# Survey-Based Study on Partial Aspects of Retirement Decisions of Private Persons in Germany

von Ivonne Honekamp

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# Abstract

In Germany, private retirement provision is a topic of increasing importance. The ageing population in combination with unemployment, an increasing number of temporary work contracts, more individuals who work part-time or in jobs not subject to social insurance contributions, make it problematic to finance the pensions of the retired in a pay-as-you-go financed pension system. Besides, the number of individuals not able to acquire sufficient pension claims exceeding the needs- oriented basic pension is increasing. Several pension reforms have taken place in order to alleviate the pressure on the pay-as-you-go system. In 2001, a voluntarily funded part was introduced to close the pension gap which has slowly been rising due to a declining replacement rate in the statutory pension system. Individuals now have to decide if they start to provide for retirement privately, how much they are going to save and where to invest. Such decisions require a sound knowledge of the German pension system and general financial knowledge in order to be able to approximate retirement needs and to compare financial products.

Based on the theory of saving and its behavioral refinements, a decision model has been developed in this thesis which describes each step from thinking about retirement to actually saving for retirement. Each of these steps has been investigated empirically in order to find out more about the hurdles individuals face on their way towards private retirement savings.

Based on an instrumental variable estimation, it will be shown that providing information about retirement provision alone will not be sufficient to make people think about an appropriate retirement income, to induce people to make concrete retirement plans and to increase the number of individuals who translate their plans into action. Instead of providing general pension knowledge, offering concrete and targeted information at the time it is needed might be a more successful strategy. These idea, results and conclusions stem from Oehler and Wilhelm-Oehler 2009a, 2011 who analyze the data from „Altersvorsorge macht Schule" („retirement planning goes school").[1] They recommend a practice-oriented, case-based financial education as well as a „meta education" to improve the „meta literacy" as shown by Oehler (2004, 2009a, 2011, 2012a, 2012d-e, 2013a-b). „Meta literacy" in this sense means that it is more important to know methods or people who can solve the problem when it appears, than acquiring all knowledge themselves being prepared to solve all possible prob-

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[1] For an evaluation of the course "Altersvorsorge macht Schule" see also Frommert 2008.

lems (Oehler/Wilhelm-Oehler 2009, 2011; Oehler 2011, 2012a, 2012d-e, 2013a-b).

This strategy may also be successful to solve the problem of time constraints which many individuals stated to be the main reason why they would not participate in a retirement seminar. Furthermore, the confidence in one's own knowledge seems to be more important than actual knowledge which requires measures to increase consumer confidence. Such a measure could be, for example, a hypothetical situation in which seminar participants have to evaluate the offer they received from a financial advisor (Oehler 2004, 2005b, 2006, 2011, 2012a, 2012d-e, 2013a-b).

According to the literature findings in the last five decades it is known that individuals fall back to heuristics in order to simplify decision. This behavior has also been observed in this work. Even though they own a pension product, they stated they did not try to figure out how much retirement wealth would be necessary to live an adequate retirement life. Hence, they must have followed some kind of decision rule to decide, among others, about the amount they save. Using heuristics was more prevalent among individuals owning a "Riester Pension" than among individuals owning a company pension. Since individuals with a company pension often receive information about the pension plan through the employer or via employer sponsored retirement seminars, such seminars seem likely to have the potential of increasing the number of individuals who engage in retirement planning before starting to save.

The second one is that individuals who admit that they tend to procrastinate on financial decisions are more likely to join a retirement seminar than individuals who indicate that they would rather not procrastinate. Making people aware of the widespread problem of procrastinating retirement savings might increase the number of individuals who realize that they have procrastinated retirement planning and henceforth increase the number of individuals participating in retirement seminars.[2]

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[2] These results confirm previous findings in connection with the first evaluation of the German retirement seminars „Altersvorsorge macht Schule" by Frommert 2008 and Oehler/Wilhelm-Oehler 2009, 2011).

## Zusammenfassung

In Deutschland ist die private Altersvorsorge ein immer wichtiger werdendes Thema. Die Alterung der Gesellschaft in Zusammenhang mit Arbeitslosigkeit und befristeten Arbeitsverhältnissen sowie eine wachsende Anzahl an Arbeitnehmern in Teilzeitbeschäftigung oder nicht sozialversicherungspflichtigen Beschäftigungs-verhältnissen erschweren es, die lebensstandardsichernden Renten der Rentner in einem umlagefinanzierten Rentensystem weiter aufrecht zu erhalten. Des Weiteren führt diese Art von Arbeit und die damit verbundenen unterbrochenen Erwerbsverläufe dazu, dass in Zukunft die Zahl der Menschen, die nicht in der Lage sein werden genügend Rentenansprüche zu erwerben, um später eine Rente über der Grundrente zu erhalten, steigen wird. In den letzten Jahren hat es einige Rentenreformen gegeben, die die Belastungen gerecht zwischen den Generationen verteilen sollten. Im Jahre 2001 wurde eine zusätzliche freiwillige private Altersvorsorge eingeführt, welche dazu gedacht ist, die Rentenlücke, welche durch das Absenken des Rentenniveaus entsteht, zu schließen. Individuen müssen sich nun selbst entscheiden, ob sie sparen, wie viel sie sparen und wie sie ihr Geld investieren. Solche Entscheidungen setzten zum einen gute Kenntnisse des deutschen Rentensystems und zum anderen finanzielles Grundwissen voraus.

Auf der Grundlage der Theorie des Sparens und ihrer verhaltenswissenschaftlichen Verfeinerungen wird in dieser Arbeit ein Entscheidungsmodell entwickelt, welches die einzelnen Schritte zwischen den ersten Überlegungen zum Alter bis zum tatsächlichen Altersvorsorgesparen abbildet. Jeder dieser Schritte wird empirisch untersucht, um mehr über die Hürden, vor denen die Individuen bei der Altersvorsorge stehen, herauszufinden. Basierend auf einer Instrument-Variablen-Schätzung wird gezeigt, dass die Bereitstellung von allgemeinen Informationen zur Altersvorsorge allein nicht ausreichend ist, um die Menschen dazu zu motivieren, über ihre eigene Altersvorsorge nachzudenken, für das Alter zu planen und diese Planungen dann in die Tat umzusetzen. Eine bessere Strategie kann es sein, gezielte Informationen genau dann bereitzustellen, wenn der Konsument sie benötigt. Diese Ideen und Schlussfolgerungen gehen auch aus den Arbeiten von Oehler und Wilhelm-Oehler (2009a, 2011) hervor. Sie analysieren Daten einer Befragung von Teilnehmern des Kurses „Altersvorsorge macht Schule".[3] Oehler und Wilhelm-Oehler schalgen eine praxisorientierte, fallbezogene finanzielle Bildung sowie „Meta Bildung" vor um die „Meta Literacy" zu verbessern (Oehler 2004, 2009a, 2011, 2012a, 2012d-e, 2013a-b).

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[3] Die erste Evaluation des Kurses "Altersvorsorge macht Schule" wurde von Frommert (2008) durchgeführt.

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Das Konzept der „Meta Literacy" besagt, dass es für die Lösung eines bestimmten Problems wichtiger ist Methoden und Personen zu kennen, mit welchen man dieses Problem lösen kann, als selbst allumfassend informiert zu sein(Oehler/Wilhelm-Oehler 2009, 2011; Oehler 2011, 2012a, 2012d-e, 2013a-b).

Der Hauptgrund, warum Individuen nicht an Altersvorsorgeschulungen teilnehmen, ist laut der zugrundeliegenden Befragung, dass sie keine Zeit haben. Genau dieses Zeitproblem könnte durch die „Meta Bildung" reduziert werden. Darüber hinaus kann gezeigt werden, dass die Selbsteinschätzung bezüglich des eigenen Wissens zur Altersvorsorge bei der Altersvorsorgeplanung und Umsetzung wichtiger ist, als das tatsächlich vorhandene Wissen. Es sollten also zudem Maßnahmen ergriffen werden, um den Konsumenten mehr Sicherheit im Umgang mit Altersvorsorgeprodukten zu vermitteln. Möglich wäre so etwas zum Beispiel durch hypothetische Situationen in Seminaren, in welchen die Teilnehmer aufgefordert werden Angebote einzuholen, um diese daraufhin in der Gruppe zu diskutieren (siehe auch Oehler 2004, 2005b, 2006, 2011, 2012a, 2012d-e, 2013a-b).

