-response. As mentioned earlier, the unbiased property that random sampling is supposed to provide does not necessarily apply when we have non-response. As shown in table A1-2, non-response is high, which increases the probability of non-response errors.

Table A1-2

Response rates for the RP and the HIP for the first wave of data collection

	A Response rate sample %	B Response rate within sample First wave %	A x B Overall response rate First wave %	Length of membership in panel
RP	18.5	94.8	17.5	Up to 4 years
HIP	20.2	99.4	20.1	Up to 1 year

Table A1-2 shows the response rates from the first wave of data collection for the RP and the HIP respectively. The response rate (AxB) is defined as the number of completed interviews divided by the total number of eligible sample units. The response rates reported here are on household level. The response rates for panel participation (A) are based on information from the additional sampling carried out in 1992 for the RP and on certain assumptions with respect to hitting rates of residential households in the target income group for the HIP<sup>55</sup>. Table A1-2 shows that the response rates for panel participation are relatively low. The response rates reported in column A are a product of two different mechanisms: 1) the households who were approached but declined to become panel members (refusals) and 2) households who were willing to participate in the panel but were not included in the sample due the quota sampling (non-selection). It is not possible to separate these mechanisms' relative contribution to non-responsiveness.

In column B, questionnaire-specific non-response is reported. This is non-response caused by panel members who, for some reason, did not fill in the different parts of the Savings Project questionnaire (here: the HS). The response rates within the panels were relatively high (probably because of specifications in the contract between CentER and the field working company); 94.8% for the RP while it was 99.4 % for the HIP (at the household level). The overall response rates (column AxB) are a product of both refusals to participate and questionnaire-specific non-response.

Finally, we have item non-response, which is a failure to answer specific questions in the questionnaire. For example, certain types of debt and assets tend not to be reported. This type of non-response might be important and should be studied further, but it will not be discussed here. An overview of item non-response can be found in the "Variable Documentation VSB panel 1993" (Camphuis & Ketelaars, 1995).

<sup>55</sup> More exact information about response rates is not available. The ratio given in Table A1-2 is not actual response rates. As some of the households that initially participated in the panel dropped out before the data for the Savings Project were collected, the response rates in the columns A and AxB are likely to be lower. Likewise, the response rate for the later waves of data collection is difficult to estimate, as there exists little information about attrition, additional sampling and non-response when maintaining the panel.

### Biases caused by refusals to become panel members

Data are collected by using computers and modems and this requires that the respondents have some insight in how to use a computer, or that they are willing and able to learn it. This requirement might cause some biases. It is possible that elderly or people with little education and little knowledge about computers would decline to participate in the survey, meaning that people co-operating in the telepanel are a little better educated than others. It is not unreasonable to expect that more highly-educated people are more aware of alternative ways of holding assets than others, so it might be the case that panel members engage in more complex saving behaviour than non-members.

According to Ritzema and Homan (1991), previous investigations have shown that the procedure used to recruit the members to the telepanels minimises the drop-out rate that can be attributed to the use of computers. The computers are only mentioned in the last part of the initial recruitment interviews. According to Ritzema and Homan (1991) only 5.1% of those who chose not to participate in the NIPO telepanel made this decision because a computer had to be used. If this is correct, sample bias caused by the use of computers might be small.

It is possible to adjust for biases caused by refusals in the recruitment process using purposive selection or quota sampling. However, it is only possible to estimate and adjust for biases for variables of which we know the distribution in the target population, like income and age. Biases with respect to psychological traits are impossible to identify, and afterwards weighting or quota sampling cannot be done in order to secure representativeness for these variables. Neyman (1934) reported that Italian statisticians who applied the method of purposive selection did not find their results to be satisfactory. Their (Gini & Galvini, 1929) chief purpose had been to obtain a sample that would be representative of the Italian population with respect to important demographic, social, economic, and geographic characteristics. The comparison between the sample and the whole country showed disappointing results. Despite the fact that the average values of the seven control variables used when constructing the sample were in satisfactory agreement, the agreement of average values of other variables, which were not used as controls, were poor. The selection of respondents with respect to socio-economic variables did not provide a sample that was representative with respect to other variables.

Calling the RP “the representative sample” might therefore not be justifiable. People co-operating in the panel might be different from the people who refuse. They might be more open, have better-organised economic behaviour or not feel that they have anything to hide. The low response rate can represent a threat to the extent results involving effects of psychological variables on economic behaviour can be generalised.

### Bias caused by questionnaire-specific non-response

There are many possible causes of questionnaire-specific non-response. For example, people may only answer the questionnaires they like. People who refuse to answer the savings questionnaires may do so either because they have large savings or little savings, the former do not wish to report the amount of their savings, while the latter might feel that they have little of interest to contribute to the study or may be reluctant to disclose how little savings they have. Panel members who perceive themselves as atypical with respect to financial affairs might therefore drop out.

Table A1-2 shows that the questionnaire-specific response rate is higher for the HIP than for the RP. The reason might be that the members of this panel are all new panel members and, consequently, might be more motivated to answer questions than people that have been members for a longer period. There are also other differences between the HIP and RP that might explain the difference in response rates. The HIP was recruited specifically for the CSS and the HIP members were well informed about the goal of the project and the questions that were going to be asked before they committed themselves to co-operate. The RP members did not receive such project-specific information before they decided to join the panel. A higher proportion of the RP members might therefore be unmotivated to answer questions about financial data. HIP members received better computers than the RP members, something that might increase their feeling of commitment to the project. Finally, the HIP members get more time to answer the questionnaires, and this increases the probability of that they will be at home during the period the responses should be given.



## APPENDIX 2: THE DATA COLLECTION METHODS

In this appendix, the methods used when collecting the data are described and discussed.

### A2.1 Computer Assisted Panel Research (CAPAR)

Computer assisted panel research is different from traditional interviewing techniques in many ways. The questionnaires are reproduced by a computer in accordance with instructions from the researcher and a programmer. The respondent enters the answers and the data are processed immediately with a minimum of interface (Sikkel, 1988). Members of the telepanel answer questions on a regular basis and supervise the interviewing themselves by starting the data programme and answering the questions that are presented to them by typing their responses. As all data collection methods, CAPAR has advantages and disadvantages. We discuss them below.

#### Advantages

Complex routing and high control over questions flows are the two main advantages of computerised interviewing. Answers can be edited on-line by validation of responses, the questionnaires can be personalised and the order of the questions randomised. As there is no interviewer present, it avoids any interviewer effects and is more convenient for the respondents because they can answer the questionnaires according to their own schedule. Finally, the respondents might also improve in their ability to answer questionnaires over time, as they encounter fewer misunderstandings (Sikkel, 1988; Snijkers, 1992). These issues will be outlined in more detail below.

Routing potential is important when measuring a complex variable like “assets”. Household assets may consist of components as different as money, paintings, call options and houses. In order to get a good measure of household assets the questionnaire should include questions about all these components. This results in a long questionnaire, and for most respondents, many of the questions are irrelevant. The possibility of routing reduces the workload for the respondents, as they are routed only to the questions that are relevant for them. This might increase the response rate, and it might have a positive effect on data quality (Saris, 1991).

In computerised interviewing it is possible to ask for confirmations in order to ensure that the respondent has answered correctly before follow-up questions are presented. Range errors are avoided by programming checks that assess validity of answers on, for example, dates (if people produce day indicators greater than 31 or month numbers over 12). Moreover, it is possible to program consistency checks directly by allowing the program to compare responses to two different questions that are intended to measure the same variable. Hence, computerised interviewing allows interactive on-line editing which, in most cases, would not be possible in paper and pencil interviews (Saris, 1991).

CAPAR is an impersonal form of interview. Question text is presented on screen and the respondents are given an opportunity to enter data. As the respondents do not have contact with interviewers, biases due to the associated interviewer effects are avoided. For example, it has been found that interviewers do not read questions exactly as they have been formulated. Moreover, interviewers do not always help the respondent in the same manner if questions are misunderstood. A consequence of these differences might be that responses to questions collected by different interviewers are not comparable (Saris, 1991).

Another advantage of CAPAR over telephone and personal interviews is that the respondents can, to a certain extent, control the time schedule of their answers. This can be particularly important when collecting financial data, because respondents will not feel the pressure from a waiting interviewer to give a quick answer. Especially in telephone interviews, a long break in the interview while waiting for a question or an answer can be perceived as embarrassing for both interviewer and respondent (Snijkers, 1992). Computer-based interviewing enables the respondents to check information by verifying their records or consulting with other members of the family. CAPAR therefore increases the probability of getting thoughtful replies instead of some hasty estimates given under pressure.

The panel membership might have different effects on the respondents. One of these can be that the panel members gradually improve in answering questionnaires because they obtain a better understanding of the surveys and thus restrict answers in ways consistent with this understanding. The Savings Project questionnaire can also make people more conscious about how much they save and earn so that the answers might be more accurate in later waves. If this is the case, the panel design might improve the quality of responses.

#### Disadvantages

Teleinterviewing also has some drawbacks. The routing might lead to missing data that is difficult to discover. As there is nobody present during the interview, there is little control over which person in the household actually answers the questionnaire. Moreover, panel conditioning might have negative effect on the respondents' motivation for answering the questions accurately. Panel membership might even cause changes in the respondents' behaviour.

The routing in the computer aided interviewing has the drawback that a mistake made by the respondent when answering one question might cause a chain reaction of mistakes. For example, if a respondent gives a wrong answer to the question about whether he has one or more checking accounts, this might lead to a lot of missing data. A respondent, who mistakenly answers that he does not have a checking account, will not receive the questions about how many checking accounts he has and their associated balances. These kinds of mistakes are difficult for the users of the data files to detect. A complex routing structure also results in a data matrix with many holes that might make the data difficult to analyse.

As with mail interviews, there is no control for who actually answers the questionnaire. It might happen that some of the household members do not have time to fill in the questionnaire and therefore leave it to some other household member to do it in order to fulfil the obligation to the Stichting TelePanel or CentERdata. There is also the chance that household members answer the questions together - not alone, as intended. This might be an advantage for some of the questions on financial matters, but a disadvantage for questions on psychological variables.

There is still limited knowledge about how the respondents are affected by answering questionnaires from different researchers on a regular basis. There might, for example, exist priming effects, in the sense that a set of questions from one organisation might affect the answers given to questionnaires sent out the following weeks by other organisations. If two different organisations collect data on the same matter in subsequent weeks, for example balances on bank accounts, this might cause respondents to become bored with answering and simply skip these questions or the whole questionnaire.



Above, we mentioned that people might get better in answering the questionnaires as they participate in the panel. The experience in answering questionnaires could also have negative effects. Panel members might become fed up with answering all the questionnaires and learn how to answer in order to minimise the workload (always choose the “I do not know - options” or give random answers). Inaccurate data might therefore be collected because panel members would like to keep the computer for a minimum of effort.

The panel membership itself may also cause behavioural change. Panel members might become more conscious of their participation in the panel as time goes by, which manifests itself in altered attitudes or behaviour (Ferber, 1966). Panel members will then become atypical of the population that they are intended to represent. For example, answering questions about expenditure and saving on a regular basis can make the respondents more conscious about their own spending behaviour and self-controlling strategies. The questionnaire can also make them more aware of saving alternatives and reasons for saving, which might result in a change in behaviour. In some cases, we might even find that answering higher saving than the previous year can become some sort of saving goal.



### APPENDIX 3: PARTS OF THE QUESTIONNAIRE

This appendix contains some of the questions used when collecting the data. The complete questionnaire is too long to include here, so the purpose is to give the reader some idea of how the data collections was done. The full questionnaire and documentation can be downloaded from Center (http://center-ar.kub.nl/cps/). The questions have been provided by numbers by the author so that they can be easily found. These numbers do not indicate the order in which the questions were asked.

Examples of question block about Assets and Liabilities:

#### Information to the respondent:

This part of the research project on savings concerns assets and liabilities. The following questions concern your own ASSETS.

The following questions will also be presented to other household members aged 16 years or over. To prevent double reporting, JOINT assets should be mentioned by one member of the household only. The member of the household who is responsible for paying bills etc. has been selected to report not only personal assets but also joint assets of the household.

CHECKING ACCOUNTS are private accounts with bank or giro to which, for example, your salary or benefits-payment is transferred, and from which you can make payments. CHECKING ACCOUNTS are sometimes called: giro bank accounts, salary accounts, or private accounts. If you have a checking account that you mainly use for saving, please consider this account to be a SAVINGS ACCOUNT. Savings accounts will be reported later. Do not include checking accounts that you also use for making payments and/or to receive income for your OWN BUSINESS here.

- 1) Did you, on 31 December 1994, have one or more CHECKING ACCOUNTS? If applicable: do NOT include checking accounts that you also use for making payments and/or to receive income for your own business here.
- 1 yes ..... BET2  
2 no ..... BZ2

The routing is indicated for each question. People who said that they have checking accounts, where routed to question "bet2", whereas those who said they do not have checking accounts did not receive the rest of the questions about checking accounts but were routed directly to the next block concerning employer-sponsored saving accounts.

- 2) BET2 How many CHECKING ACCOUNTS did you have on 31 December 1994?  
more than 5: ..... BET3  
1 thru 5: ..... BET61
- 3) BET3 Did you (in total) have a credit or a deficit balance on your checking accounts on 31 December 1994?  
1 credit ..... BET4  
2 deficit ..... BET4
- 4) BET4 What was the total balance of your CHECKING ACCOUNTS on 31 December 1994? If the balance is a deficit, just enter the amount without a minus (with the previous question you have already answered whether the balance of your CHECKING ACCOUNTS is a credit or a deficit balance). If you don't know the exact amount, type 0 (zero).  
answer > 0: ..... BET61  
answer = 0: ..... BET5

- 5) BET5 Into which of the categories mentioned below does the total balance (either a credit or a deficit) of your checking accounts go?
- |                                  |       |
|----------------------------------|-------|
| 1 less than Dfl. 100 .....       | BET61 |
| 2 between 100 and 1000 .....     | BET61 |
| 3 between 1000 and 3000 .....    | BET61 |
| 4 between 3000 and 5000 .....    | BET61 |
| 5 between 5000 and 10000 .....   | BET61 |
| 6 between 10000 and 15000 .....  | BET61 |
| 7 between 15000 and 20000 .....  | BET61 |
| 8 between 20000 and 25000 .....  | BET61 |
| 9 between 25000 and 30000 .....  | BET61 |
| 10 between 30000 and 35000 ..... | BET61 |
| 11 between 35000 and 40000 ..... | BET61 |
| 12 between 40000 and 45000 ..... | BET61 |
| 13 between 45000 and 50000 ..... | BET61 |
| 14 50000 or more .....           | BET61 |
| 0 unknown .....                  | BET61 |

The following questions are repeated for a maximum of five checking accounts. When answering these questions, please keep in mind the five - to you - most important CHECKING ACCOUNTS.