In der Literatur der vergangen Dekaden wurde herausgefunden, dass Menschen Heuristiken verwenden um Entscheidungen zu vereinfachen. So konnten auch in dieser Arbeit Hinweise darauf gefunden werden, dass einige der befragten Personen Heuristiken verwendet haben. Diese Personen gaben an, dass sie ein Altersvorsorgeprodukt besitzen ohne sich vorher Gedanken darüber gemacht zu haben, wie viel Altersvorsorgevermögen notwendig ist, um eine ausreichende Rente zu erzielen. Daher müssen sie eine Art von Entscheidungsregel befolgt haben, welche ihnen dabei half, die richtige Altersvorsorgeentscheidung zu treffen. Die Verwendung von Heuristiken konnte häufiger bei Individuen mit „Riester-Rente" beobachtet werden als bei Personen mit einer betrieblichen Altersvorsorge. Personen mit einer betrieblichen Altersvorsorge erhalten häufig über ihren Arbeitgeber, zum Beispiel bei Informationsveranstaltungen oder Seminaren, Informationen zur betrieblichen Altersvorsorge. Diese Seminare können dazu beigetragen haben, dass sich die Arbeitnehmer mehr Gedanken über ihre eigene Altersvorsorge machen als Personen, denen diese nicht zur Verfügung stehen.

# 1  Introduction

In the United States, individuals have been partially responsible for providing for their own retirement for a long time. Private retirement saving plans and company pensions are an inherent part of retirement income. Old age provision in Germany is composed of three pillars: the statutory pay-as-you go pension, company pension, and private pension. For a long time most Germans relied almost solely on their statutory pension entitlements. In the year 2007 about 75% of retirement income was pay-as-you-go financed (Bundesministerium für Arbeit und Soziales 2008a).

In the light of an aging population, many researchers projected rising contribution rates to the statutory pension insurance (Bofinger 1999). To distribute the burden more equally among the generations several pension reforms have taken place. The first and most prominent pension reform took place in 2001 which is named after the then minister of employment and social affairs, Walter Riester. This reform initiated a system change by slightly reducing the pay-as-you go pension and introducing subsidized private funded pension (Honekamp 2007). The introduction of the subsidy was intended to foster individual savings in private pension plans. Generally the pension reform in 2001 and the following reform in 2004, which will be described in more detail in the background in chapter 1, have led to a decreasing pension level.

Pension reforms are not the only reason why pension entitlements for future cohorts will decline. Work histories have changed during the past years, long spells of unemployment, part-time work and other atypical forms of employment decrease pension entitlements in the future. In its national strategy report "Social security and social integration 2008-2010" the Ministry of Employment and Social Affairs argues that it is certain, that the accustomed standard of living during retirement can only be achieved if individuals engage in supplemental savings in the form of company pensions or other kinds of private old age provision (Bundesministerium für Arbeit und Soziales 2008b). Therefore it has been stated that it is the goal of the Federal Government to achieve the largest possible spread of state subsidized supplemental retirement provision.

The responsibility of ensuring sufficient financial resources during retirement has to some extent been shifted from the government to the consumer. The younger an individual, the lower the expected replacement rate from the statutory pension system and therefore the greater the need for private pension provisions. After the reforms banks and insurance companies started to offer savings products which had to be certified and to meet certain criteria in order to be eligible for the "Riester-Subsidy". The variety of these savings contracts, called "Riester-Pension" have increased rapidly since the reforms.

According to classical economic theory of consumption and savings, an optimal savings decision which maximizes life time utility requires individuals to be far-sighted, rational and informed about all available consumption and savings opportunities (Modigliani and Brumberg 1954). A lack of knowledge about the pension system and financial matters and the inability to apply this knowledge would lead to suboptimal savings decisions. In practice these assumptions are rarely met. Considering the decision to save for retirement, individuals have to calculate their retirement needs in order to determine how much they should save during their working-life. Having done this they are confronted with a range of different products. In the light of many uncertainties in life it is unlikely that consumers can perfectly predict their life-time income and their retirement needs. Another problem is the assumption that individuals are completely informed about all the options available to them. In the light of an increasing number of financial products on the market even financial experts would rarely be able to claim that they are perfectly informed about every single product. Even if individuals could be entirely rational and possess all relevant information most of them would not be able to solve the problem of dynamic optimization.

In behavioral and new institutional economics research the classical theory of savings has been enriched by psychological and behavioral insights in order to be better able to explain an individual's savings behavior. It has been observed that individuals often procrastinate with regards to retirement provision, and many people do not engage in retirement savings even though they know that they should save (Honekamp and Uehleke 2012, Laibson 1998). The reason for this observation could be procrastination, whereby present orientated individuals continuously delay the decision to save to a later point in time (Laibson 1998, O'Donoghue and Rabin 1998, 1999). The decision to start planning and saving for retirement depends on an individual's evaluation of the costs and benefits this action would entail and thus the likelihood of starting saving today rather than next month can be increased by either reducing the costs of planning or by increasing the costs of not planning.

There are many measures which could be taken in order to decrease the costs of planning. The most important measures are notably the simplification of choices, for example, through the provision of heuristics or standardized product information, and the provision of information through retirement seminars (Leinert 2005, Oehler 2009a, 2012c). A measure which increases the costs of failing to plan is the lost return on the investment. Besides the interest payments which would not be claimed there are also lost subsidies or tax advantages.

In this thesis the hurdles which prevent individuals from planning and saving for retirement play an important role. For this reason a decision model has been

developed describing each step on the path towards private retirement savings, starting with the first thought about retirement and ending with active retirement savings. Within this model pension knowledge plays an important role, which according to the theory should decrease planning costs and foster retirement savings (e.g. O'Donoghue and Rabin 1998, Shefrin and Thaler 1981).

Hung, Parker and Yoong (2009) reviewed the literature in which financial literacy has been measured and detected that there is no consensus about how financial literacy is defined. Sometimes financial literacy refers to a specific form of knowledge, the ability to apply that knowledge, perceived knowledge, good financial behavior or financial experience. Based on their findings Hung, Parker and Yoong (2009) provided the following definition for financial literacy: "knowledge of basic financial concepts, as well as the ability to use that knowledge and other financial skills to manage financial resources effectively for a lifetime of financial well-being". In order to integrate pension knowledge into this definition, I have developed the following figure.

**Figure 1: Defining Financial Literacy**
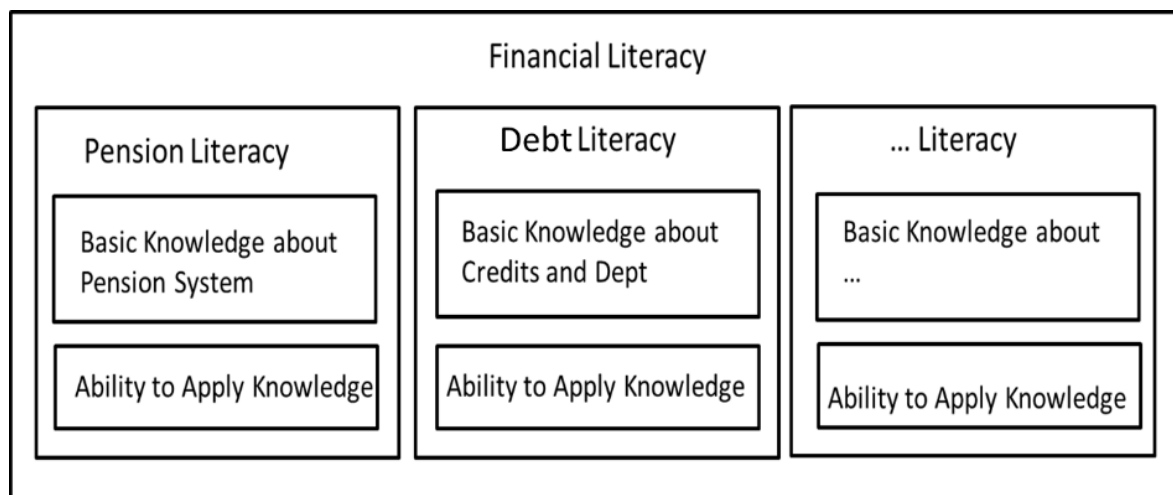


In this research only the knowledge aspect of financial literacy can be approximated by variables which will be generated out of questions designed to measure actual knowledge of basic financial literacy but more importantly to measure actual knowledge of the German pension system. In the same sense it is possible to approximate perceived financial and pension knowledge. According to Hung, Parker and Yoong's definition, what will be investigated here is individual knowledge, rather than ability, which is only one part of the definition for financial literacy. Throughout this thesis financial or pension literacy have generally been approximated by the knowledge of financial concepts or the pension system, and this is also the case for the literature reviewed in chapter 2.3. However, as soon as researchers integrate financial knowledge into a regression explaining for example retirement planning, a positive coefficient would imply

that the individuals were able to apply their knowledge.[4] Generally the terms financial literacy, pension literacy, financial knowledge and pension knowledge will be used interchangeably.

Existing research has shown that financial illiteracy is especially pronounced for women, the low educated and individuals with low income (e.g. Leinert 2004, Lusardi and Mitchell 2008, Rooij van et al. 2011a). For this group of people the expected income from the statutory pension system will be especially low, therefore they are most in need to provide for retirement privately (e.g. Bundesministerium für Arbeit und Soziales 2008b, Coppola and Gasche 2011, Schmähl 2008). In order to inform individuals about the German pension system the government has initiated the course "Old-age provision goes to school" in cooperation with other actors. The course supports individuals by calculating retirement needs and indicates what costs are to be expected in old-age (see the first evaluation these retirement seminars by Frommert 2008 and Oehler and Wilhelm-Oehler 2009, 2011). Furthermore individuals receive information about the statutory pension system, the "Riester-Pension", company pension, housing equity and other vehicles that provide for retirement.

After such a course, individuals will know if they are going to face a pension gap, what savings vehicle is best suited for their needs and know to whom they can turn if they need further advice. Furthermore they are then well prepared to assess offers from banks or insurance companies depending on their choice of product. The evidence of the effectiveness of seminars concerning its effect on behavior is mixed. While some researchers only report modest effects, others found that after the seminar individuals adjusted their expected retirement age and that the seminar increased the number of individuals contributing to a pension plan (Bayer et al. 2009; Duflo and Saez 2003). The effectiveness of a seminar should, however, not just be rated based on behavior changes with respect to increased or optimized retirement savings. Instead retirement seminars are often targeted at specific groups of people. If it is not possible to get these individuals to participate in the seminar it would be rated as not effective in this respect (e.g. Honekamp and Uehleke 2012). The aim of this work is to analyze data on individual retirement savings behavior in order to examine why many individuals know that they should save more but still fail to start saving. The data had been generated in the connection with a research project in 2010 and 2011.[5] In the light of existing theoretical and empirical research it will be discussed which measures might be taken by the government, by other institutions or by the in-

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[4] As long as there is no variable measuring the ability to apply knoweldge.

[5] A detailed description of the data can be found in chapter 3.

dividual him-/herself in order to increase the number of individuals who are successfully reaching their aspired level of retirement income.

One of the proposed measures for decreasing the cost of planning and saving for retirement is the provision of retirement seminars. There are many relevant und future-oriented results from the first evaluation of the German retirement seminars "Altersvorsorge macht Schule" by Frommert (2008) and Oehler and Wilhelm-Oehler (2009, 2011) which are the basis for further projects. The data analyzed in this thesis offers the unique opportunity to analyze why individuals refrain from participating in a retirement seminar. These findings will help to provide evidence about how existing retirement seminars could be adjusted and how new seminars could be organized in order to attract these individuals. Furthermore, it is possible to show how different sources of information can influence product choice. In this respect, the effects of joining a retirement seminar and other information channels on the probability of applying for a specific savings product will be analyzed. The research in this thesis is based on data which has been generated within a project investigating the effect of a retirement seminar on savings behavior (Honekamp and Uehleke 2012). Questions concerning their knowledge, perception and behavior concerning retirement provision were answered by 1016 individuals. A decision model describing each step to be taken from the first thought about retirement to actual retirement savings has been developed using the insights of theory on saving and its psychological and behavioral advancements. This model provides the basis for the empirical analysis. Assuming diminishing marginal utility of consumption and a decreasing pension level, saving for retirement increases life-time utility for most individuals.[6] Each step on the way towards private retirement provision constitutes a hurdle and bears the risk that individuals will not continue retirement planning to the extent that they will never start to save. This would be the case if the cost of planning is greater than the expected utility which could be derived from planning. The empirical analysis will provide information about why individuals might not engage in retirement planning and why individuals choose to save using specific savings products.

The findings in this thesis contribute to the existing literature in several important ways. Firstly, German research into the effects of financial literacy on

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[6] Even though these assumptions hold, there could be a case whereby private retirement savings do not increase life-time utility. For very poor individuals the utility of future consumption may not outweigh the sacrifice of present day consumption. Nevertheless, this does not mean that retirement planning is not necessary. It might be worth thinking about life in retirement, like living in a multi-generation house or engaging in an association of pensioners who support each other (see also chapter 2.1.4).

retirement savings behavior is rare. Extending the research on financial literacy and its effect on retirement behavior is important because findings from the US and other countries are not readily applicable to Germany because those countries differ in important aspects. The most important differences are notably the organization and development of financial markets and the organization of the pension system.

Secondly, the hurdles preventing individuals in Germany from planning and saving for retirement have been investigated and specific suggestions have been made to decrease them. The measures which have been suggested to encourage people to deal with retirement issues and to educate people are not new, and the empirical results of this thesis can be seen as further evidence for the potential positive effect these measures could have at specific stages on the way towards private retirement savings. The fact that many individuals still lack basic pension knowledge also implies that existing programs providing retirement education are not sufficient for reaching all individuals and especially those most in need to receive this information (see also Oehler and Werner 2008 and Coppola and Gasche 2011).

The research in this thesis also provides explanations about why individuals do not participate in retirement seminars, and on the basis of these findings concrete suggestions are formulated to show how to modify existing seminars or how to organize new seminars. Thirdly an attempt has been made to test four hypotheses which have been derived from the theory discussed in chapter 2.1. The first hypothesis claims that financially literate people are more likely to plan and save for retirement than individuals who are less literate. Within this hypothesis an endogeneity problem arises since the path of causality is not clear. It could be that financial literacy encourages individuals to plan and save for retirement but on the other hand it is also likely that an individual's literacy level increases because he/she plans and saves for retirement. In order to circumvent this potential problem, a specific question on economics education at school has been implemented into the survey which makes it possible to create an instrument variable for financial literacy. This approach has already been applied successfully in American and Dutch research (Lusardi and Mitchell 2007b, Rooij van et al. 2011).

The reasoning of hypothesis 1 will be taken further in hypothesis 2 by questioning one of the assumptions underlying the model of endogenous time preferences from Becker and Mulligan (1997), which states that financial literacy is more effective in decreasing the discount rate for individuals with an initially low discount rate. A similar hypothesis has been tested before (Howlett and Kees 2008).

The third hypothesis tests the theory of O'Donoghue and Rabin (1998) who find that "procrastination does not arise from present-biased preferences per se, but rather from present-biased preferences combined with naïveté" (O'Donoghue and Rabin, 1998). Findings which either verify or falsify these hypotheses are important since they provide information about the potential effectiveness of providing retirement seminars for individuals who are present orientated. Furthermore, it will be possible to show if the knowledge of a self-control problem concerning procrastination behavior influences decisions relating to retirement provision. If the hypothesis can be verified then measures can be taken in order to call attention to the problem of procrastination.

The fourth hypothesis states that individuals who participated in retirement seminars are more likely to save for retirement than individuals who did not complete the seminar. In order to test this hypothesis, which is similar to the reasoning in hypothesis 1, the effect of different sources of information on the probability of saving using different retirement savings vehicles will be analysed. Within this analysis it is possible to distinguish between the effect of a retirement seminar for individuals who like dealing with financial matters and for individuals who do not like to deal with financial matters. The use of further control variables makes it possible to check for a potential selection bias which arises when individuals choose either to join a seminar or to use other kinds of information sources.