The questions below are repeated a maximum of five times; the last number in the variable name indicates which checking account the question concerns.

6) BET61 thru BET65

Because we cannot ask you to give the number of your account, we would like you to indicate the (main) purpose of your account. Our main reason for doing this is to be able to distinguish between different checking accounts.

What is the main purpose of your [1st thru 5th] CHECKING ACCOUNT?

- |                                       |       |
|---------------------------------------|-------|
| 1 to make all sorts of payments ..... | BET91 |
| 2 particular purpose .....            | BET71 |

By a salary account we mean an account to which regular income (such as salary, benefit payments, pension) is transferred. By a household account, we mean an account which is used for paying recurring expenses (such as rent, gas and electricity costs, subscriptions, household expenses, etc.).

7) BET71 thru BET75

For what particular purpose do you have your [1st thru 5th] CHECKING ACCOUNT?

- |                                       |       |
|---------------------------------------|-------|
| 1 salary account .....                | BET91 |
| 2 household account .....             | BET91 |
| 3 government scholarship scheme ..... | BET91 |
| 4 other .....                         | BET81 |

8) BET81 thru BET85 (string)

So, for what particular purpose do you have your [1st thru 5th] CHECKING ACCOUNT? If you don't know, type a question mark.

- |                  |       |
|------------------|-------|
| any answer ..... | BET91 |
|------------------|-------|

9) BET91 thru BET95

Who is the account holder of your [1st thru 5th] CHECKING ACCOUNT?

- |   |        |
|---|--------|
| 1 the account is registered in my own name .....  | BET111 |
| 2 the account is registered in my partner's/spouse's name .....   | BET111 |
| 3 the account is registered jointly in my own name and someone else's name<br>(e.g. partner/spouse) ..... | BET111 |
| 4 the account is registered in (one of) my parents' name .....  | BET111 |
| 5 other .....   | BET101 |

- 10) BET101 thru BET105 (string)  
So who is the account holder of your [1st thru 5th] CHECKING ACCOUNT? If you don't know, type a question mark.  
any answer ..... BET111
- 11) BET111 thru BET115  
With which bank or financial institution is your [1st thru 5th] CHECKING ACCOUNT registered?  
1 ABN Amro ..... BET131  
2 Postbank ..... BET131  
3 Rabobank ..... BET131  
4 ING Bank (NMB) ..... BET131  
5 VSB Bank ..... BET131  
6 SNS Bank ..... BET131  
7 other ..... BET121
- 12) BET121 thru BET125 (string)  
So with which bank or financial institution is your [1st thru 5th] CHECKING ACCOUNT registered? If you don't know, type a question mark.  
any answer ..... BET131
- 13) BET131 thru BET135  
Did you, on 31 December 1994, have a credit or a deficit balance on your [1st thru 5th] CHECKING ACCOUNT?  
1 credit ..... BET141  
2 deficit ..... BET141
- 14) BET141 thru BET145  
What was the balance of your [1st thru 5th] CHECKING ACCOUNT on 31 December 1994? If you don't know the amount, type 0 (zero).
- 15) BET151 thru BET155  
Into which of the categories mentioned below does the balance (either a credit or a deficit) go?  
1 less than Dfl. 100 ..... BET161  
2 between 100 and 1000 ..... BET161  
3 between 1000 and 3000 ..... BET161  
4 between 3000 and 5000 ..... BET161  
5 between 5000 and 10000 ..... BET161  
6 between 10000 and 15000 ..... BET161  
7 between 15000 and 20000 ..... BET161  
8 between 20000 and 25000 ..... BET161  
9 between 25000 and 30000 ..... BET161  
10 between 30000 and 35000 ..... BET161  
11 between 35000 and 40000 ..... BET161  
12 between 40000 and 45000 ..... BET161  
13 between 45000 and 50000 ..... BET161  
14 50000 or more ..... BET161  
0 unknown ..... BET161
- 16) BET161 thru BET165  
Do you have an agreement with your bank with respect to the maximum sum you are allowed to be in the red on your [1st thru 5th] CHECKING ACCOUNT?  
1 yes, there is an agreement ..... BZ2  
2 no, no agreement ..... BZ2

This procedure is repeated for all assets and liabilities mentioned in section 6.5.

### Examples of Question Block About Mortgages

**ANNUITY MORTGAGE:** With an annuity mortgage, the total amount of your periodic payments on interest and repayment remains the same (at least) during the period for which the interest rate was fixed. During the first part of this period, the amount due consists of a relatively large part of interest and a relatively small part of repayment. In later years, it is the other way around.

**TRADITIONAL LIFE-INSURANCE MORTGAGE:** This sort of mortgage consists of a loan and a life-insurance policy. The idea is that there is no repayment, but only paying interest on the loan, and paying a premium for the life-insurance policy. There is no direct relation between the interest rate of the mortgage loan and the savings interest rate of the life-insurance policy (in contrast with an improved life-insurance mortgage, where there is a relation between those two interest rates).

**IMPROVED LIFE-INSURANCE MORTGAGE:** This is a modernized version of a traditional life-insurance mortgage. An improved life-insurance mortgage consists of a loan and a life-insurance policy. The idea is that there is no repayment, but only paying interest on the loan, and paying a premium for the life-insurance policy. In this case, the interest rate of the mortgage-loan and the savings interest rate of the life-insurance policy are related, which causes monthly net-costs to be rather stable.

**LINEAR MORTGAGE:** With this sort of mortgage, the periodic payments include paying off a fixed percentage of the total mortgage loan, and paying interest on the loan that is left at that moment. Over time, the amount you pay on interest becomes less and less, such that total monthly costs go down through the years. In the first period of the term of the mortgage, the costs of a linear mortgage are higher than the costs of an annuity mortgage.

**ENDOWMENT MORTGAGE:** With an endowment mortgage it is possible, during the term of the mortgage, to get a new loan on (part of) the amount that you have already paid off.

#### 17) HYP11 thru HYP15

Do you have a municipal mortgage guarantee for your [1st thru 5th] mortgage?

- 1 yes ..... HYP21 thru HYP25  
 2 no ..... HYP21 thru HYP25

#### 18) HYP21 thru HYP25

With which financial institution have you taken out the [1st thru 5th] mortgage?

- 1 ABN Amro ..... HYP41 thru HYP45  
 2 Postbank ..... HYP41 thru HYP45  
 3 Rabobank ..... HYP41 thru HYP45  
 4 ING Bank (NMB) ..... HYP41 thru HYP45  
 5 VSB Bank ..... HYP41 thru HYP45  
 6 SNS Bank ..... HYP41 thru HYP45  
 7 Nationale Nederlanden ..... HYP41 thru HYP45  
 8 AEGON ..... HYP41 thru HYP45  
 9 AMEV ..... HYP41 thru HYP45  
 10 Bouwfonds Nederlandse Gemeenten ..... HYP41 thru HYP45  
 11 ABP ..... HYP41 thru HYP45  
 12 other financial institution ..... HYP31 thru HYP35

#### 19) HYP31 thru HYP35 (string)

With which financial institution have you taken out the [1st thru 5th] mortgage? If you don't know the answer, type a question mark.

- any answer ..... HYP41 thru HYP45

#### 20) HYP41 thru HYP45

What sort of mortgage was the [1st thru 5th] MORTGAGE?

- 1 annuity mortgage ..... HYP61 thru HYP65  
 2 traditional life-insurance mortgage ..... HYP61 thru HYP65  
 3 improved traditional life-insurance mortgage ..... HYP61 thru HYP65  
 4 linear mortgage ..... HYP61 thru HYP65  
 5 endowment mortgage ..... HYP61 thru HYP65  
 6 other ..... HYP51 thru HYP55

- 21) HYP51 thru HYP55 (string)  
 What sort of mortgage was the [1st thru 5th] MORTGAGE?  
 any answer.....HYP61 thru HYP65
- 22) HYP61 thru HYP65  
 When (which year) was the [1st thru 5th] MORTGAGE taken out?  
 any answer.....HY11 thru HY15
- MORTGAGE LOAN: the amount of the loan when you took out the mortgage.  
 REMAINING DEBT of the mortgage: the amount that is still to be paid off.
- 23) HY11 thru HY15  
 How much was the loan at the time you took out the [1st thru 5th] MORTGAGE? If you really don't know, type 0 (zero).  
 any answer.....HY21 thru HY25
- 24) HY21 thru HY25  
 How much of the loan of the [1st thru 5th] MORTGAGE is left at present? With (improved) traditional life-insurance mortgages the mortgage loan doesn't change as a result of premium payments to the life-insurance. If you really don't know, type 0 (zero).  
 any answer.....HY31 thru HY35
- 25) HY31 thru HY35  
 What is the current interest rate of the [1st thru 5th] MORTGAGE? If you really don't know, type 0.00 (zero).  
 any answer.....HY71 thru HY75
- 26) HY71 thru HY75  
 Does the [1st thru 5th] mortgage have a so-called fixed interest rate?  
 1 yes.....HY81 thru HY85  
 2 no.....HY41 thru HY45
- 27) HY81 thru HY85  
 For how many years is the interest of the [1st thru 5th] mortgage fixed the last time?  
 any answer.....HY91 thru HY95
- 28) HY91 thru HY95  
 In what year is the interest of the [1st thru 5th] mortgage fixed?  
 any answer.....HY41 thru HY45
- 29) HY41 thru HY45  
 What is the end date (which year) of the [1st thru 5th] MORTGAGE?  
 any answer.....HY51 thru HY55
- 30) HY51 thru HY55  
 Do you pay mortgage expenses for the [1st thru 5th] mortgage:  
 1 per month.....HY61 thru HY65  
 2 per quarter.....HY61 thru HY65  
 3 per six months.....HY61 thru HY65  
 4 per year.....HY61 thru HY65
- Total MORTGAGE EXPENSES include interest payments, repayment, and premiums (if any).
- 31) HY61 thru HY65  
 How much do you pay now on all mortgage expenses for the [1st thru 5th] MORTGAGE on your [property mentioned earlier] per month/quarter/six months/year? If you really don't know, type 0 (zero).  
 any answer.....WO53

Examples of questions about income

INCOME THROUGH WORK

32) IJ2 How many employers did you have in 1994? Note: This question concerns paid jobs on a contractual basis. Do NOT include self-employed work here. Being the director of a public/private limited company is employment on a contractual basis. If you didn't have an employer in 1994, type 0 (zero).  
 number of employers: ..... IJ301

Below, questions IJ301 thru IJ2401 are presented. These 17 questions were presented to the respondents at a maximum of 10 times. For each employer, a maximum of three periods could be mentioned. First, the questions are asked, but the answers are not yet stored in the data file. Next, the respondents are shown an overview of their answers and they have the opportunity to correct them. The program also includes a number of checks, which makes it impossible for respondents to enter a starting date which is LATER THAN the end date. As soon as the respondents have completed everything and confirmed that it is correct, the data are stored.

IJ301 thru IJ310	name of the organization (string)	
IJ401 thru IJ410	starting day period 1	
IJ501 thru IJ510	starting month period 1	
IJ601 thru IJ610	last day period 1	
IJ701 thru IJ710	last month period 1	
IJ801 thru IJ810	starting day period 2	
IJ901 thru IJ910	starting month period 2	
IJ1001 thru IJ1010	last day period 2	
IJ1101 thru IJ1110	last month period 2	
IJ1201 thru IJ1210	starting day period 3	
IJ1301 thru IJ1310	starting month period 3	
IJ1401 thru IJ1410	last day period 3	
IJ1501 thru IJ1510	last month period 3	
IJ1601 thru IJ1610	gross salary employer x	
IJ1801 thru IJ1810	net salary employer x	
IJ2001 thru IJ2010	income tax and premiums for social insurance policies .....	IJ2401

33) IJ2401 thru IJ2410  
 Which source did you use to fill in the data on your salary with [EMPLOYER IJ301]?  
 1 written annual statement..... IZ1  
 2 other written source..... IZ1  
 3 no written source..... IZ1

Income through pensions

The program used for measuring pension income operates in the same way as the program in INCOME THROUGH WORK. First, respondents are asked what kinds of income they received (up to a maximum of four types), in what periods (up to a maximum of three periods for each type) they received it, and what amounts they received from each type. The answers given by the respondents are shown to them on the screen, and they have the opportunity to correct their answers. As soon as the respondent has confirmed that the information shown on the screen is correct, the data are stored.

Information to the respondent:

The following questions concern the amounts you received through early retirement pension [VUT], general old-age pension [AOW], annuities, and/or other pensions in 1994.

34) IP20 thru IP24  
 Which of the pension payments mentioned below did you receive in 1994? More than 1 answer is possible here.  
 0 none of the above-mentioned ..... II20  
 1 early retirement pension [VUT] .....IP41  
 2 general old-age pension [AOW] .....IP41  
 3 annuity.....IP41  
 4 other pensions.....IP41



35) IP41 thru IP44

How much is the GROSS sum you received in 1994 through [SOURCE OF INCOME IP20 through IP24]. If you really don't know, type 0 (zero).

amount.....IP71
0 .....IP71
> 0.....IP101

36) IP71 thru IP74

Perhaps you know the NET sum you received in 1994 through [SOURCE OF INCOME]? If you really don't know, type 0 (zero).

amount: .....IP121

37) IP101 thru IP104

How much was the total amount of withheld income tax and premiums for social insurance policies in 1994 on your [SOURCE OF INCOME]? If you really don't know, type 0 (zero).

amount: .....IP121

Please indicate the month by a number (1=January, 2=February, etc.). If periods 2 and 3 are not applicable to you, please type ENTER and proceed to the next question. You can provide information about a maximum of 3 periods. If, in your situation, there are more than 3 periods, please record the 3 most important periods.