**Outline**

In the following chapter, chapter 1, important theoretical and empirical findings about the decision to save and the effect of financial literacy on retirement outcomes will be presented. Furthermore key features of the German pension system will be outlined (2.2). The theory is going to start with the first psychological research which has dealt with the subject of the intertemporal substitution of consumption and saving, then its formalization and its use within an optimization framework of life-time utility will be discussed. Finally the revival of psychological concepts in the research of new institutional and behavioral economics research to enrich classical economic models will be presented (2.1). Based on the insights from the economic models hypothesis will be formulated and a theoretical decision model to analyze retirement savings will be developed. The last part of the background is devoted to the literature review of empirical findings which examine the degree of financial literacy, the influence of financial literacy on retirement outcomes, the effectiveness of retirement education and further measures which have been taken in order to increase retirement savings (2.3).

Chapter 3 describes the data generating process, comprising the survey method (3.1.1), a short description of the sample (3.1.2), the response rate (3.1.3) and the imputation of missing values (3.2). The methods section will describe how important concepts like financial literacy (4.2) and time preferences (4.1) will be measured and how the hypothesis will be operationalized (4.3). Furthermore, the estimation technique (4.4) and the model variables (4.5) will be described

Financial and pension knowledge are a part of financial literacy and will be analyzed in chapter (5) which is the first chapter presenting empirical findings based on the data used in this thesis. This chapter shows how well the Germans who participated in the survey are informed about general financial concepts and pension matters. On the one hand actual knowledge has been measured using a short quiz on pension issues (5.1), and perceived knowledge has been measured by asking individuals how they rate their knowledge of different pension related concepts (5.2).

The sixth chapter translates the theoretical model into an empirical model and investigates which individual characteristics are beneficial for thinking (6.1), planning (6.2) and saving (6.4) for retirement. This chapter is therefore designed to look closer at the hurdles which prevent individuals from investing in private retirement provision. Chapter 6.3 tries to find out why individuals often fail to translate their plans into action and chapter 6.5 analyses the reasons why many individuals decide not to participate in retirement seminars. Chapter 6.6 looks at the effect that different sources of information have on savings decisions. Each of the topics analyzed in chapter 6 is then followed by a discussion of the respective results.

Based on the findings, the concluding chapter 7 provides suggestions and advice concerning measures which could be taken in order to help people to negotiate each hurdle on the way towards private retirement provision. Furthermore, suggestions regarding directions for future research will be provided.

# 2 Background

The background is composed of three different parts. The first part discusses the early developments of the theory of saving and consumption. The most important concept will be time preferences which present the desire for present and future consumption. Individuals who are future orientated place more weight on utility in the future and will therefore be more likely to save for retirement than individuals who are present orientated. The theoretical review focuses on research which will make it possible to formulate predictions about the effects that financial or pension literacy have on savings decisions. At the end of the theoretical discussion a model will be developed which comprises each action to be taken in order to start private retirement provision and to figure out which role financial and pension literacy may play in this process.

The second part of the background provides an overview about the latest pension reforms and the pension system in Germany in general. The third part of the background chapter is the literature review, reviewing literature investigating the extent of financial and pension illiteracy in the population, the effects of financial and pension literacy on retirement behavior and the effectiveness of retirement seminars and other measures to induce people to save.

## 2.1 Theoretical Framework

The first part discusses the early developments of the theory of saving and consumption (2.1.1). Early theories were highly psychological and later transferred into mathematical formulations before being applied, for example, to the life-cycle model of saving which constitutes the second part of the theoretical framework (2.1.2). Several empirical findings point to deviations from the standard-life cycle model to the extent that models have been developed which relax assumptions in order to improve explanatory power. Nevertheless, there are two assumptions which are less easy to relax than others, namely, perfect information and rationality, both of which are especially relevant for private retirement provision. Theories which explicitly address these issues are New Institutional and Behavioral Economics, both of which will be outlined in chapter 2.1.3. (see also the literature review and empirical results in Oehler 1992, 1994, 1995, 2000, 2002, 2009, 2011). The final chapter (2.1.4) infers what these theoretical and empirical findings imply for financial literacy and its effect on retirement saving decisions. Furthermore, a decision model will be developed which guides the empirical analysis in chapter 6.

### 2.1.1 The History of Intertemporal Choice

The question of how individuals evaluate present and future consumption has played an important role in classical and neo-classical theory for a long time.

The first approaches where highly psychological in identifying different motives which ought to influence time preferences. Later these motives were continuously abstracted and finally integrated into a mathematical formulation. Nowadays an increasing number of economists go back to apply psychological motives to explain intertemporal choices. Since I also follow this approach in my thesis, it is necessary to briefly describe the development of the study of intertemporal choice.

In 1834 the economist John Rae explained why wealth differed among nations and argued that the reason for different levels of savings and investments in a society is determined by "the effective desire of accumulation". He established three factors that promote the effective desire for accumulation (Rae 1905 p.58). Frederick et al. (2002) interpreted the first factor as the bequest motive and the second as the propensity to exercise self-restraint. The third notion can be described as certainty of human life, a feature that is important to consider because uncertainty induced by, for example, financial crises or political unrest is likely to affect the savings and investment decisions of many consumers.

This analysis formed the basis for investigations into how individuals make temporal choices, and based on the psychological factors identified by Rae (1834), Senior (1836) developed the abstinence perspective. His approach is characterized by the assumption that individuals treat the future and the present equally; hence there is no discounting of the future. He thus argues that the only reason why the present is overweighed is the self-denial which is needed to delay gratification (Senior 1836). Instead of associating time preferences with the pain induced by deferred consumption, Jevons (1965) argues that individuals anticipate the utility of future consumption, whereby consumption which has been transferred into the future causes immediate pleasure which increases present utility.

"The anticipatory-utility and abstinence perspectives share the idea that intertemporal tradeoffs depend on immediate feelings – in one case, the immediate pleasure of anticipation, and in the other, the immediate discomfort of self-denial." (Frederick et al. 2002). Intertemporal choices, therefore, depend on present utility in which the future is taken into consideration through psychological mechanisms.

As with the approaches of Rae, Senior and Jevons, Böhm-Barwerk (1889) also employs psychological explanations to describe the determinants of intertemporal choice. He argues that individuals systematically underestimate their future wants, and they do so because of the inability of individuals to imagine the future and to abstract from it, or their reluctance to make the effort to consider the future (Böhm-Bawerk 1889). These considerations were again taken up by psychologists and economists, focusing on behavioral aspects of decision-

making which are not in line with the classical model of rational decision making (Simon 1955, 1959). Among others the related concepts are bounded rationality and the theory of self-control which will be discussed later on in this review. Böhm-Bawerk (1889) also described intertemporal choices as an allocation of resources over different points in time. Decisions are no longer based solely on present utility, instead utility which can be realized in the future will also be part of the decision-making process. This method of reasoning constitutes an important step towards its formalization.

Fisher (1930) refined Böhm-Bawerk's idea and established the fisher diagram, which is still taught as a basic concept in economics. It centers around a diagram which depicts a representative individual's decision to allocate consumption between the current year, on the abscissa, and the following year, on the ordinate axis (Figure 2). One possible decision of the consumer would be to choose C1< Y1, whereby in this case the consumer would be saving. In the second period, the individual is able to consume that saving plus the interest earned and the second-period income. Fisher describes the pure time preference as the marginal rate of substitution at the point where consumption is equal in both periods. In addition he stresses the presence of diminishing marginal utility of consumption which entails a desire to smooth consumption over time.

**Figure 2: Intertemporal Choice (Fisher 1930)**



$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$
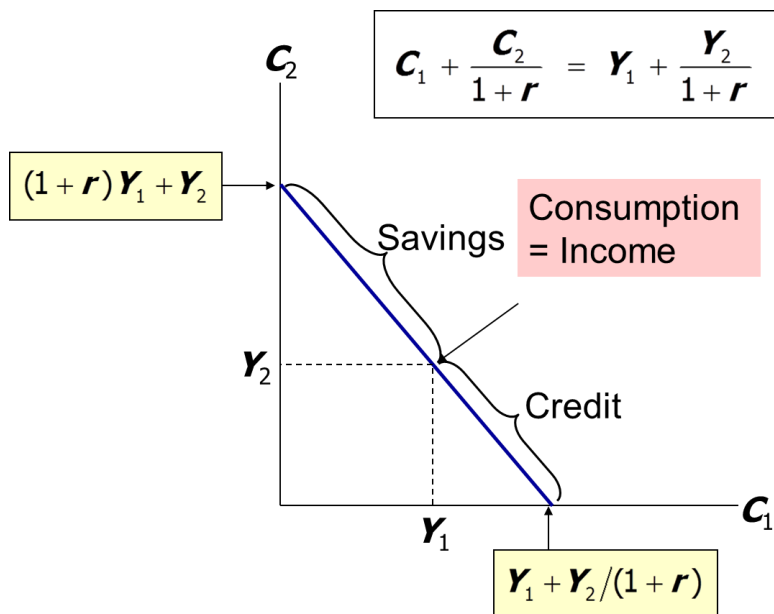
Notes: Y1 = income in period 1, Y2 = income in period 2, C1 = consumption in period 1, C2 = consumption in period 2, r = the interest rate.