- IP121 thru IP124 starting day period 1
IP131 thru IP134 starting month period 1
IP141 thru IP144 last day period 1
IP151 thru IP154 last month period 1
IP161 thru IP164 starting day period 2
IP171 thru IP174 starting month period 2
IP181 thru IP184 last day period 2
IP191 thru IP194 last month period 2
IP201 thru IP204 starting day period 3
IP211 thru IP214 starting month period 3
IP221 thru IP224 last day period 3
IP231 thru IP234 last month period 3.....IP271

38) IP271 thru IP274

What source did you use to answer the questions mentioned above?

- 1 annual statement.....II20 thru II23
2 other statement.....II20 thru II23
3 no statement.....II20 thru II23

Evaluation Questions

These evaluation questions were asked at the end of the question block concerning income:

39) ANSWER

Do you think your answers are (if you really don't know, type 0 (zero)):

- 0 .....WRONG0
1 (almost) all correct .....HOWMANY
2 mostly correct .....HOWMANY
3 mostly wrong .....WRONG0
4 (almost) all wrong.....WRONG0

40) WRONG0 t/m WRONG6

if ANSWER=3: Please indicate why you think most of your answers are wrong.

if ANSWER=4: Please indicate why you think all your answers are wrong.

More than 1 answer is possible here.

0 none of the below-mentioned .....	HOWMANY
1 the questionnaires did not suit my situation .....	HOWMANY
2 it was not possible to correct mistakes once they were made .....	HOWMANY
3 my answers were wrongly recorded by the computer .....	HOWMANY
4 the questions were too complicated .....	HOWMANY
5 the answers were too hard to remember/too much work to look them up .....	HOWMANY
6 other reason .....	REASON

Economic psychological concepts

41) INKNORM

Is this income (the net income of your household that you have just mentioned) unusually high or low compared to the income you would expect in a 'regular' year, or is it regular? .....

1 unusually low .....	INKROND
2 regular .....	INKROND
3 unusually high .....	INKROND
4 don't know .....	INKROND

42) INKROND

How well can you manage on the total income of your household (as mentioned in the second from last question)? .....

1 very hard .....	FINSITU
2 hard .....	FINSITU
3 neither hard nor easy .....	FINSITU
4 easy .....	FINSITU
5 very easy .....	FINSITU

43) FINSITU

How is the financial situation of your household at the moment?

1 I am/we are in debt .....	INKEVEN
2 I am/we are drawing upon our savings .....	INKEVEN
3 I can/we can just about manage .....	INKEVEN
4 I can/we can save some money .....	INKEVEN
5 I can/we can save a lot of money .....	INKEVEN

44) INKTOE

The TOTAL NET INCOME OF YOUR HOUSEHOLD consists of the income of all members of the household, after deduction of taxes, taken as the sum total over the past 12 months. Do you think, taking into account possible changes within the household, the total net income of your household will increase, remain the same, or decrease, IN THE NEXT 12 MONTHS?

1 increase .....	INKTOEHO
2 remain the same .....	INKZEKER
3 decrease .....	INKTOELA

45) INKTOEHO

By what PERCENTAGE do you think the total net income of your household will increase IN THE NEXT 12 MONTHS?

percentage: .....

	INKZEKER
--	----------

46) INKTOELA

By what PERCENTAGE do you think the total net income of your household will decrease IN THE NEXT 12 MONTHS?

percentage: .....

	INKZEKER
--	----------

47) INKZEKER

How certain do you feel about this change of income?

1 very certain .....	INKZEK1
2 rather certain .....	INKZEK1
3 not very certain .....	INKZEK1
4 not at all certain .....	INKZEK1

With the next few questions, you will be asked to choose a number between 1 and 7.

highly unlikely							highly likely
1	2	3	4	5	6	7	

We would like to know a bit more about your expectations of the next 12 months. Below we have presented a number of possible changes in income. Please indicate with any of those changes, how likely you think it is that the total income of your household will change by that percentage IN THE NEXT 12 MONTHS. If you don't know, type 0 (zero).

- 48) INKZEK1  
rise in income of more than 15% ..... INKZEK2
- 49) INKZEK2  
rise in income between 10 and 15%..... INKZEK3
- 50) INKZEK3  
rise in income between 5 and 10%..... INKZEK4
- 51) INKZEK4  
no significant change in income ..... INKZEK5
- 52) INKZEK5  
drop in income between 5 and 10% ..... INKZEK6
- 53) INKZEK6  
drop in income between 10 and 15% ..... INKZEK7
- 54) INKZEK7  
drop in income of more than 15%..... INK5
  
- 55) INK5 Do you think the total net income of your household will increase, remain the same, or decrease, in the NEXT FIVE YEARS?  
 1 increase ..... INK5HO  
 2 remain about the same..... INK5ZEK  
 3 decrease ..... INK5LA
  
- 56) INK5HO  
 By what PERCENTAGE do you think the TOTAL net income of your household will increase in THE NEXT FIVE YEARS?  
 percentage: ..... INK5ZEK
  
- 57) INK5LA  
 By what PERCENTAGE do you think the TOTAL net income of your household will decrease in THE NEXT FIVE YEARS?  
 percentage: ..... INK5ZEK
  
- 58) INK5ZEK  
 How certain do you feel about this change in income?  
 1 very certain ..... INKLOON  
 2 rather certain ..... INKLOON  
 3 not very certain ..... INKLOON  
 4 not at all certain..... INKLOON
  
- 59) HOEVOPZY  
 About how much money has your household put aside IN THE PAST 12 MONTHS? If you really don't know, type 0 (zero).  
 1 less than Dfl. 3,000..... OPZIJ12  
 2 3,000 - 10,000..... OPZIJ12  
 3 10,000 - 25,000..... OPZIJ12  
 4 25,000 - 40,000..... OPZIJ12  
 5 40,000 - 75,000..... OPZIJ12  
 6 75,000 - 150,000..... OPZIJ12  
 7 150,000 or more..... OPZIJ12

60) SPAARGEW

Which of the statements mentioned below provides the best description of your (household's) ways to save money?

- 1 I do not save, usually I spend more than my income ..... SPAARM01
- 2 I do not save, usually all the income is spent ..... SPAARM01
- 3 I do not really try to save, but usually I have some money left by the end of the year ..... SPAARM01
- 4 I save whatever is left by the end of the month, no particular intention..... SPAARM01
- 5 I save all irregular income, and spend all regular income ..... SPAARM01
- 6 I save regularly by putting money aside every month..... SPAARM01
- 0 don't know ..... SPAARM01

We would now like to ask you some questions about your personal opinion about saving. People have many different reasons for saving money for a short or for a long time. Please indicate your opinion about each statement mentioned below. Is it to you personally of much or of little importance? If you really don't know, type 0 (zero).

very						very
unimportant						important
1	2	3	4	5	6	7

- 61) SPAARM01 to leave money to my children (or other relatives)..... SPAARM02
- 62) SPAARM02 to give presents or other gifts to my (grand)children ..... SPAARM03
- 63) SPAARM03 to have some savings to cover unforeseen expenses as a consequence of illness or accidents SPAARM04
- 64) SPAARM04 to have some savings in case I or a member of my family get(s) unemployed ..... SPAARM05
- 65) SPAARM05 to supplement (in future possibly lower) general old-age pension..... SPAARM06
- 66) SPAARM06 to supplement my retirement pension, and to have some extra money to spend when I am retired ..... SPAARM07
- 67) SPAARM07 to pay for my children's (or other relatives=) education ..... SPAARM08
- 68) SPAARM08 to buy durable goods such as furniture, electric appliances, or bicycles in the future..... SPAARM09
- 69) SPAARM09 to generate income from interests or dividends ..... SPAARM10
- 70) SPAARM10 to buy a house in the future ..... SPAARM11
- 71) SPAARM11 to set up my own business..... SPAARM12
- 72) SPAARM12 as a reserve to cover unforeseen expenses..... SPAARM13
- 73) SPAARM13 to have enough money in my bank account to be sure I will be able to meet my financial liabilities.....STIGSB01

The following statements are concerned with saving. Please, indicate to what extent you agree or disagree with each statement.

- 74) STIGSB01 I save to create a larger freedom of choice and to be more independent .....STIGSB02
- 75) STIGSB02 I always try to pick saving plans that yield high profits. ....STIGSB03
- 76) STIGSB03 In general, it is a good idea to be able to buy a care on the instalments plan. ....STIGSB04
- 77) STIGSB04 Being careful with money is an important character trait. ....STIGSB05
- 78) STIGSB05 With financial affair, I tend to listen carefully to advice by family or friends. ....STIGSB06

- 79) STIGSB06  
To me, the service of a bank is very important. .... STIGSB07
- 80) STIGSB07  
Banks are only appropriate for people who have much money ..... STIGSB08
- 81) STIGSB08  
It is important to always save as much as possible, and only to spend money  
on things that are strictly necessary. .... STIGSB09
- 82) STIGSB09  
I try to have enough money in my bank accounts to be sure I will be  
able to meet my financial liabilities. .... STIGSB10
- 83) STIGSB10  
It is important to have some money left at the end of the month ..... STIGSB11
- 84) STIGSB11  
People who buy on instalment are wasters. .... STIGSB12
- 85) STIGSB12  
I am very interested in financial matters (insurance, investments, etc.) ..... STIGSB13
- 86) STIGSB13  
It is not a good idea to borrow money to be able to go on holidays ..... STIGSB14
- 87) STIGSB14  
I reserve part of my salary to save it ..... STIGSB15
- 88) STIGSB15  
I always keep some reserve money because my income varies during the year. .... STIGSB16
- 89) STIGSB16  
Saving should be encouraged in today's society. .... STIGSB17
- 90) STIGSB17  
People who are successful in saving are also successful in life ..... STIGSB18
- 91) STIGSB18  
If I compare myself with my friends, I think in general I am (financially) better off. .... STIGSB19
- 92) STIGSB19  
For me, there is no need to save because my income will rise significantly in the future ..... STIGSB20
- 93) STIGSB20  
Most people in my environment are saving money ..... STIGSB21
- 94) STIGSB21  
Because of the social security system in our country, there is no need to save money. ....

The following questions concern your preferences with respect to future possibilities compared to the present. We would like to know whether you prefer to receive things at once, or whether you prefer to wait a while before receiving them. There are no right or wrong answers to these questions. We are interested in your personal preference.

- 95) TIJD1  
Imagine you win a cash prize in a lottery. The prize is worth Dfl. 1,000 and can be paid out AT ONCE. Imagine the lottery, which is a financially trustworthy organization, asks if you are prepared to wait 3 months before you get the prize. Would you agree on that proposal, or would you ask for more money if you had to wait for 3 months?  
1 I would agree on the waiting term of 3 months without the need to receive extra money for that. So, after 3 months I receive Dfl. 1,000. .... TIJD3  
2 I would agree on the waiting term of 3 months, but I want to receive extra money for that. .... TIJD2
- 96) TIJD2  
How much EXTRA money (in guilders) do you want to receive AT LEAST, in addition to the Dfl. 1,000, to compensate for the waiting term of 3 months?  
number of guilders: ..... TIJD3
- 97) TIJD3  
Imagine the cash prize that you win in the lottery is worth Dfl. 100,000. The lottery asks if you are prepared to wait 3 MONTHS before you get the prize. What would you prefer?  
1 I would agree on the waiting term of 3 months without the need to receive extra money for that. So, after 3 months I receive Dfl. 100,000. .... TIJD5  
2 I would agree on the waiting term of 3 months, but I want to receive extra money for that. .... TIJD4

98) TIJD4

How much EXTRA money (in guilders) do you want to receive AT LEAST, in addition to the Dfl.100,000, to compensate for the waiting term of 3 months?

number of guilders: ..... TIJD5

99) TIJD5

Imagine the lottery asks if you are prepared to wait a YEAR before collecting the prize of Dfl. 100,000. What would you prefer:

1 I would agree on the waiting term of a year without the need to receive extra money for that. So, after a year I receive Dfl. 100,000. .... TIJD7

2 I would agree on the waiting term of a year, but I want to receive extra money for that. .... TIJD6

100) TIJD6

How much EXTRA money (in guilders) do you want to receive AT LEAST, in addition to the Dfl. 100,000, to compensate for the waiting term of a year?

number of guilders: ..... TIJD7

101) TIJD7

Imagine you receive an assessment for tax arrears. To settle the payment, you have two options. One option is paying Dfl. 1,000 NOW. The other option is paying LATER, but in that case you have to pay MORE. What would you prefer?

1 I would pay Dfl. 1,000 now. .... TIJD9

2 I pay 3 months later, and I am prepared to pay more for that. .... TIJD8

102) TIJD8

How much EXTRA money (in guilders) would you be prepared to pay AT MOST, in addition to the Dfl. 1,000, to get the extension of payment of 3 months?

number of guilders: ..... TIJD9

103) TIJD9

Imagine you could wait a YEAR with settling the tax assessment of Dfl. 1,000. What would you prefer?

1 I would pay Dfl. 1,000 now. .... TIJD11

2 I pay a year later, and I am prepared to pay more for that. .... TIJD10

104) TIJD10

How much EXTRA money (in guilders) would you be prepared to pay AT MOST, in addition to the Dfl. 1,000, to get the extension of payment of a YEAR?

number of guilders: ..... TIJD11

The following questions are similar to the questions above, but now the question is how much LESS you would be prepared to receive, if you receive something at once compared to receiving it later.

105) TIJD11

Imagine the cash prize that you win in the lottery is worth Dfl. 1,000, but is paid out only after 3 MONTHS. The lottery, however, offers to pay out at once, but in that case you will receive less.

What would you prefer:

1 I would wait 3 months, and receive Dfl. 1,000. .... TIJD13

2 I would like to have the money now, and receive less. .... TIJD12

106) TIJD12

How much LESS money (in guilders) would you be prepared to receive AT MOST, if you would get the money at once instead of Dfl. 1,000 after 3 MONTHS?

number of guilders: ..... TIJD13

107) TIJD13

Now imagine the prize is paid out only after A YEAR. What would you prefer?

1 I would wait a year, and receive Dfl. 1,000. .... TIJD15

2 I would like to have the money now, and receive less. .... TIJD14

108) TIJD14

How much LESS money (in guilders) would you be prepared to receive AT MOST, if you would get the money at once instead of Dfl. 1,000 after A YEAR?

number of guilders: ..... TIJD15

109) TIJD15

Imagine the prize is worth Dfl. 100,000, but is only paid out after 3 MONTHS. What would you prefer?

1 I would wait 3 months, and receive Dfl. 100,000. .... TIJD17

2 I would like to have the money now, and receive less. .... TIJD16

110) TIJD16

How much LESS money (in guilders) would you be prepared to receive AT MOST, if you would get the money at once instead of Dfl. 100,000 after 3 MONTHS?

number of guilders: ..... TIJD17

111) TIJD17

Imagine the prize is worth Dfl. 100,000, but is only paid out after A YEAR. What would you prefer?

1 I would wait a year, and receive Dfl. 100,000. ....ROUTING VARIABLE

2 I would like to have the money now, and receive less. .... TIJD18

112) TIJD18

How much LESS money (in guilders) would you be prepared to receive AT MOST, if you would get the money at once instead of Dfl. 100,000 after A YEAR?

number of guilders: .....ROUTING VARIABLE

People have different opinions about planning financial affairs. Some people find it important to plan in advance, other people manage without much planning. The following questions concern planning financial affairs.

113) UITGEVEN

Some people spend all their income immediately. Others save some money in order to have something to fall back on. Please indicate what you do with money that is left over after having paid for food, rent, and other necessities. Are you the sort of person that likes to spend his/her money immediately, or are you the sort of person that tries to save as much as possible, or are you somewhere in between those two extremes? If you really don't know, type 0 (zero).

I like to spend all my money immediately

1      2                  3                  4                  5                  6

I want to save as much as possible

7

114) PLANNEN

Many people find it difficult to plan or control their expenditures. Do you find it difficult to control your expenditures? If you really don't know, type 0 (zero).

no, very easy

1      2                  3                  4                  5                  6

yes, very difficult

7 .....PERIODE1

115) PERIODE1

People use different time-horizons when they decide about what part of the income to spend, and what part to save. Which of the time-horizons mentioned below is in your household MOST important with regard to planning expenditures and savings?

1 the next couple of months.....PERIODE2

2 the next year.....PERIODE2

3 the next couple of years .....PERIODE2

4 the next 5 to 10 years.....PERIODE2

5 more than 10 years from now .....PERIODE2





123) TEG3	1	2	3	4	5	6	7	
	easily get worried							not easily get worried..... TEG4
124) TEG4	1	2	3	4	5	6	7	
	flexible, ready to adapt myself							stubborn, persistent..... TEG5
125) TEG5	1	2	3	4	5	6	7	
	quiet, calm							vivid, vivacious ..... TEG6
126) TEG6	1	2	3	4	5	6	7	
	carefree							meticulous..... TEG7
127) TEG7	1	2	3	4	5	6	7	
	shy							dominant ..... TEG8
128) TEG8	1	2	3	4	5	6	7	
	not easily hurt/offended							sensitive, easily hurt/offended ..... TEG9
129) TEG9	1	2	3	4	5	6	7	
	trusting, credulous							suspicious..... TEG10
130) TEG10	1	2	3	4	5	6	7	
	oriented towards reality							dreamer ..... TEG11
131) TEG11	1	2	3	4	5	6	7	
	direct, straightforward							diplomatic, tactful..... TEG12
132) TEG12	1	2	3	4	5	6	7	
	happy with myself							doubts about myself..... TEG13
133) TEG13	1	2	3	4	5	6	7	
	creature of habit							open to changes ..... TEG14
134) TEG14	1	2	3	4	5	6	7	
	need to be supported							independent, self-reliant..... TEG15
135) TEG15	1	2	3	4	5	6	7	
	little self-control							disciplined..... TEG16
136) TEG16	1	2	3	4	5	6	7	
	well-balanced, stable							irritable, quick-tempered.....
137) TEGA1	1	2	3	4	5	6	7	
	nervous							relaxed ..... TEGA2
138) TEGA2	1	2	3	4	5	6	7	
	like to try things							conservative ..... TEGA3
139) TEGA3	1	2	3	4	5	6	7	
	trained thinker							untrained thinker ..... TEGA4
140) TEGA4	1	2	3	4	5	6	7	
	gentle							rough..... TEGA5
141) TEGA5	1	2	3	4	5	6	7	
	worried							unconcerned ..... TEGA6
142) TEGA6	1	2	3	4	5	6	7	
	imaginative							down to earth..... TEGA7
143) TEGA7	1	2	3	4	5	6	7	
	aimed at proving myself							indulgent ..... TEGA8
144) TEGA8	1	2	3	4	5	6	7	
	friendly							cold ..... TEGA9
145) TEGA9	1	2	3	4	5	6	7	
	principled							carefree ..... TEGA10
146) TEGA10	1	2	3	4	5	6	7	
	critical							accommodating ..... TEGA11
147) TEGA11	1	2	3	4	5	6	7	
	prefer to be independent							prefer to be in other people's company TEGA12
148) TEGA12	1	2	3	4	5	6	7	
	artificial							natural..... TEGA13
149) TEGA13	1	2	3	4	5	6	7	
	self-controlled							moody..... TEGA14
150) TEGA14	1	2	3	4	5	6	7	
	self-confident							timid ..... TEGA15
151) TEGA15	1	2	3	4	5	6	7	
	good at handling stress							not good at handling stress..... TEGA16
152) TEGA16	1	2	3	4	5	6	7	
	always want new experiences							want a quiet life



## APPENDIX 4: THE ASSET COMPONENTS

In this appendix, the definitions and construction of the savings variables will be described. The assets questionnaire is extensive and covers many different asset components. Examples of how the questions were asked are given in Appendix 3. Detailed questions were asked about the following assets:

### 1) Checking accounts (CHAC)

Checking accounts are private accounts with a bank or giro to which salary or benefits-payments are transferred and from which it is possible to make payments.

### 2) Employer-sponsored savings plans (EMPSP)

An employer-sponsored savings plan is an arrangement in which part of the salary is withheld and saved. Employers grant premiums on the saved sum.

### 3) Post bank savings accounts (POSTB)

The Dutch Post bank offers a number of savings arrangements that are linked to a Post bank account. With these arrangements, money is transferred and withdrawn by giro bank transfer forms.

### 4) Deposit books and savings and deposit accounts (DEPB AND SAVAC)

A deposit book is a book in which saving deposits and savings interests are recorded. A savings account is an account that yields interest as of the first day a deposit is made.

Respondents are asked about balances on the accounts listed above (1-4) as of 31<sup>st</sup> of December each year. Saving in 1994 was measured by calculating the differences in the balance as of December 1993 and 1994.

### 5) Saving certificates (CERTI)

Saving certificates are securities with a set date for a set sum of repayment. The interest is usually included in the sum of repayment. Respondents are asked about how much they paid for the certificates and how much they are to be repaid for the certificates. Savings in saving certificates are defined as the mean of these two figures. If one of the values is missing, the other value is counted as the savings in saving certificates. Saving in certificates in 1994 is measured by calculating changes in savings in certificates between December 1993 and 1994.

### 6) Single-premium annuity insurance policies (ANNINS)

A single-premium annuity insurance policy is a life insurance policy taken out with a single premium payment. At the end of the insurance term, it is possible to buy an annuity. The premium can be deducted from the taxable income. The payment (annuity) is taxable. The annuity entitles periodic payments that end, at the latest, with the holder's death. Saving for 1994 is calculated as the difference in the estimated value of the insurance policies as of 31<sup>st</sup> of December 1993 and 1994 respectively.

### 7) Savings or endowment insurance policies (ENDINS)

A savings or endowment insurance policy is a life insurance policy that pays out an agreed sum at the end term of the insurance or at the time of death when this is earlier than the end term. The paid premiums cannot be deducted from the taxable income. The single payment is tax-free as long as it does not exceed the tax-free sum and the periods of premium payments are paid for less than 12 years. Saving in endowment

insurance policies is measured by calculating the difference in the total sum that the respondent had saved through their savings or endowment insurance policies as of 31<sup>st</sup> of December each year.

8) Combined life insurance policies (LIFINS)

A combined life insurance is an insurance that is paid out at the time of death or when the policyholder has reached a certain age. Saving in life insurance policies is measured by calculating the difference in the total sum that the respondent had saved through these policies as of 31<sup>st</sup> of December each year.

9) Individual retirement pension schemes (PRVPEN)

Individual pension schemes are pension schemes with an insurance company that are not partly paid for by the employer. Respondents are asked about how much they pay in premium each year on their individual pension scheme. This is used as a measure of yearly saving for this asset component.

10) Growth funds (GRWFU)

A growth fund is an investment fund that does not pay out interest or dividends, but invests dividend returns in the fund itself. Respondents were asked about the value of their investment in growth funds as of 31<sup>st</sup> of December each year. Saving was estimated by calculating the change in this value in 1994.

11) Mutual funds or mutual fund accounts (MUTFU)

Mutual funds are created by institution that invest money from individual savers in joint programs. Respondents were asked about the value of their investment in mutual funds as of 31<sup>st</sup> of December each year. Saving was estimated by calculating the change in this value during 1994.

12) Bonds and/or mortgage bonds (BONDS)

Bonds are loans to the government, companies, or institutions. Bonds yield interest through a fixed interest rate. A mortgage bond is an obligation/debenture issued by a mortgage bank. Respondents were asked about the value of their investment in bonds as of 31<sup>st</sup> of December each year. Saving is estimated by calculating the change in this value over 1 year (1994).

13) Shares (SHARES)

Respondents were asked about the market value of their shares as of 31<sup>st</sup> of December each year. Saving was estimated by calculating the change in the market value over one year (1994).

14) Bought or written put options and call options (BPUTOP, WPUTOP, BCALLOP, WCALLOP)

An option is a right (with a limited period of validity) to buy shares or to make other investments. The price of buying and selling these options is set in advance by the option-selling institution. A put-option yields the right (not the obligation) to sell a certain underlying value by the exercise price, to one of the writers of such an option. A call option yields the right to (during a certain period) to buy a standard number of the underlying value of that option by a fixed exercise price. Falcons and warrants are comparable to call-options. The respondents are asked about the value of their bought or written options as of 31<sup>st</sup> of December each year. Saving for 1994 is estimated by calculating the difference in values of options between December 1993 and 1994.

15) Money lent out to family or friends (PRIVLO)

Respondents are asked about how much they had lent out to families and friends as of 31<sup>st</sup> of December each year. Saving in 1994 is estimated by calculating the difference in total amounts lent out in December 1993 and 1994.

## 16) Other savings not mentioned before (OTHSA94)

In the end of the part of the questionnaire that concerns different types of saving, the respondents are asked whether they have other types of saving or investments than those already reported, and if they have, they are asked to estimate the value of these investments. Saving is measured by calculating the difference in the value of these assets between December 1993 and 1994.

In addition to these monetary forms of saving, the respondents are asked about the value of the following assets:

## 17) Value of real estate not being used for own accommodation (REALEST)

By real estate is meant land and the buildings on that land, including goods that by their use belong to it and the right to those goods.

## 18) Value of cars, motorbikes, boats, or caravans (CARS, MOTORB, BOATS, CARAV)

The respondents are asked about estimated market value of cars, motorbikes, boats, or caravans as of 31<sup>st</sup> of December each year.

## 19) Value of accommodation and value of second residence (HOUSE, HOUSE2)

In the questionnaire about accommodation and mortgages, the respondents who own their accommodation are asked to estimate the value of their accommodation and of any second residence. The questions do not concern a special date except "the present". In this study, the estimated market value given in the first wave of data collection (May 1994) is used as an estimated of value of the respondents' residence.

Questions were asked about the following loans and mortgages:

## 20) Private loans (PRDEBT)

With a private loan, the whole sum is made available to the person taking out the loan at one time.

## 21) Extended lines of credit (CREDIT)

An extended line of credit is an arrangement that enables the debtor to withdraw money up to a specified limit.

## 22) Outstanding debts on hire-purchase contracts, debts based on payment by instalment and/or equity-based loans (DEBTS)

This category of loans includes outstanding debts on hire-purchase contracts, debts based on payment by instalment as well as equity loans. Debt based on payment by instalment does not involve any reception of money, but just the object that was bought. The object is the buyer's property from the moment the deal is made. Usually, the loan is paid back by paying monthly amounts to cover interest and repayment. Debt based on hire-purchase contract has similar characteristics as instalment buying, except that the object is not the buyer's property before the whole loan (+ interest) has been paid off. An equity-based loan means that the debtor gives an asset (like a house or stocks) in pledge. The interest rate is usually the same as the mortgage interest rate.

## 23) Outstanding debts with mail order firms, shops or other sorts of retail business (INSTAL)

The respondents were also asked whether they had other outstanding debts with a mail-order firm, shop(s) or other sorts of retail business not mentioned before.

## 24) Number of loans from family or friends (FALOAN)

## 25) Study loans (STULOA)

## 26) Credit cards debt (CRECAR)

Credit card debt was described as “being in the red” on one or more of the respondents’ credit cards.

## 27) Other loans not mentioned before (OTHLOA)

The last question about the respondents’ debt concerns debt “not mentioned before in this questionnaire”, in order to cover other types of loans than those who was specified.

Respondents were asked about the remaining debt of their loans and credit lines (described in 18-25 above) as of 31<sup>st</sup> December each year. Saving is measured as the difference in remaining debt in December 1993 and 1994. Down payments on the loans are counted as saving, while new loans (subtracted by possible down payments in the year the loan was taken out) are counted as dissaving.