Fisher emphasizes that his model depends on the assumptions of perfect foresight. He appreciates that in the real world individuals will not act like the rational agent modelled in his diagram of intertemporal choice. Thaler (1997) ar-

gues that, "[w]hile it is impressive that Fisher essentially anticipates the life-cycle theory of saving, it is perhaps more impressive that he also anticipates the behavioral critique of this model". Like his predecessors, Fisher describes psychological factors which determine time preferences. On the one hand impatience depends on personal income, and more precisely on its size, time shape, composition and risk. On the other hand he identifies six personal factors, which are self-control, foresight, habit, expectation of life, concern for the lives of others and fashion[7]. Although Fisher formalized intertemporal choice he did not neglect the psychological motives that explain differences in time preferences.

In 1937 Samuelson (1937) developed the discounted utility model (DU model) which allowed the analysis of intertemporal choices over multiple time periods. As a cardinal measure of an individual's rate of time preference he employed a discount rate which integrates all psychological concerns discussed above into one notation. The psychological determinants of time preferences proposed by the scientists discussed previously are rendered irrelevant for the economic analysis of temporal choices based on the discounted utility model, as discounting utility by a constant factor allows a comparison of costs and benefits to be made occurring at different points in time. The utility function can be described as follows:

$$U(x) = \sum_{t=0}^{\infty} \rho^t U(x_t) \tag{1}$$

where $x_t$ is the consequence of option $x$ in period t. The discount factor is $\rho$, such that $\rho = 1/(1 + d)$, where $d$ is referred to as the discount rate. A patient person would therefore have a high discount factor and a low rate of time preference. In his short paper "A Note on Measurement of Utility", however, Samuelson (1937) also expressed concerns about the validity of his assumptions when applying them to the real world. He explained that, "in the analysis of the supply of savings, it is extremely doubtful whether we can learn much from considering such an economic man, whose tastes remain unchanged, who seeks to maximize some functional of consumption alone, in a perfect world, where all things are certain and synchronized. " (Samuelson 1937, p. 160) Despite Samuelson's doubts, researchers quickly integrated the discounted utility model as the framework of choice into their studies of intertemporal choice (Frederick et al. 2002).

$$U(x) = \sum_{t=0}^{\infty} \rho^t U(x_t) \tag{2}$$

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[7] For Fisher (1930) fashion means that individuals imitate others, and an example given by Fisher is that millionaires seem to be induced to live in an ostentatious manner, while poorer individuals are led to work hard and save to become millionaires one day.

### 2.1.2 The Life-Cycle-Model of Saving

Samuelson (1937) argued that the determinants of an individual's savings decision are seldom certain. In fact an individual encounters several uncertainties. He or she is for example not able to predict his/her future employment prospects, the development of the economy or the stock market nor is he/she able to predict how politicians will influence capital markets and the pension system in the future. Decisions under uncertainty depend on the probability with which alternative outcomes occur. If the probabilities are known it is about decision under risk. In expected utility theory, which dates back from Bernouli, decision makers choose between risky prospects by comparing their expected utility values. These expected utility values are the weighted sums obtained by adding the utility values of outcomes multiplied by their respective probabilities. In order to derive rational behavior from the expected utility theory, the axioms from von Neumann und Morgenstern (1947) have to be met (Bitz 1981, Oehler 1995, Weber 1990). These axioms describe decision rules to which rational agents would adhere.

In contrast to the decision under risk, in which case the probabilities are known, it is also possible that probabilities are not known. In the previously described case in which an individual decides how much to save for retirement it is likely that probabilities are uncertain. In subjective expected utility theory an individual derives probabilities and outcomes simultaneously (Oehler 1995, Savage 1954). An individual is not able to determine probabilities exactly. Ambiguity can range from complete uncertainty about the probability of occurrence to almost complete certainty about the probability (Oehler 2005, Weber 1990).

The prominent model of intertemporal choice, the life cycle model of saving is the first economic model which concentrates predominantly on saving for retirement as the most important savings motive (Werner 2009). This model is grounded in expected utility theory and is still the foundation for much of the theoretical and empirical research on consumption and saving behavior. According to this model agents are rational and farsighted. They are optimally informed about all actions available to them and they know which implications these might have. Such individuals then maximize the expected utility of their lifetime subject to the resources available over the course of their lives. The result of the model is that individual's smooth consumption over their life cycle. In times of high income, usually during prime working age, individuals save a fraction of their income and borrow against future earnings or do not save in times of low or zero income, as is the case for individuals just starting their working career or just ending it when they reach retirement age. In Figure 3 the pattern of saving and consumption over the life cycle is described visually.

Empirical evidence has shown that real savings patterns generally deviate from these model predictions. The reason offered is the large number of simplifying assumptions that underlie the basic life cycle model.[8] Empirical studies have shown that individuals may not engage in dissaving as has been predicted by the standard life-cycle model (e.g. Porterba 1994, Börsch-Supan et al. 2003). Furthermore, young individuals and households are often reluctant to take on credit to finance consumption even if they face an increasing wage profile (e.g. Alessie et al. 1997, Börsch-Supan and Lusardi 2003, Browning and Crossley 2001, Deaton 1991, Jappelli and Pagano 1994, Thurow 1969). Additionally, there has been evidence that many people approach retirement with too little wealth (e.g. Lusardi and Mitchell 2007a, Mitchell and Moore 1998, Munnell 2005). This means that their standard of living during retirement is likely to be lower than before.

**Figure 3: Income, consumption and life-cycle saving**
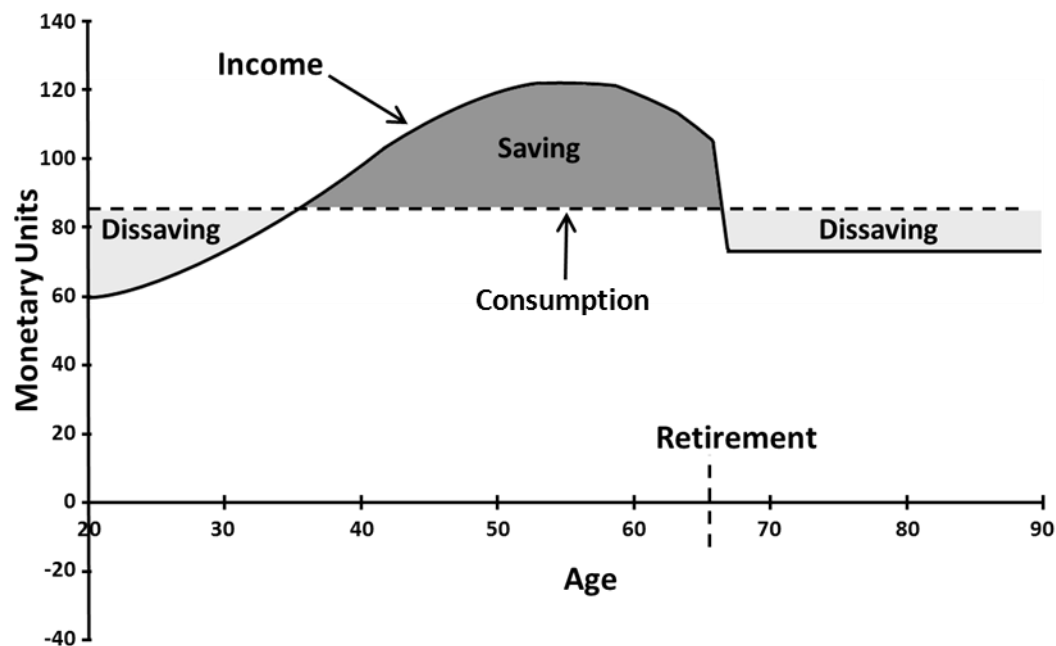


Source: Based on Börsch-Supan and Lusardi 2003.

Some of the studies investigating savings behavior during retirement have been criticized by Jappelli and Modigliani (2005) for using an incorrect definition of savings. Social security contributions like the mandatory contributions to a pay-as-you-go financed pension scheme have been treated as taxes, and pension

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[8] The term basic or standard life-cycle model will refer to the life-cycle model designed by Brumberg and Modigliani 1954. There are many variants of the life-cycle model today, which relax one or more of the assumption of the standard model. These models will be part of the following overview.

benefits have been treated as income. Instead one should treat social security contributions as mandatory savings and pension benefits as a mixture of capital income and capital decumulation. The same definition should be applied to health expenditures, which generally increase with age. An empirical estimation conducted by Brugiavini and Padula (2003) has shown that retirees in Italy indeed dissave, when their pension is defined as capital decumulation. Treating pensions as earned income on the other hand has led to a positive saving rate of 20 per cent of retirement income. A negative savings rate for retired people has also been confirmed by a study in New Zealand in which 50 per cent of pensions have been treated as income and 50 per cent as dissaving (Coleman 2006). Despite considering the proposed definition of savings, Börsch-Supan et al. (2003) found a positive savings rate even for most retired low-income households. This positive saving rate has been explained by the generous statutory pension and health insurance or habit formation, to the extent that individuals have not wanted to change their accustomed standard of living (Börsch-Supan 2003). Börsch-Supan and Stahl (1991) suggest that poor health conditions may be responsible for a positive savings rate because individuals who are seriously ill are not able to spend money.

Furthermore, individuals might be reluctant to start dissaving because of the uncertainty about their own and/or their partner's future health prospects, hence they save to pay for better health treatment later. After the death of a partner individuals may also gain less utility from spending money such that they save all money which is not spent on the necessities of daily life. This positive saving rate may change in the future and converge to match the results in the USA where many people approach retirement with too little wealth (Lusardi and Mitchell 2007a, Mitchell and Moore 1998, Munnell 2005). The reason for this convergence is the declining replacement rate from the statutory pension system. In Germany private retirement savings will become increasingly important, just as they already are in the United States.[9]

These examples show that the definition of savings can cause huge differences in empirical estimations. Another source of inaccuracy is the data on savings and wealth itself. These issues are very sensitive and if information is collected through a questionnaire it is common for many people refuse to answer these questions or to make guesses. Use of this data needs to take such conditions into account as estimation results are likely to be distorted.

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[9] Further information obout pension reforms and the declining replacement rate in Germany will be provided in the following chapter 2.2 on pension reforms and their impact.

When looking at an earlier period in the life-cycle, it can be observed that many young households are reluctant to borrow against future income as proposed by the basic life-cycle model. The three widely accepted explanations are liquidity constraints, precautionary savings and demographic changes such as the birth of a child (Börsch-Supan and Lusardi 2003, Browning and Crossley 2001). It has been assumed that young individuals spend more if they do not face borrowing constraints (Alessie et al. 1997, Deaton 1991, Jappelli and Pagano 1994, Thurow 1969). According to Browning and Crossley (2001) prudence is the precautionary motive for saving. For Young households' future income is uncertain, hence many of them decline to borrow money when repayment is uncertain (Carroll 1994, 1997, Nagatani 1972). The presence of children drives up expenditure for young households including the savings for the children's education in the future.[10]

These were not the only empirical evidence which contradict the predictions of the basic life-cycle model of consumption. A review of empirical studies investigating the retirement preparedness in the USA concluded that, compared to their pre-retirement living standards, about half of the retirees are likely to experience a drop. For half of these individuals this would imply a huge decline in their standard of living, the other half will only experience a modest fall (Munnell 2005). To summarize, there has been a lot of empirical evidence which rejects the basic life-cycle model, but does that render it of no use for future research on intertemporal savings and consumption decisions? Browning and Crossley (2001) and others argue that this is not the case. Instead a lot of heterogeneity present in the data can be modelled within the life-cycle framework. They argue that it can be seen as a challenge for model builders to enrich the life-cycle model with realistic features while maintaining rejectability. In the years following the introduction of the basic life-cycle model by Brumberg and Modigliani (1997) researchers have relaxed one or more of the assumptions underlying the standard life-cycle model to make it more realistic. Mechanisms to allow for precautionary savings, liquidity constraints, endogenous labour choice, tax rules, uncertainty over income, children, social safety nets and others have been incorporated into the model. These refinements also include the theoretical considerations mentioned above, which explain why the data did not match with the predictions of the standard life-cycle model.[11]

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[10] Studies that account for children are for example Attanasio et al. 1999 and Browning, Ejrnaes 2002.

[11] References to authors which deal with these refinements of the standard life-cycle model can be found in the preceding theoretical overview regarding why empirical evidence might not be in line with the standard life-cycle model.

Many features of inter-temporal decisions have been incorporated into the standard-life-cycle model. These refinements also revived some of the psychological motives which have been the core elements of understanding temporal choice in the years before the discounted utility model appeared. One important explanation of time preferences put forward by Rae (1834) is the uncertainty of life. Nowadays there are models that account for various life uncertainties, for example, income uncertainty, uncertainty about the time of retirement and uncertainty over health and mortality.[12] However, psychologists and behavioral economists point to behavioral aspects which they argue cannot be integrated into the framework of a life-cycle model. Browning and Crossley 2001 also admit that there are psychological concepts, especially rule of thumb behavior, which the model rules out.

### 2.1.3 New Institutional and Behavioral Economics

New institutional economics and information economics are closely related to be-havioral economics. New and institutional economics and information economics employ concepts such like asymmetric information, bounded rationality and transaction costs. Behavioral economists generally develop their theories based on observations of individual savings behavior either in the real world or in an experimental setting (see the literature review and empirical results in Oehler 1992, 1994, 1995, 2000, 2002, 2009, 2011).

New institutional economics emerged in the 1970s and analyses how institutional frameworks and trade organizations emerge and what their existence implies for the individual and society. This is different from a neoclassical point of view because here the institutional framework is assumed to be given (Gabler Verlag 2012). New institutional economists often work within a modified neoclassical framework and use a different set of assumptions such as bounded rationality which are closer to real world behavior than the assumptions made in the original neoclassical theory. Many aspects of economic arrangements and behavior have been analysed in current new institutional research, and the aspects of most interest with respect to the topic of this work are asymmetric information, bounded rationality and transaction costs. A strand which has arisen out of new institutional economics is information economics which has as its main focus on these three aspects.

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[12] References for uncertainty of income: Pemberton 1997; Irvine and Wang 2001; uncertainty about time of retirement: Blau 2008; uncertainty over health and mortality: Milevsky et al. 2011.

Information economics considers the implications of incomplete information in decision-making concerning the present and the future. This incompleteness arises from the uncertainty of the future, boundedly rational agents and asymmetric information between economic agents. In order to avoid a suboptimal or costly decision, contracting parties may gather information to reduce uncertainty about the quality of a product. Information gathering, however, is not costless, a fact which has to be considered by both contracting parties. Information economics considers two models of decision making as relevant for their research. This is on the one hand Marschak's model (1954) which is based on a neoclassical microeconomic framework. He relaxes the assumption that the institutional environment can be taken as given and furthermore allows for a variation in the availability of information about this environment. It is therefore possible that decisions are not based on the true state of the environment but on the information which the individual has about it.

On the other hand Simon (Simon 1955, 1956, 1959) developed a model in which an individual is not perfectly informed about his/her environment, about the kind and number of all available options, about their outcomes and about the benefits and costs of additional information. He concludes that individuals are boundedly rational because of their limited capability of acquiring and processing information. Simon assumes that each individual has an aspiration level which he/she tries to attain and which can vary depending on the experience and knowledge of the individual. As soon as an individual has gathered all the relevant information to achieve the goal or as soon as he/she realizes that the aspired aspiration level cannot be achieved, he/she stops searching for more information. He called this kind of behavior "satisficing," which refers to the fact that the individual intentionally stops the information gathering process as soon as an option is available that allows his/her aspiration level to be attained.