In addition, respondents were asked about mortgages on their accommodation:

## 28) Mortgages on the house, second house, and other real estate (MORTH, MORTH2, MORTG)

The part of the questionnaire that regards accommodation and mortgages associated with it (HS), included questions about how much of the mortgages were left at the time of the interview. Saving in 1994 was estimated by calculating the difference in mortgages reported in the first and second wave of data collection. This period (May 1994 - May 1995) is different from the period chosen as period of analyses, but it is assumed here that down payments on mortgages are done on a regular basis, so that the estimate will be sufficiently accurate.

The data sets that contain data of total amounts per asset components (e.g. the total sum of the balances on checking accounts instead of the balance of 1-10 checking accounts) on respondent level are used<sup>56</sup>. The variables representing saving in 1994 were constructed after merging the files containing assets data concerning December 31<sup>st</sup> in 1993 and 1994 respectively. After merging and cleaning the files so that the file only contained complete couples (both head of household and spouse/partner when the household consisted of a couple), 2793 individuals in 1610 households remained.

### Data Cleaning

A frequent problem when measuring assets is that respondents are reluctant to provide information about the value of their assets (e.g. Ferber, 1966; Maynes, 1965; Wentland, 1993). Often, they might admit that they own, for example, a bank account, while they refuse to give information about the balance of the account. Hence, financial data from households often suffer from the problem with missing observations. In this section, the degree of the missing data and the ways the missing data problem were handled are described.

As shown in Appendix 3, respondents who were unable or unwilling to answer the open-ended questions about values of assets or balances of accounts could give an answer by choosing one of several brackets. In this study, the mid-values of the brackets were used as a measure of the value of the relevant components. For the last brackets, which are defined only

---

<sup>56</sup> The files are called *agw94en* and *agw95en* respectively and can be downloaded from CentER. These files have been subject to some cleaning. Documentation about the procedures followed can be found in the file HSE-doc.txt at the same ftp-site.

by a lower bound (e.g. Dfl. 300 000 or more), the lower bound was used as a measure of the value of the component. The last bracket was used 21 times in the second wave and 16 times in the third wave across all asset components. Hence, the possible underestimation of these assets caused by the use of the lower bound does not affect many respondents.

Table A4-1  
Missing values pr. asset component

ASSET COMP.	Number and ratios of missing values					
	Dec. 1993 (Second wave)			Dec. 1994 (Third wave)		
	Numb. of "Don't knows"	Total numb. of ownership	Ratio of "Don't knows".	Numb. of "Don't knows"	Total numb. of ownership	Ratio of "Don't knows"
CHAC	101	3050	3,3%	153	3043	5,0%
POSTB	46	1105	4,2%	51	1002	5,1%
DEPBO	73	854	8,6%	57	663	8,6%
SAVAC	76	1234	6,2%	78	1106	7,1%
PRIVLO	16	180	8,9%	18	168	7,1%
MUTFU	56	468	12,0%	55	453	12,1%
GRWFU	32	231	13,9%	15	205	7,3%
CERTI	14	382	3,7%	9	360	2,5%
BONDS	19	115	16,5%	25	100	25,0%
SHARES	58	625	9,3%	125	688	18,2%
BPUTOP	10	21	47,6%	7	11	63,6%
WPUTOP	10	16	62,5%	9	12	75,0%
BCALLOP	13	28	46,4%	12	31	38,7%
WCALLOP	15	28	53,6%	8	13	61,5%
OTHS94	30	80	37,5%	35	99	35,4%
EMPSP	16	356	4,5%	36	748	4,8%
STULOA	3	74	4,1%	4	61	6,6%
FALOAN	1	85	1,2%	4	74	5,4%
PRDEBT	5	160	3,1%	13	146	8,9%
MORTG	6	47	12,8%	1	45	2,2%
MORTH	23	925	2,5%	47	1050	4,5%
MORTH2	2	16	12,5%	4	22	18,2%
CREDIT	23	382	6,0%	36	350	10,3%
INSTAL	5	51	9,8%	8	43	18,6%
DEBTS	9	57	15,8%	9	52	17,3%
CRECAR	6	26	23,1%	8	31	25,8%
OTHLOA	2	36	5,6%	6	50	12,0%
ANNINS	60	664	9,0%	78	681	11,5%
ENDINS	61	244	25,0%	52	223	23,3%
LIFINS	131	397	33,0%	143	349	41,0%
PRVPEN	53	92	57,6%	20	69	29,0%
REALEST	3	134	2,2%	6	119	5,0%
HOUSE	35	1071	3,3%	38	1082	3,5%
HOUSE2	2	58	3,4%	1	58	1,7%
CARS	69	1507	4,6%	107	1526	7,0%
MOTORB	12	89	13,5%	7	82	8,5%
BOATS	25	87	28,7%	16	74	21,6%
CARAV	44	189	23,3%	56	194	28,9%

N=2679. The sample consists of heads of households and any spouses/partners who answered the wealth questionnaires in both the second and third wave of data collection. Households lacking information from one spouse were excluded from the sample.

The original files containing the assets data are large and complicated. Therefore, files in which the total sum of each asset component can be found have been constructed. In these files, missing values have been substituted with zeros. In order to be able to distinguish between “correct” zeros (the respondent doesn’t have the asset) and zeros caused by a “don’t know” answer (respondent says s/he owns a particular asset, but does *not* report the balance or value of it), separate flag variables were constructed for indicating the presence of “don’t know” answers. In table A4-1, the numbers of don’t know answers associated with the different asset components are compared with the total number of ownerships of each component for December 1993 and 1994 respectively.

Table A4-1 shows that the ratios of missing values are quite low for different types of bank accounts, mortgages, and loans, while for other types of assets components, there were more missing values than valid ones (for example, different types of options). The reason why there are so many missing values for assets such as options, pension arrangements and insurance policies, is that these are complicated asset components for which it is difficult to assess a present value. This difficulty with assessing a value is associated with many assets that can be characterised as investments.

Because of any possible substitution effects between investment savings and saving in bank accounts, it is desirable to include as many assets components as possible in the definition of saving. However, too many missing values in a variable will lead to difficulties in assessing the saving that took place between the two points in time at which assets were measured. A missing value at the beginning or the end of a year might cause the estimated saving in that asset to be highly over- or underestimated. The fact that a large portion of the respondents had obvious problems with answering questions about a particular asset also gives doubts about the accuracy of the valid values. For the purpose of this study, assets components for which missing values constitute more than 35% of the total number of components owned by the panel members are not used. Hence, the four variables containing information about the value of options as well as the variables “other types of saving”, “life insurance” and “private pension arrangements” will not be included in the operational definition of saving.

The exclusion of the seven assets components implies that estimates of total savings at the end of each year are underestimated in this study. It also suggests that the degree of underestimation is not constant across the respondents. Probably, the underestimation is largest among respondents with the most diversified savings portfolios. The extent to which this causes the saving that took place in 1994 to be under- or overestimated is difficult to assess because we do not know whether the changes in the values of the assets were large and either positive or negative.

In addition to excluding variables that contained over 30% missing values, respondents who gave a “don’t know” answer for a substantial number of asset components are also excluded. Table A4-2 shows an overview of the frequencies of the sum of “don’t know” answers across the two waves (excluding “don’t know” answers given to the seven assets components not included in the operational definition of saving). Nearly 70% of the individuals in the sample did not give any “don’t know” answers. Over 99% of the sample had 10 “don’t know” answers or less. The results are less encouraging when counting the number of don’t know answers on the household level. Only some 56% of the households had no “don’t know” answers, while over 90% of the households had three or less. Households with more than three “don’t know” answers were excluded from the sample. After this cleaning, 2339 individuals in 1365 households remained.



Furthermore, some of the minimum and maximum values of discretionary and contractual saving were examined. Often these were caused by a respondent reporting a value of an asset in only one of the years for one or several assets. Households found to give incomplete information in one of the years were also deleted.

Table A4-2  
Number of "don't know" answers at the individual level

No. Don' know	Frequ.	Val. %	Cum. %
0	1816	69.8	69.8
1	399	15.3	85.2
2	155	6.0	91.1
3	88	3.4	94.5
4	44	1.7	96.2
5	29	1.1	97.3
6	14	.5	97.8
7	16	.6	98.5
8	4	.2	98.6
9	6	.2	98.8
10	8	.3	99.2
11	2	.1	99.2
12	6	.2	99.5
13	2	.1	99.5
15	2	.1	99.6
16	2	.1	99.7
17	2	.1	99.8
18	2	.1	99.8
20	1	.0	99.9
22	1	.0	99.9
26	1	.0	100.0
29	1	.0	100.0
Total	2679	100.0	

Table A4-3  
Number of "don't know" answers at the household level

No. Don' know	Frequ.	Val. %	Cum. %
0	856	56.1	56.1
1	298	19.5	75.7
2	132	8.7	84.3
3	79	5.2	89.5
4	44	2.9	92.4
5	29	1.9	94.3
6	22	1.4	95.7
7	15	1.0	96.7
8	8	.5	97.2
9	11	.7	98.0
10	7	.5	98.4
11	3	.2	98.6
12	3	.2	98.8
13	3	.2	99.0
14	2	.1	99.1
15	2	.1	99.3
16	2	.1	99.4
17	1	.1	99.5
18	1	.1	99.5
19	1	.1	99.6
20	3	.2	99.8
26	1	.1	99.9
29	1	.1	99.9
48	1	.1	100.0
Total	1525	100.0	



## APPENDIX 5: CONSTRUCTION OF THE HOUSEHOLD INCOME VARIABLE

### Definition of individual gross income

The income questionnaire used for collecting income information is detailed and includes a long range of income components (examples of the question formulations are shown in Appendix 3). The questions are about individual income, and all panel members older than 15 years are supposed to answer them. The questionnaire also contains some questions about taxable income and the total net income of the household. Employees at CentER have constructed a dataset at respondent level in which different sources of incomes have been added up. This file is used here. It is, more specifically, the aggregated income file from 1995 (*agi95en.por*) with some additional variables merged from the income95 file (*inc95en.por*) and the household information file (*hhi95en.por*). The data in these files cover the fiscal year 1994. Only responses from heads of households and their spouse/partner are included in the file used for this study (position in household is either head of household, spouse or unmarried partner)<sup>57</sup>.

Some of the values of income and tax in the *agi94en.por* file were inputted based on the computer program "Brunet". This was done for respondents who had either answered the question about withheld income tax or net gross income. With the Brunet program, the missing values of withheld income tax and premiums for social insurance policies can be derived from the gross income, or the gross income can be derived from the net income.

Previous studies on the accuracy of income data indicate that detailed questions about different income components produce more accurate income data than questions about total income (e.g. Grondil & Michaud, 1994). This is because people forget or fail to consider certain types of income sources and thereby underestimate their total income. For this reason, information about different income components is used for constructing a measure of total income for the respondents who have provided such information. Gross household income is defined as the sum of the following income sources:

$$BTOT = LOON + VUT + AOW + PENS + WW + ZW + WG + AAW + WAO + AWW + RWW + ABW + IOAW + OG + ALIM + WINST + RENTE + HWF + HPREM - HTR$$

Where

LOON:	Gross labour income / wage
VUT:	Gross early retirement benefit
AOW :	Gross General old-age pension
PENS:	Gross Retirement pension (incl. Disability pension)
WW:	Gross Short-term unemployment benefit
ZW:	Gross Sickness benefit
WG:	Gross Reduced pay scheme/ Waiting money (unemployment benefit)
AAW:	Gross disability benefit
WAO	Gross disability pension
AWW:	Gross General widow's and orphan's pension

<sup>57</sup> In some households, more than two household members defined themselves as head, spouse, or partner. In these cases, the person with the highest household member number was excluded.

RWW:	Gross Long-term unemployment benefit
ABW :	Gross General social assistance (incl. benefits for self-employed)
IOAW:	Gross benefit for elderly and partly disabled unemployed/self-employed
OG:	Gross income from letting rooms (or other income from real estate)
ALIM:	Gross alimony from/to spouse
WINST:	Gross Profit (self-employed)
RENTE:	Gross Interest/dividends/other income
HWF:	Imputed tax for homeowners/ rateable value of accommodation
HPREM:	Subsidy for buying a house (Government contribution to home owners)
HTR:	Interest on mortgages

The BTOT variable had 3565 valid values (4327 cases). 762 (17.6%) cases had a missing value since the respondent had not filled in a valid answer to one or more of the income components. Most missing values were caused by a missing value for labour income. 30 cases had a negative value for gross income. Since the number of missing cases is substantial and a missing data analyses revealed that the missing data were not missing completely at random intervals, missing values are replaced by alternative observations of personal or household income and by estimating values using the methods of expectations maximisation and maximum likelihood. The imputations are done in several steps.

#### Replacing missing values with observed values for taxable income

First, missing values and negative values for BTOT are replaced with valid answers to questions about taxable income. In addition, values of BTOT below 10,000 guilders were substituted with values for taxable income if that was higher than 10,000 guilders. The questionnaire contained four questions about taxable income.

First, the following question was asked:

*“Do you know how much your taxable income was for 1994?”*

Those who answered “yes” to this question (38.8% of the sample), were asked

*“How much was your taxable income for 1994?” (TI1).*

Those who answered “no” to the question (22.1% of the sample), were asked

*“Can you give an estimation of your taxable income for 1994?”, (TI2).*

If they still did not give a valid answer, they were asked

*“It’s unfortunate that you don’t know your taxable income for 1994. Perhaps you know (about) how much your taxable income was for 1993?” (TI3).*

The Pearson correlation coefficients between valid values of BTOT and the valid values of the three questions about taxable income were .93, .78, and .22 for IT1, IT2 and IT3 respectively. Hence, IT1 and IT2 are used for replacing missing observations and for substituting negative or low values for BTOT. IT3 was not used since the correlation between valid answers to this question and the BTOT was not significant.

The highly significant correlation coefficients (both at the .01 level) between valid answers to both BTOT and either IT1 or IT2 do not necessarily mean that IT1 and IT2 are good estimates for missing observations of BTOT. Missing values of BTOT are caused by the fact that the respondent failed to fill in the income questionnaire accurately, and their answer to IT1 or IT2 might therefore be inaccurate too. Nevertheless, it seems reasonable to expect that answers

about taxable income will provide reliable estimates of the missing value of BTOT. After replacing missing values for BTOT with valid values for taxable income (191 cases) and substituting negative (10 cases) and low values (22 cases) of BTOT with taxable income when it was higher than BTOT, the number of negative values was reduced to 20 and the number of missing to 571 (13.2%) of the sample.