Behavioral economics research as well as the research around new institutional economics focuses on cases in which decisions do not adhere to the predictions made by the standard neo-classical model. Instead of assuming that individuals' decisions are rational in the sense of the homo oeconomicus, it has been assumed that individuals act boundedly rational. Individuals have problems in processing information if a problem is too complex, which leads to decisions which are often only based on the incomplete set of information which would be available. If such individuals have worked out a strategy or plan they often fail to carry it out. They may know that they should save more for retirement but they frequently do not start to save more. Behavior like this has been called bounded will-power (Barr 2012). When presenting the behavioral findings which are relevant for savings decisions it is difficult to differentiate between information economics and behavioral economics because the boundaries are flawed. Both

research directions have something to say about bounded rationality as well as about bounded will-power. For that reason the anomalies which do not adhere to the assumptions of rational behavior and/or perfect information will now be outlined while resisting assigning the findings to either of the two theoretical approaches.

**Framing**

The situational context in which the information is presented and the presentation itself is important in showing how willing individuals are to understand, process and implement this information (Oehler and Reisch 2008). Applying prospect theory, Tversky and Kahneman (Tversky and Kahneman 1986) confirmed the dependence of choices on the language of presentation, the context of the choice and on the nature of the display in an experimental setting. Empirical evidence derived from field data has been presented by Iyengar and Kamenica (2006) who found that the number of funds in an individual's 401(k) plan affected the allocation of funds. They observed that greater funds encouraged an increased allocation to money market and bond funds at the expense of equity funds.

**Information/Choice overload**

Experiments as well as field data have shown that too much choice can derogate rational choice, to the extent that more information does not necessarily entail better decision-making. Too much information can even lead individuals to make no decision at all, to procrastinate, or fall back on heuristics to simplify decisions. Lyengar and Kamenica (2006) argue that the benefit of information would decrease as the information load and complexity increases. They found that individuals who face a large choice set have strong preferences for simple, easy to understand options.

That too much choice can cause individuals to make no decisions at all has been shown by, among others, Lyengar and Jiang Wei (2003) who found that the participation in 401(k) is higher in plans offering about five funds than in plans offering ten or more options.[13] Lyengar and Lepper (2000) conducted choice experiments in a grocery store and found that more choice not only lessens the motivation to choose but also the subsequent motivation to commit to a choice.

The decision in a grocery store about which marmalade to choose is not preceded by substantial time and effort costs to acquire information about the product nor is the wrong decision associated with any great loss. This, however, can be

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[13] See also Huberman and Jiang (2006) who finds that as the number of funds available in 401(k) plans increases, the percentage of individuals who participates declines.

different with other products such as retirement investments. Lyengar and Jiang Wei (2003) argue that too much information would matter more in those cases in which the cost of a wrong choice is large and acquiring further information would be time consuming and demand a lot of effort. As a result individuals may decide not to make a decision at all, use a heuristic, or to turn to an expert who suggests how to decide.

**Heuristics / Rule of Thumb**

Gigerenzer and Gaissmaier (2011) describe a heuristic as "[...] a strategy that ignores part of the information, with the goal of making decisions more quickly, frugal, and/or accurately than more complex methods." Generally, it had been claimed that heuristics trade off some loss in accuracy for faster and simpler decisions (Shah and Oppenheimper 2008). One commonly used heuristic when allocating money among assets is the *1/N rule,* which states that money should be allocated equally to each of N funds. Empirical evidence has shown that about 50% of people rely on this heuristic (DeMiguel and Garlappi 2009). Research which investigated the 1/N rule by comparing asset allocations which resulted from this heuristic with asset allocations which followed complex optimization rules found that often the heuristic performed better (DeMiguel and Garlappi 2009, Fischer and Gallmeyer 2012). The probability of a heuristic outperforming an optimization solution increases with an increasing number of assets and increasing uncertainty. DeMiguel and Garlappi (2009) conclude that neither model can guarantee an optimal outcome, instead they both entail a good or a bad outcome.

A further heuristic frequently used is the *recognition heuristic* (Gigerenzer and Gaissmaier 2011). This implies that that if one of two alternatives is recognized and the other is not, then the recognized alternative will be chosen. Evidence for this heuristic has for example been found by the publishing companies *der Spiegel* and the manager magazine who carried out a study focusing on financial services in Germany (Wienke 2004, Stuhr 2004). They surveyed more than 10.000 individuals aged 14 years and above. 91% of the respondents stated that they would prefer money investment which bore no risk and 88% looked for an investment which they knew very well. Oehler (2012b) rated these heuristics as behavior of a rather short sighted nature.[14] A negative example for choosing the familiar alternative is the Enron worker who heavily invested in the stock of Enron and when Enron went bankrupt he/she not only lost his/her wage but his/her pension claims as well.

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[14] Further evidence on the recognition heuristic has been found by Coates et al. (2004) and Marewski et al. (2010).

**Status Quo Bias**

The status quo bias is a preference for the current state of affairs which is taken as a reference point. Hence individuals tend to stick to their current choice or previous decision even though a better alternative exists.[15] Kempf and Ruenzi (2005) found evidence for the status quo bias in the US equity mutual fund market. Individuals who already had a plan were reluctant to adjust this plan even though it was no longer the optimal choice. They also detected that the status quo bias increased with the number of alternatives, thereby also delivering evidence for the behavioral implications of choice overload. Therefore they confirmed earlier results from Samuelson and Zeckhauser (1988) who proved the status quo bias experimentally and using field data. Individuals who participated in retirement plans could choose to allocate their premium between two funds. Even though large variations in the rate of return had been observed between the two funds, they did not find any significant change in asset allocations.

**Peer Effects / Herding**

Peer effects or herding behavior arises from the sensitivity with which individuals react to the decisions and actions of others. Individuals often take an action or decision because others do so, without any planned direction. Burke et al. (2010)) investigated the brain processes evident in the event of participants observing someone else buying stocks, and found that an area of the brain responsible for reward feelings had been activated. Experimental evidence for herd behavior had been provided among others by Banerjee (1992) who showed that the decisions of other individuals has a much greater influence on an individual's choice than his/her own information.[16] Raafat, Chater and Frith (2009) proposed an integrated approach to herding, "[...] describing two key issues: *mechanisms of transmission* of thoughts or behaviour between agents, and *patterns of connections* between agents."

**Mental accounts**

Another concern of behavioral economists is the assumption of the life-cycle model that wealth is perfectly fungible. This assumption is often not met in the real world, instead the marginal propensity to consume varies between different wealth accounts (Shefrin and Thaler 1988, Thaler 1990, 1999), which Shefrin

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[15] Further evidence for the status quo bias in be found in Kahneman et al. (1991).

[16] Further literature finding evidence for herding behavior or peer effects for example Bikhchandani et al. (1992) Beseley and Banarjee (1990), Akerlof (1980), peer effects on the date of retirement has been found by Chalmers et al.(2008) and implications of peer effects on retirement savings decisions has among other been analysed by Beshears et al.(2010).

and Thaler (1988) called mental accounts, which are arranged according to how tempting it is for an individual to spend the money held in them. Spending money from a checking account is, for example, more tempting than spending money from a retirement account. Shefrin and Thaler (1988) found that the propensity to consume from a checking account, which belongs to the "current assets" category, is nearly 1.0 whereas spending out of a retirement account, which is categorized as "future income", has a marginal propensity to consume close to zero. In fact they introduced three classes of accounts, which are called "current assets", "current wealth" and "future income". Browning and Crossley 2001, however, argue that it could be possible to relax the fungibility assumption in the life-cycle model if theoreticians refine the model by relating behavior "to the properties of assets in a theoretically consistent way".[17]

## Self-Control

Thaler and Shefrin (1981) developed the Economic Theory of Self-Control, whereby they modelled an individual as having two conflicting selves. Each time individuals have to decide if and how much to save, conflict occurs because one of the selves, the doer, is myopic and the other, the planner, is farsighted. The planner would like to save for retirement but the doer does not. Individuals generally have a preference for short term gratification, and place more weight on current utility than on future utility. Subsequently they prefer to spend money today rather than save for the future. As a result, forgoing consumption today is associated with psychological costs for the individual.

## Procrastination

Procrastination is a concept closely related to self-control problems. Individuals agree that they should save more for retirement but continually delay increasing savings or starting to save (Choi et al. Laibson et al. 1998). Procrastination is not only an important concept in retirement savings decision but also in many other areas such as losing weight, giving up smoking or preparing for an exam.