#### Definition of household net income

Responses to another income question could also be used for replacing missing values of income. One of the last questions in the income questionnaire is about the net income of the household in the previous year. This question has the following wording

*Do you know, approximately, how much the net income of your household would amount to over 1994?*

Those who answered “yes” (55.3% of the sample) received the following question:

*“On the next screen you will be asked how much, approximately, the TOTAL NET INCOME OF YOUR HOUSEHOLD AS A WHOLE has been over the period 1 January 1994 through 31. December 1994. The total net income of the household means the sum of net incomes of all household members. By net income, we mean the income after deduction of taxes, but before making payments for things like rent, mortgages, and the like. Please, indicate about how much the TOTAL NET INCOME OF YOUR HOUSEHOLD was over the period 1 JANUARY 1994 through 31 DECEMBER 1994.”*

Answers were given by choosing one of eleven income brackets. The mid-value of the brackets are used for replacements of missing data. When both the head of household and the spouse/partner had answered this question, the average of their response was used as value.

As this question concerns net income on the household level, this data cannot be used directly for replacing missing values of BTOT, which is on individual level and concerns gross income. A new variable is therefore constructed, “NTOT”, which is defined as

$$NTOT = BTOT - IB + HTR$$

where IB represents calculated income tax and HTR is interest on mortgages. As IB had missing values for some of the cases that had missing values for BTOT before the imputation [this word has a negative (criminal) connotation] of taxable income, it was estimated for these cases in accordance with the progressive tax system used in the Netherlands<sup>58</sup>. 133 replacements of missing values for IB were made. Three of the new values were negative, and these were replaced with zeroes.

#### Aggregation to the household level

Before aggregating the income data to the household level, further cleaning of the data was necessary. For many households (498 of 2699), information from one of the partners was missing. These households were deleted from the sample, along with seven other households

<sup>58</sup> The following formulas were used for calculating tax:

If  $0 < BTOT < 43267$  then  $cib = totinc95 * 0.38125$ .

If  $43267 < BTOT < 86531$  then  $cib = 0.38125 * 43267 + 0.5 * (totinc95 - 43267)$ .

If  $BTOT > 86531$  then  $cib = 0.38125 * 43267 + 0.5 * (86531 - 43267) + 0.6 * (totinc95 - 86531)$ .

with inconsistent household information. Then NTOT was aggregated to the household level (HNTOT). This variable contained 437 missing values (19.9 % of the sample of 2194 complete households) and two negative values. Households with a HNTOT less than 12000 guilders, in which one of the partners works more than 16 hours a week, were giving a missing value for HNTOT (113 cases). In addition, households with negative income were assigned a missing value for HNTOT. In total, HNTOT had 462 missing values (21.1 % of the sample).

#### Replacing missing values with alternative observed values of household net income

Answers to the question about net household income were used for imputing missing<sup>59</sup>. The correlation (Spearman's rho) coefficient between HNTOT and the mid-value of the brackets used in the net-income question was .872 and significant at the .01 level. After filling in missing values with the bracket information, 300 missing values remained, and 4 households had income equal to 0. In addition to using the income bracket for replacing some of the missing values, it was also used for replacing low values of HNTOT (below Dfl. 17500). This was done for the households who had indicated that their household net income was over 17500 when choosing an income bracket. Five replacements were made.

#### Definition of household disposable income

As households also have other incomes than those that are subject to taxation, a second income variable called Household Disposable Income (HDI) is constructed. HDI is defined as:

$$\text{HDI} = \text{HNTOT} + \text{ALIK} + \text{BEURS} + \text{STUDLEN} + \text{OTOEL} + \text{FTOEL} + \text{ERF} + \text{HS} + \text{HG} - \text{ZFP} - \text{ZKP}$$

where

ALIK:	Net alimony for children
BEURS:	Scholarship or additional support through government scholarship scheme
STUDLEN:	Study loan (interest-bearing loan through government scholarship scheme)
OTOEL:	Student grant from parents/ parental support for studies
FTOEL:	Net allowance/support from family <sup>4</sup>
ERF:	Net inheritance and/or gifts <sup>60</sup>
HS:	Rent subsidy / net rent allowance
HG:	Net subsidy for tenants (allowance to help adjusting to a new and higher rent)
ZKP:	Premium private health insurance
ZFP:	Premium national health service

HDI had two negative values and one zero, which were substituted with a missing value. HDI had 315 missing values.

#### Estimation and imputation of missing values

Missing values were estimated for both variables. The natural logarithm of the two variables was used in the rest of the analyses as the 'log transformed' variables were closer to the

<sup>59</sup> The difference in the definition of income between the net-income question and the NTOT may represent a problem. If a household member, not being head of household or spouse/partner, has substantial income, they might choose a bracket that overestimates the income of the head and spouse/partner. In this study, we use the income of the head of household and spouse/partner only, and the inclusion of high incomes of other household members is not adequate. However, this problem will not affect many cases.

<sup>60</sup> Inheritance and family support are considered as net sums. The reason for this is that the data do not provide information about the tax rate that should be applied since the tax rate depends on the relationship between the person who gives the money and the person who receives it.

normal distribution. Skewness and kurtosis for (LN)HNTOT were -1.306 and 4.879 respectively, while the corresponding values for (LN)HDI were -.879 and 4.313 (see Table A5-2).

An analysis was carried out in order to check the pattern of missing data. Separate variance *t*-tests showed that an observation of household income was more probable among members in the high-income panel, and in households with two partners, in households with two earners, in households in which the main breadwinner was a man and had high education. The probability for observing income also increased with the age of the main breadwinner. These results show that the observed values of income do not form a random sample of the sampled values of income, which means that income is not Missing Completely at Random (MCAR) (Little & Rubin, 1987). This is also indicated by Little's MCAR test, which is significant. This means that we can reject the null hypothesis that the data are MCAR. When missing is not MCAR, listwise or pair-wise deletion of cases with missing values for income can produce biased estimates and are inadequate methods for handling missing values (i.e. Arbuckle, 1996).

A weaker assumption about the missing observations of income is that they are missing at random (MAR) in the sense that missing values depend on other variables, but not on the value of income. That would mean that observed values of income are not a random subsample of the sampled values, but they form a random sample of the sampled values within subclasses defined by values of education, age, gender, panel and number of earners. If this assumption holds, missing can be estimated by using regression or ML (Maximum Likelihood) estimation (Arbuckle, 1996). According to Arbuckle (1996), ML estimation is a more efficient way in reducing estimation bias caused by the missing data mechanism than the commonly used listwise or pairwise deletion.

Unfortunately, there is no test that can reveal whether the data are missing at random or not within the subclasses of variables. It is therefore difficult to assess whether the MAR assumption holds for the missing values of the LNNTOT and LNNDI variables. However, Little and Rubin (1987) and Muthen, Kaplan and Hollis (1987) suggest that the use of ML will reduce bias even when the MAR condition is not strictly satisfied. Therefore, although there are some doubts about whether missing values of income are MAR, missing values for HNTOT are estimated and imputed by using the EM (Expectation Maximisation and Maximum Likelihood) method provided by the software package SPSS 9.0. Estimation and imputing of missing was also done by multiple linear regressions in order to compare the imputed values with those estimated by the EM method. The distribution of income is not strictly normal, but due to the large sample size, these two methods are used. Regression imputation means that a missing observation for income is estimated by predicted values from the regression on the known variables for income.

The following 17 variables were used for the estimation of missing values of income:

PARTPRES	a dummy that indicates whether there is a partner present in the household (1=yes)
TWOEARN	a dummy that indicates whether there is two earners in the hh (1= two earners)
NUKIDS	number of children
LOGFAM	the log of number of household members
PANEL	a dummy that indicates panel membership (1= member of the high income panel)

SEXKOSW	a dummy that indicates the sex of the main bread winner of the hh (man=0)
AGEKOSW	the age of the main breadwinner (as well as the second- and third-order terms)
AGE2	
AGE3	
EDUMID	2 dummies indicating the education level of the main bread winner <sup>61</sup> ;
EDUHIGH	middle and high.
AGEMID	6 interaction terms between education and age of the main breadwinner. <sup>62</sup>
AGEHIGH	
AGE2MID	
AGE2HIGH	
AGE3MID	
AGE3HIGH	

The estimates from two OLS (Ordinary Least Squares) regressions using the variables listed above are displayed in Table A2-1. The models used are:

$$Y_{1i} = X_i\beta + e_i, \quad e_i \sim N(0, \sigma^2), \quad i=1, \dots, n_R, \quad (1)$$

and

$$Y_{2i} = X_i\alpha + e_i, \quad e_i \sim N(0, \sigma^2), \quad i=1, \dots, n_R, \quad (2)$$

with  $Y_{1i}$  and  $Y_{2i}$  representing the dependent variables LNNTOT and LNNDI respectively,  $X_iR^{k+1}$  representing the corresponding vector of auxiliary variables with the coefficient of the first element equal to one,  $\alpha$  and  $\beta \in R^{k+1}$  representing a corresponding vector with first element equal the constant term and  $n_R$  the number of observations (here: the households with a valid value for the dependent variables). The auxiliary variables are the 17 variables listed above. For the purpose of this analysis, missing data was handled by pairwise deletion. Applying Ordinary Least Squares to equations (1) and (2) with the above described variables results in the estimates that are summarised in Table A5-1. The results are shown in order to give an indication of how well these variables perform as predictors of income<sup>63</sup>.

Table A5-1 shows that the most important predictors of income are the presence of a partner in the household, the presence of two earners in the household, panel membership, the sex and education of the main bread winner and the interaction between age and education. The three interaction terms containing the second order term of age were excluded from the analyses because their partial F values were less than 4. Hence, the F-test does not reject the null-hypothesis that their coefficients are equal to zero. When producing the regression estimates for replacing missing values, the estimates are augmented with a residual from a randomly selected complete case in order to avoid underestimation of the residual variance of LNNTOT and LNNDI.

<sup>61</sup> Education was missing for 18 cases. These were coded as low education for the purpose of this analysis.

<sup>62</sup> The reason for including these interaction terms is that studies indicate a significant effect of these variables on income (e.g. Alessie, Camphuis & Kapteyn, 1990).

<sup>63</sup> SPSS does not report which model was used when missing values are estimated. Neither does it report how well the predictor variables fit the data.



Table A5-1  
Estimation results of model (1) and (2)

	Dependent variable: Lnntot			Dependent variable: LNhdi		
	Stand. coef.			Stand. coef.		
	Beta	t	Sig.	Beta	t	Sig.
(Constant)		20.605	.000		20.953	.000
PARTPRES	.292	6.627	.000	.217	4.787	.000
TWOEARN	.163	8.316	.000	.168	8.369	.000
NUKIDS	-.031	-5.90	.555	-.075	-1.374	.170
LOGFAM	-.046	-.624	.533	.034	.444	.657
PANEL	.360	20.158	.000	.373	20.415	.000
SEXKOSW	-.064	-3.472	.001	-.045	-2.385	.017
AGEKOSW	2.678	4.813	.000	2.164	3.794	.000
AGE2	-5.495	-4.932	.000	-4.469	-3.913	.000
AGE3	2.778	4.753	.000	2.255	3.764	.000
EDUMID	-.402	-2.558	.011	-.406	-2.518	.012
EDUHIGH	-.445	-2.605	.009	-.486	-2.779	.006
AGEMID	.679	2.923	.004	.658	2.764	.006
AGEHIGH	.937	3.614	.000	1.030	3.877	.000
AGE3MID	-.247	-2.432	.015	-.224	-2.149	.032
AGE3HIGH	-.325	-2.832	.005	-.387	-3.289	.001
N	2194			2194		
Adj. R <sup>2</sup>	.541			.517		

For the EM procedure, a distribution is assumed for the partially missing data and inferences are based on the likelihood under that distribution (SPSS 9.0). In the present analyses, a normal distribution is assumed. Each iteration consists of an E-step (expectations maximisation) and an M-step (maximum likelihood). The E-step finds the conditional expectation of the missing values, given the observed values and current estimates of the parameters. These expectations are substitutions for the missing data. In the M-step, maximum likelihood estimates of the parameters are computed using the current expected values of the missing values.

Table A5-2  
Descriptive statistics for income with and without imputed estimates of missing values

	N		Mean	Median	Mode	Std. Devia- tion	Skew- ness	Kurto- sis	Mini- mum	Maxi- mum
	Valid	Mis- sing								
LNNTOT	1890	304	10.95	11.03	11.12	.5867	-1.306	4.879	7.00	12.75
EMLNNTOT	2194	0	10.92	10.95	11.12	.5681	-1.142	4.560	7.00	12.75
RELGNNTOT	2194	0	10.91	10.97	11.12	.5818	-1.122	4.106	7.00	12.75
LNHDI	1879	315	10.92	10.97	10.34	.5863	-.879	4.313	6.73	13.40
EMLNHDI	2194	0	10.88	10.89	10.34	.5662	-.722	4.112	6.73	13.40
REGLNHDI	2194	0	10.88	10.91	10.34	.5867	-.793	3.953	6.73	13.40

Table A5-2 displays the descriptive statistics of the two variables LNNTOT and LNHDH before and after imputation of missing data by the EM method (denoted by EM) and the regression method (denoted by REG) respectively. The table shows that the mean, median, and mode are left nearly unchanged. In addition, degree of skew and kurtosis are relatively similar for the six variables. As the underlying true values of the missing observations of income are not known, it is difficult to assess which estimates are the best.

Figure A5-1 shows plots of imputed values from the EM method against those from the regression method with random residuals. The scatter plot shows that the estimates of the two methods are quite similar. However, large deviations are found for a few cases. These are probably caused by the addition of random residuals used in combination with the regression method. For the purpose of the analyses, the values imputed by using the EM method will be used.

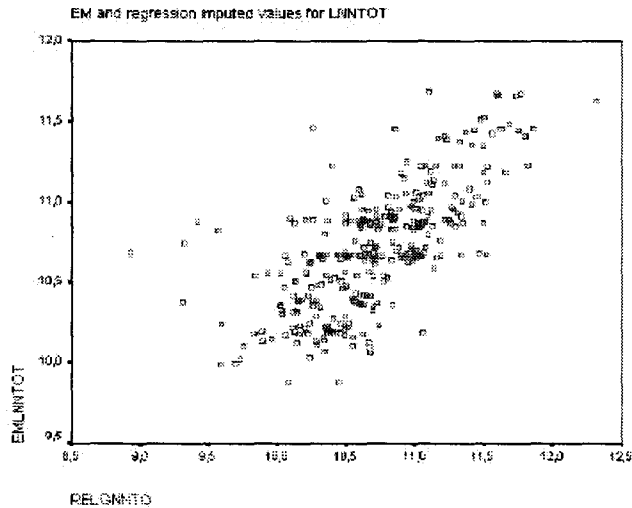


Figure 5A-1  
Plots of observed and EM and regression imputed values for (LN)HNTOT

## APPENDIX 6: RESULTS

Table A6-1

OLS regressions: Financial wealth Dec. 1994, discretionary saving in 1994 and the discretionary saving ratio 1994

Independent variables	Fin. wealth. Dec. 1994		Discr. Saving 1994		Discr. saving/inc.	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.825		.319		.791
<b>Socio-economic variables</b>						
Disp. Income/1000	.316	.000	.222	.002	.221	.002
Panel	.099	.035	-.151	.014	-.033	.583
Age	-.600	.017	.066	.837	-.313	.323
Age squared/100	.806	.001	-.070	.827	.361	.257
Education level	.110	.016	-.021	.710	.006	.920
Children present =1	.000	.998	.077	.394	.129	.149
Log of family size	.023	.827	-.045	.731	-.048	.715
Partner present =1	.004	.957	-.080	.403	-.073	.443
<b>Discount rates</b>						
Delay payment rate	.002	.955	.000	.995	.013	.757
Delay reward rate	-.052	.107	.025	.523	-.065	.100
Speed-up reward rate	.002	.944	.069	.104	.070	.094
<b>Future-related variables</b>						
Expectations 1 year	.003	.916	-.023	.557	.013	.738
Expectations 5 years	-.010	.775	.007	.873	-.032	.435
Time horizon	.066	.039	.012	.757	.039	.321
Perceived income variability	-.038	.251	-.032	.419	.004	.924
<b>Attitudes</b>						
Thrift	-.104	.006	-.026	.575	-.067	.145
Saving involvement	.109	.006	-.024	.622	-.057	.241
Saving habits	.015	.644	-.060	.148	-.083	.044
Shame of debt	.131	.000	-.032	.453	-.085	.047
<b>Saving motives</b>						
Importance of precautionary saving	.057	.188	.064	.230	.074	.163
Importance of goal saving	-.038	.316	-.134	.005	.079	.098
Importance of supporting children	-.086	.048	-.011	.837	-.037	.493
Importance of leaving bequest	.095	.012	-.085	.069	-.056	.226
Importance of saving for old age	.066	.083	.009	.854	.062	.182
Importance of earning interest	.098	.015	-.076	.130	-.024	.632
Ec. Situation compared to "others"	.016	.656	.016	.720	-.071	.100
<b>Personality factors</b>						
Emotional stability	.026	.414	-.009	.826	-.033	.410
Conscientiousness	.005	.874	.067	.116	.038	.370
Toughmindedness	-.009	.765	-.014	.723	.011	.785
Inflexibility	.088	.009	-.022	.599	.008	.845
Extraversion	.065	.047	-.013	.754	.045	.269
N	786		711		711	
Adjusted R <sup>2</sup> Model 1	19.4	.000	1.3	.031	1.6	.014
Adjusted R <sup>2</sup> Model 2	28.7	.000	1.7	.294	2.9	.094

Note: This table reports OLS regressions of the sum of financial wealth as of December 1994, discretionary saving during 1994, and the discretionary saving ratio on the set of variables listed in the first column. The distribution of discretionary saving was trimmed by 5% of each tail before analysing discretionary saving and the discretionary saving ratio. Values of fin. wealth above 400000 were not included in the analysis.

Table A6-2

OLS regressions: Debt, December 1994, contractual saving in 1994 (mortg. excl.) and the contractual saving ratio in 1994 (mortg. excl)

Dependent variables	Debt Dec. 1994		Repayment of debt 1994		Log (Repayment of debt /income)	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.215		.500		.220
<b>Socio-economic variables</b>						
Size of debt			.516	.000	.228	.002
Disp. Income/1000	-.043	.629	.337	.004	-.169	.138
Panel	.045	.587	-.071	.489	.023	.834
Age	-.346	.496	-.290	.541	.716	.178
Age squared/100	.368	.459	.382	.420	-.738	.166
Education level	.029	.756	.156	.113	.223	.042
Children present =1	-.023	.874	.316	.058	.157	.353
Log of family size	.098	.628	-.499	.041	-.309	.197
Partner present =1	.119	.436	.298	.078	.378	.028
<b>Discount rates</b>						
Delay payment rate	-.095	.122	-.048	.480	.068	.349
Delay reward rate	-.062	.303	.118	.065	.086	.223
Speed-up reward rate	-.043	.489	-.044	.518	.004	.962
<b>Future-related variables</b>						
Expectations 1 year	-.032	.616	.008	.919	.002	.975
Expectations 5 years	.124	.058	.011	.886	-.106	.203
Time horizon	.120	.054	-.041	.546	.016	.833
Perceived income variability	.052	.419	-.121	.074	-.094	.218
<b>Attitudes</b>						
Thrift	-.044	.551	.130	.098	.087	.328
Saving involvement	.025	.742	-.014	.858	-.214	.015
Saving habits	-.048	.461	-.209	.003	-.232	.003
Shame of debt	-.056	.390	.006	.925	-.123	.103
<b>Saving motives</b>						
Importance of precautionary saving	.081	.320	.192	.032	.111	.270
Importance of goal saving	-.145	.044	-.095	.243	-.020	.821
Importance of supporting children	.070	.408	.008	.933	.072	.483
Importance of leaving bequest	-.001	.988	.036	.667	-.078	.396
Importance of saving for old age	-.133	.068	-.005	.948	-.021	.818
Importance of earning interest	-.038	.609	.036	.655	.100	.262
Ec. Situation compared to "others"	-.076	.245	-.004	.961	-.097	.217
<b>Personality factors</b>						
Emotional stability	-.072	.227	.004	.946	.031	.650
Conscientiousness	-.004	.955	-.042	.546	-.049	.519
Toughmindedness	.052	.398	-.113	.091	-.098	.188
Inflexibility	.031	.616	.047	.513	-.058	.441
Extraversion	-.024	.694	-.060	.368	-.042	.573
N	297		190		218	
Adjusted R <sup>2</sup> Model 1	1.9	.092	33.1	.000	5.0	.020
Adjusted R <sup>2</sup> Model 2	4.7	.127	36.3	.126	9.4	.096

Note: This table reports OLS regressions of the sum of debt as of December 1994, debt repayment in 1994, and debt repayment over income in 1994 on the set of variables listed in the first column.

Table A6-3

OLS regressions: Debt, December 1994, (Log)contractual saving in 1994 (mortg. incl.) and the contractual saving ratio in 1994 (mortg. incl)

Dependent variables	Debt and mortgages Dec. 1994		Log (Repayment of debt and mortgages in 1994)		Repaym. of debt and mortg. in 1994/income	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.948		.004		.047
<b>Socio-economic variables</b>						
Disp. Income/1000	.486	.000	.177	.083	-.195	.073
Panel	.160	.000	.104	.275	.089	.380
Age	-.033	.900	.538	.292	.594	.274
Age squared/100	-.063	.810	-.535	.292	-.340	.529
Education level	.017	.726	.057	.575	.141	.197
Children present =1	-.014	.852	.088	.605	.112	.535
Log of family size	.101	.327	-.064	.799	-.024	.930
Partner present =1	-.004	.953	.165	.370	.041	.834
<b>Discount rates</b>						
Delay payment rate	-.040	.208	-.086	.200	.057	.425
Delay reward rate	-.059	.065	.011	.861	.108	.117
Speed-up reward rate	.068	.037	.064	.348	.003	.962
<b>Future-related variables</b>						
Expectations 1 year	-.020	.551	.074	.305	.058	.453
Expectations 5 years	.015	.668	-.158	.036	-.010	.899
Time horizon	.070	.032	.090	.186	.026	.714
Perceived income variability	-.024	.463	-.081	.255	.079	.296
<b>Attitudes</b>						
Thrift	.020	.588	.009	.905	.010	.903
Saving involvement	.019	.619	-.172	.030	-.088	.293
Saving habits	-.075	.027	.009	.900	-.042	.579
Shame of debt	-.093	.006	.078	.283	.087	.259
<b>Saving motives</b>						
Importance of precautionary saving	.052	.224	.078	.364	.078	.395
Importance of goal saving	-.025	.512	-.036	.651	-.004	.959
Importance of supporting children	.065	.140	-.069	.476	-.124	.228
Importance of leaving bequest	-.010	.790	-.015	.858	-.066	.456
Importance of saving for old age	-.106	.005	-.094	.213	.072	.374
Importance of earning interest	-.115	.004	.119	.129	.126	.131
Ec. Situation compared to "others"	.044	.200	.044	.547	.092	.234
<b>Personality factors</b>						
Emotional stability	-.070	.027	-.074	.241	-.002	.972
Conscientiousness	-.039	.268	-.152	.034	-.069	.363
Toughmindedness	-.005	.888	.033	.633	.048	.510
Inflexibility	-.061	.063	-.151	.026	.017	.817
Extraversion	-.059	.070	.007	.916	.096	.170
N	552		248		248	
Adjusted R <sup>2</sup> Model 1	46.1	.000	11.8	.000	2.3	.090
Adjusted R <sup>2</sup> Model 2	50.1	.000	12.9	.309	1.3	.616

Note: This table reports OLS regressions on the sum of debt and mortgages, the log of changes in the sum of debt and mortgages, and changes in debt and mortgages over income on the set of variables listed in the first column.

Table A6-4

OLS regressions: Total wealth, December 1994, total saving in 1994 and the total saving ratio 1994

Dependent variables	Total wealth Dec. 1994		Total Saving 1994		Total saving/income	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.002		.027		.198
<b>Socio-economic variables</b>						
Disp. Income/1000	.379	.000	.156	.013	.118	.045
Panel	.104	.022	-.023	.679	.072	.173
Age	.186	.422	.265	.364	.049	.866
Age squared/100	.037	.873	-.153	.602	.021	.943
Education level	.099	.018	.004	.933	.037	.475
Children present =1	-.017	.800	.147	.083	.122	.151
Log of family size	.039	.692	-.113	.361	-.127	.306
Partner present =1	.046	.516	.011	.899	.048	.587
<b>Discount rates</b>						
Delay payment rate	-.006	.841	-.059	.107	.000	.999
Delay reward rate	-.036	.213	.040	.281	.003	.928
Speed-up reward rate	-.021	.478	.022	.556	.008	.838
<b>Future-related variables</b>						
Expectations 1 year	-.014	.646	-.029	.439	-.027	.477
Expectations 5 years	.021	.518	-.007	.861	-.043	.266
Time horizon	.088	.003	.080	.031	.083	.026
Perceived income variability	-.077	.010	.015	.694	-.004	.920
<b>Attitudes</b>						
Thrift	-.068	.047	-.045	.307	-.081	.062
Saving involvement	.069	.055	.018	.696	-.008	.863
Saving habits	.035	.253	-.029	.457	-.040	.297
Shame of debt	.128	.000	-.024	.555	-.030	.449
<b>Saving motives</b>						
Importance of precautionary saving	.038	.340	.002	.960	.077	.120
Importance of goal saving	-.073	.038	.061	.165	.044	.316
Importance of supporting children	-.056	.165	.018	.730	.028	.581
Importance of leaving bequest	.100	.004	.006	.891	-.047	.284
Importance of saving for old age	-.002	.950	.049	.266	.049	.266
Importance of earning interest	.154	.000	.002	.966	-.008	.861
Ec. Situation compared to "others"	.035	.273	.030	.460	-.030	.465
<b>Personality factors</b>						
Emotional stability	-.031	.301	-.006	.866	-.031	.409
Conscientiousness	.010	.757	.023	.558	.031	.431
Toughmindedness	.013	.646	-.031	.405	-.010	.784
Inflexibility	.067	.029	-.038	.327	.016	.680
Extraversion	.061	.041	-.002	.963	.005	.903
N	767		792		800	
Adjusted R <sup>2</sup> Model 1	32.7	.000	3.2	.000	2.9	.000
Adjusted R <sup>2</sup> Model 2	41.7	.000	3.1	.521	2.8	.548

Note: This table reports OLS regressions of total wealth as of December 1994, total saving during 1994, and total saving over income on the set of variables listed in the first column.

Table A6-5  
 OLS regressions: Financial wealth, December 1994, of the three income groups

Dependent variables	Low income group		Middle income group		High income group	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.402		.956		.064
<b>Socio-economic variables</b>						
Disp. Income/1000	.015	.941	-.001	.999	-.123	.574
Panel	.346	.003	.031	.827	.013	.900
Age	.062	.929	-1.011	.131	-1.431	.030
Age squared/100	.056	.938	1.243	.066	1.664	.012
Education level	.083	.499	.127	.183	.086	.430
Children present =1	.088	.576	-.146	.427	-.190	.327
Log of family size	-.177	.513	1.081	.049	1.325	.044
Partner present =1	.167	.306	-.473	.070	-.898	.081
<b>Discount rates</b>						
Delay payment rate	-.092	.332	-.035	.630	-.030	.706
Delay reward rate	-.040	.618	-.133	.076	-.058	.508
Speed-up reward rate	.033	.724	.044	.564	.045	.591
<b>Future-related variables</b>						
Expectations 1 year	-.049	.562	-.128	.108	-.065	.487
Expectations 5 years	-.020	.827	.073	.364	.005	.958
Time horizon	.099	.226	.213	.007	-.101	.232
Perceived income variability	-.070	.396	-.073	.351	-.090	.267
<b>Attitudes</b>						
Thrift	-.164	.087	-.044	.633	-.055	.556
Saving involvement	.083	.392	-.026	.766	.122	.198
Saving habits	-.005	.956	-.018	.811	.134	.130
Shame of debt	.187	.034	-.035	.671	.130	.129
<b>Saving motives</b>						
Importance of precautionary saving	.049	.657	.146	.149	-.149	.174
Importance of goal saving	-.043	.643	.067	.438	.069	.506
Importance of supporting children	-.064	.524	-.304	.005	-.006	.953
Importance of leaving bequest	.187	.036	.089	.325	.058	.550
Importance of saving for old age	.201	.027	.071	.427	.213	.036
Importance of earning interest	.054	.565	.128	.187	-.001	.992
Ec. Situation compared to "others"	.163	.076	.133	.086	.019	.813
<b>Personality factors</b>						
Emotional stability	-.040	.625	-.008	.910	.164	.054
Conscientiousness	.045	.598	.058	.461	-.031	.751
Toughmindedness	-.138	.105	-.024	.754	.054	.498
Inflexibility	.035	.693	.179	.036	.021	.803
Extraversion	.000	1.000	.108	.185	.147	.059
N	150		158		164	
Adjusted R <sup>2</sup> Model 1	18.3	.000	20.9	.000	16.3	.000
Adjusted R <sup>2</sup> Model 2	29.1	.012	30.6	.013	23.1	.052

Note: This table reports OLS regressions of household financial wealth in 1994 for three different income groups on the set of variables listed in the first column..

Table A6-6  
 OLS regressions: Debt and Mortgages, December 1994, of the three income groups

Dependent variables Independent variables	Low income group		Middle income group		High income group	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.085		.401		.849
<b>Socio-economic variables</b>						
Disp. Income/1000	.777	.000	.395	.161	<b>.666</b>	.002
Panel	-.044	.726	.063	.590	<b>.225</b>	.041
Age	<b>-1.623</b>	.054	-.426	.504	-.141	.849
Age squared/100	<b>1.571</b>	.071	.439	.482	-.047	.949
Education level	.005	.973	-.141	.147	.138	.247
Children present =1	-.005	.976	.110	.476	.111	.723
Log of family size	.283	.299	.116	.792	-.613	.424
Partner present =1	-.244	.187	-.141	.488	.417	.516
<b>Discount rates</b>						
Delay payment rate	-.078	.380	-.089	.214	.008	.925
Delay reward rate	-.063	.516	-.056	.426	.010	.912
Speed-up reward rate	.096	.282	.103	.166	.014	.876
<b>Future-related variables</b>						
Expectations 1 year	-.011	.903	.049	.532	-.056	.562
Expectations 5 years	.037	.740	.010	.895	.033	.754
Time horizon	-.007	.943	.110	.133	.145	.124
Perceived income variability	.074	.418	-.039	.592	-.090	.336
<b>Attitudes</b>						
Thrift	.086	.409	<b>-.214</b>	.015	.063	.527
Saving involvement	.121	.253	.096	.266	.155	.123
Saving habits	.046	.622	-.084	.216	<b>-.310</b>	.001
Shame of debt	.020	.834	<b>-.165</b>	.039	-.020	.812
<b>Saving motives</b>						
Importance of precautionary saving	.068	.631	-.056	.562	.121	.289
Importance of goal saving	-.055	.596	-.061	.455	-.170	.121
Importance of supporting children	-.097	.369	<b>.201</b>	.043	-.068	.531
Importance of leaving bequest	.000	1.000	.092	.290	.002	.988
Importance of saving for old age	-.059	.574	-.057	.522	-.159	.136
Importance of earning interest	.008	.937	<b>-.163</b>	.094	-.142	.223
Ec. Situation compared to "others"	.027	.786	.022	.767	.077	.404
<b>Personality factors</b>						
Emotional stability	-.071	.429	-.061	.363	-.031	.741
Conscientiousness	-.014	.887	-.068	.378	-.064	.542
Toughmindedness	.048	.596	-.071	.335	-.064	.472
Inflexibility	-.028	.751	<b>-.155</b>	.047	-.044	.637
Extraversion	.065	.543	-.076	.330	-.050	.544
N	101		108		249	
Adjusted R <sup>2</sup> Model 1	<b>53.9</b>	.000	<b>52.9</b>	.000	<b>.090</b>	.000
Adjusted R <sup>2</sup> Model 2	46.7	.980	<b>61.8</b>	.013	.076	.616

Note: This table reports OLS regressions of the sum of debt and mortgages for three income groups on the set of variables listed in the first column.



Table A6-7  
 OLS regression: Debt, December 1994, of the three income groups

Dependent variables	Low income group		Middle income group		High income group	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.506		.527		.012
<b>Socio-economic variables</b>						
Disp. Income/1000	.710	.211	.056	.949	.383	.384
Panel	-.226	.423	.646	.027	.074	.707
Age	.176	.943	1.298	.483	<b>2.558</b>	.038
Age squared/100	-.107	.965	-.988	.571	-2.009	.108
Education level	-.349	.356	.223	.290	.347	.142
Children present =1	<b>-.686</b>	.093	<b>-1.303</b>	.063	-.205	.450
Log of family size	.894	.201	1.228	.482		
Partner present =1	<b>-.901</b>	.091	-.628	.485	.192	.638
<b>Discount rates</b>						
Delay payment rate	-.086	.661	-.297	.110	<b>-.426</b>	.007
Delay reward rate	-.105	.662	.165	.425	.109	.592
Speed-up reward rate	.282	.154	.244	.133	-.186	.243
<b>Future-related variables</b>						
Expectations 1 year	-.029	.901	.309	.165	-.060	.776
Expectations 5 years	<b>.621</b>	.024	.102	.584	<b>.432</b>	.041
Time horizon	.134	.483	.116	.486	<b>.426</b>	.017
Perceived income variability	.023	.899	-.096	.585	-.153	.413
<b>Attitudes</b>						
Thrift	-.283	.324	-.180	.409	.160	.355
Saving involvement	-.477	.122	.046	.819	.115	.553
Saving habits	-.283	.216	.058	.725	-.024	.893
Shame of debt	-.241	.270	-.019	.916	.001	.993
<b>Saving motives</b>						
Importance of precautionary saving	<b>.964</b>	.024	.093	.732	.178	.391
Importance of goal saving	.317	.161	-.286	.154	-.044	.802
Importance of supporting children	.081	.777	.259	.302	-.188	.358
Importance of leaving bequest	-.144	.576	-.124	.471	-.069	.781
Importance of saving for old age	.183	.471	-.337	.129	<b>-.365</b>	.067
Importance of earning interest	-.302	.264	.208	.321	.119	.542
Ec. Situation compared to "others"	.017	.939	-.148	.513	-.059	.764
<b>Personality factors</b>						
Emotional stability	-.371	.086	.144	.341	<b>-.524</b>	.006
Conscientiousness	-.044	.839	.125	.504	-.232	.278
Toughmindedness	-.023	.904	-.017	.925	.178	.191
Inflexibility	-.083	.692	-.269	.136	<b>.409</b>	.043
Extraversion	.410	.299	-.279	.135	-.200	.204
N	48		55		63	
Adjusted R <sup>2</sup> Model 1	5.6	.249	<b>29.5</b>	.002	2.3	.313
Adjusted R <sup>2</sup> Model 2	34.2	.129	33.2	.403	27.3	.058

Note: This table reports OLS regressions of the sum of debt for three income groups on the set of variables listed in the first column.

Table A6-8

OLS regressions: Total wealth, December 1994, of the three income groups

Dependent variables	Low income group		Middle income group		High income group	
	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant		.905		.462		.023
<b>Socio-economic variables</b>						
Disp. Income/1000	.023	.909	.754	.012	.214	.318
Panel	.431	.000	-.062	.641	.080	.439
Age	-.165	.812	-.416	.480	<b>1.277</b>	.061
Age squared/100	.171	.809	.535	.364	-.900	.187
Education level	.052	.649	.080	.368	.023	.830
Children present =1	-.007	.968	-.077	.651	<b>.393</b>	.037
Log of family size	.105	.690	-.101	.840	<b>-1.081</b>	.091
Partner present =1	.021	.893	.021	.932	<b>1.058</b>	.033
<b>Discount rates</b>						
Delay payment rate	-.005	.948	.021	.759	-.014	.859
Delay reward rate	.086	.272	-.086	.219	-.055	.500
Speed-up reward rate	.001	.994	.065	.355	.044	.587
<b>Future-related variables</b>						
Expectations 1 year	-.110	.177	-.093	.223	-.075	.401
Expectations 5 years	.117	.174	.021	.786	.141	.149
Time horizon	.022	.782	<b>.260</b>	.001	.023	.773
Perceived income variability	-.057	.496	-.049	.503	-.078	.320
<b>Attitudes</b>						
Thrift	.018	.837	.065	.446	-.022	.813
Saving involvement	<b>.165</b>	.078	.030	.713	.047	.605
Saving habits	.020	.816	.085	.228	.136	.106
Shame of debt	<b>.268</b>	.002	.121	.120	-.034	.668
<b>Saving motives</b>						
Importance of precautionary saving	.110	.290	.031	.745	-.051	.637
Importance of goal saving	-.099	.277	-.102	.208	-.083	.391
Importance of supporting children	.085	.390	<b>-.185</b>	.061	.092	.313
Importance of leaving bequest	<b>.169</b>	.051	.173	.042	-.005	.961
Importance of saving for old age	-.064	.473	-.063	.460	.086	.374
Importance of earning interest	.032	.726	.142	.117	<b>.177</b>	.083
Ec. Situation compared to "others"	-.090	.312	.082	.261	<b>.155</b>	.047
<b>Personality factors</b>						
Emotional stability	-.063	.441	-.074	.287	-.082	.330
Conscientiousness	-.015	.857	-.021	.771	.020	.826
Toughmindedness	.038	.648	.036	.611	.037	.630
Inflexibility	<b>.161</b>	.065	.089	.266	.081	.328
Extraversion	.046	.575	.040	.589	<b>.141</b>	.062
N	149		160		158	
Adjusted R <sup>2</sup> Model 1	<b>.29.1</b>	.000	<b>.27.4</b>	.000	<b>.27.8</b>	.000
Adjusted R <sup>2</sup> Model 2	<b>.46.5</b>	.045	<b>.38.4</b>	.003	<b>.31.9</b>	.045

Note: This table reports OLS regressions of total wealth for three income groups on the set of variables listed in the first column.

Table A6-9

Logistic regressions: Fin.wealth vs. non-wealth, debt and mortg. vs. non-debt and mortg. and debt vs. non-debt

Dependent variables	Fin.wealth Dec. 1994 >0		Debt+mortg.Dec. 1994>0		Debt Dec. 1994 >0	
Independent variables	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant	-4.781	.345	-3.617	.030	-4.329	.005
<b>Socio-economic variables</b>						
Disp. Income/1000	.046	.021	.036	.000	.009	.027
Panel	-1.552	.223	.058	.862	-.478	.054
Age	.161	.400	.128	.038	.164	.007
Age squared/100	-.209	.279	-.170	.005	-.193	.002
Education level	.808	.246	.335	.097	.216	.247
Children present =1	3.266	.098	-.708	.153	-.656	.106
Log of family size	-9.854	.083	2.593	.091	1.509	.228
Partner present =1	1.700	.083	-.314	.258	-.139	.565
<b>Discount rates</b>						
Delay payment rate	-.191	.840	.304	.313	.347	.116
Delay reward rate	-.047	.143	-.001	.849	.010	.155
Speed-up reward rate	.084	.049	.014	.132	.001	.827
<b>Future-related variables</b>						
Expectations 1 year	-.084	.041	.002	.845	-.004	.645
Expectations 5 years	.035	.302	.002	.570	.002	.533
Time horizon	-.175	.634	-.082	.452	-.252	.007
Perceived income variability	-2.152	.029	.004	.986	.337	.055
<b>Attitudes</b>						
Thrift	.738	.149	.178	.240	.054	.660
Saving involvement	.881	.069	-.067	.653	-.031	.795
Saving habits	.731	.130	.035	.805	-.217	.051
Shame of debt	1.789	.004	-.401	.005	-.671	.000
<b>Saving motives</b>						
Importance of precautionary saving	.427	.270	-.106	.365	.035	.723
Importance of goal saving	.113	.772	.001	.989	-.069	.371
Importance of supporting children	-.590	.096	.061	.526	-.093	.253
Importance of leaving bequest	.909	.018	.034	.661	.180	.008
Importance of saving for old age	-.575	.042	-.126	.068	-.069	.248
Importance of earning interest	.315	.497	-.008	.947	-.053	.581
Ec. Situation compared to "others"	-.061	.807	.177	.021	.083	.199
<b>Personality factors</b>						
Emotional stability	-.014	.976	-.091	.520	.018	.878
Conscientiousness	-1.146	.038	-.166	.234	-.266	.026
Toughmindedness	.105	.830	.064	.609	.188	.081
Inflexibility	-.294	.537	-.141	.303	-.150	.180
Extraversion	.658	.168	.147	.289	.045	.699
N	108		800		800	
<b>Model with socio-ec. Variables:</b>			684.28	.000	991.94	.000
-2LL	129.03	.008	80.0		61.3	
% correctly predicted:	67.6		42.4		12.1	
Nagelkerke R <sup>2</sup> :	23.2					
<b>Model with socio ec. + psyc variab.</b>						
-2LL	81.88	.002	646.01		888.92	.000
% correctly predicted:	86.1		47.1	.024	70.5	
Nagelkerke R <sup>2</sup> :	62.2		81.9		27.0	

Note: This table reports the results of logistic regression analyses of the dummies have/don't have positive financial saving, have/don't have debt and mortgages, and have/don't have debt on the set of variables listed in the first column. The results in the second and third column are based on a sample of 108 cases, where 54 had positive and 54 had zero or negative financial wealth as of December 1994.







02H003804  
Norges Handelshøyskole

**ISBN 82-405-0073-0**

**Bergen, Norway 2002**

Produsert av Allkopi Bergen - tlf. 55 54 49 40