A descriptive theory of choice, which considers the above outlined anomalies and heuritsics, is the prospect theory which has been developed by Kahnemann and Tversky (1979, Tversky and Kahnemann 1992). This theory refines the expected utility theory and has been intensely discussed among researchers and empirically tested (Oehler 1995, Weber 1990). The decision process of an individual consists of two phases, the framing or editing phase and the valuation phase. During the editing phase individuals "organize and reformulate the op-

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[17] Empirical evidence for mental accounting and rule of thumb has been provided by Bernheim and Skinner (1997), Zeisberger, Langer and Weber 2012.

tions so as to simplify subsequent evaluation and choice" (Kahnemann and Tversky 1979, p. 274). An individual determines a reference point, the starting point which is relevant for evaluating the results of lotteries. Furthermore, parts of the outcome which are certain in each of the lotteries will be separated. Then the lotteries will be evaluated based on their stochastic dominance. The prospect theory, therefore, requires an individual to edit the choice situation before they finally value each of the options (Weber 1990). The final choice is than part of the valuation phase in which the individual assesses the value of each prospect.

The two main elements of the prospect theory are a value function which is concave for gains and convex for losses and a nonlinear transformation of the probability scale (Kahnemann and Tversky 1979). The consequences of a value function which is concave for gains and convex for losses is that gains and losses are valued differently, depending on a reference point (Kahnemann and Tversky 1979, 2000). Individual decisions will therefore be influenced by the reference point they have chosen because of the different valuation of losses and gains.[18] In fact an individual's utility will not depend on total wealth of the alternative outcomes, a proposed by expected utility theory, but on the value which the individual attaches to each of the results.[19] This also implies that individuals would suffer more if they lose 100€ than they would be happy if they won 100€.

The nonlinear transformation of the probability scale is a further aspect which distinguishes the prospect theory from expected utility theory. These probabilities, also called decision weights "measure the impact of events on the desirability of prospects, and not merely the perceived likelihood of these two events" (Kahneman and Tversky 1979, p. 280). Such a transformation entails that small probabilities are overweighed and moderate and high probabilities are underweighted. There is empirical evidence that individuals overestimate low probabilities in relation to impossible events and underestimate high probabilities in relation to certain events (e.g. Oehler 1995, Tversky and Fox 2000). Another descriptive theory of choice, the behavioural life cycle hypothesis, which also considers the above outlined anomalies and heuristics, will be discussed in the next sub chapter, relating the findings to financial literacy.

### 2.1.4 Implications for Financial Literacy

The previous chapters have reviewed those theories which are relevant for an analysis of retirement savings behavior. What these theories have to say about the implications of financial literacy on retirement savings behavior will now be

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[18] For empirical evidence see Kaufmann and Weber 2013

[19] More information about expected utility theory see chapter 2.1.2.

examined. Individuals have to decide if they start to save, how much they save and which product to choose. In relation to the latter point information asymmetry plays an important role. There are a variety of financial products on the market from which individuals can choose. Since the quality of these products can often be assessed only after several years, these goods are credence goods for which a wrong decision because of information asymmetries could be especially costly. One possible solution to reduce asymmetries is to gain more information. But the findings of information economics and behavioral economics have shown that more information can cause an information overload, which may deter individuals from dealing with private retirement provision in the first place.

However, the potentially adverse results from more information leading to inactive-ness do not necessarily have to mean that providing individuals with basic information about finance and the pension system is wrong. Knowing roughly what to expect from the statutory pension, the direction in which reforms alter the system, that inflation decreases purchasing power and that compound interest increases savings, might have different effects on retirement savings behavior than providing detailed information on each potential saving plan.

Maki (2004) was concerned about the channels through which financial education might influence the optimization problem of the individual in the neo-classical framework. Indeed it will be shown that refinements which have been incorporated into the classical life cycle framework will facilitate predictions which are in line with empirical observations from previously presented behavioral and information economics. Maki (2004) put forward three considerations. Firstly, financial education may lead to higher savings by reducing the household's discount rate. Secondly, financially literate consumers might be less risk averse since they know that riskier assets do better than other investments over the long term. Lastly, financial education may increase knowledge about possible actions and their implications.

The assumption of the life-cycle model that consumers are fully informed while maximizing their utility is therefore not applicable, while the first two explanations would mean that financial education changes parameters of the utility function. Maki (2004) admitted that it is unlikely that time preferences and risk aversion will be influenced by financial education, as, on the one hand, he/she argues that there is no existing link between education on pension plans and time preferences. While on the other hand most models of saving under uncertainty would predict lower savings in the case of decreasing risk aversion. he/she concludes that the third explanation is the most likely one, namely that financial education increases the knowledge of an individual's set of choices.

Clark et. al. (2006) also criticizes the assumption that individuals are correctly informed about the various factors that determine wealth accumulation. If people are not correctly informed it would follow that they will not achieve their retirement objectives. For their analysis they use the classical life-cycle framework and describe how financial education influences different parameters of either the utility function or the budget constraint. Each time an individual acquires new knowledge in some period of his/her working life, when, for instance, he/she re-discovers that the return on stock is lower than previously known, then he/she can chose to keep the fraction of wage income he/she wants to consume during retirement unchanged and retire later, or reduce the fraction. Within their model they also allow for the possibility that financial education changes the time and risk preference parameters.

Inspired by Rae (1834), Jevons (1931), Böhm-Bawerk (1891) and Fisher (1930), Becker and Mulligan (1997) developed their "model of patience formation". They combined classical economist's theory with the psychological insides from, among others, the anticipatory utility theory. In their model they endogenize time preferences and argue that "[e]ven rational people may 'excessively' discount future utilities, but we assume that they may partially or fully offset this by spending effort and goods to reduce the degree of over discounting." (Becker and Mulligan 1997). They argue that this spending increases the "future orientated capital" of the individual which helps them to imagine the future.

Individuals can invest in future orientated capital through reading newspapers, listening to the news on TV, participating in a retirement seminar or choosing private retirement insurance with stringent rules to save regularly. A newspaper article about upcoming pension reforms could, for example, increase awareness of the need to provide for retirement. Saving rules introduced by the private sector or the government can act as disciplinary devices. Retirement provision is, therefore, present in the mind of the individual and seems less remote than before. Formally the model appears as follows.[20]

$$U = \sum_{t=1}^{T} \rho(S)^t \times u_t(c_t) \tag{2}$$

$$\sum_{t=0}^{T} R_t c_t + \pi S = A_0 \qquad \text{Budget Constraint} \tag{3}$$

According to the model, an individual lives $T$ periods and discounts future utility at rate $\rho(S)$. The underlying discount function is exponential and depends on the level of resources $S$ spend on imagining the future. More resources spent on future orientated capital increase the discount factor but at a decreasing rate. $\rho(0)$ is the endowed discount factor which is assumed to be <0. Individuals are

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[20] The notation has been adjusted for reasons of consistency throughout this thesis.

assumed to maximize their objective function U subject to the budget constraint depicted in equation (3). In this equation $R_t$ is the interest rate factor, $\pi$ the price of $S$ and the initial wealth endowment is represented by $A_0$. It has been assumed that the costs of S are constant and equal for everyone regardless of wealth and preferences.

Additional assumptions are that the stock does not appreciate over time and that consumers face a perfect capital market. One important implication of the model is the complementarity between future utilities and investments in future orientated capital. High perceived future utilities encourage investments in future orientated capital. Individuals associating negative feelings with old age would therefore invest less in acquiring S.

A similar reasoning underlies the growth model by Michel and Vidal (2003) that allows time preferences to be endogenous in a small open economy with an infinite time horizon. They assume that individuals differ in their ability to reduce the rate at which they discount the future, as some individuals are endowed with a higher ability to increase future orientation than others. In their model not only is the initial investment in future orientated capital (the authors call it personal capital) costly but also maintaining it.

From the two preceding models it can be deduced that financial education influences the rate at which individuals discount the future. Individuals who heavily discount the future may invest in acquiring financial knowledge or disciplinary devices. If they do so it might be possible that financially literate people save for retirement despite having a high initial discount rate. Investment in future orientated capital therefore postulates that individuals know that their high discount rate is irrational. They know that they would have a lower income during retirement than they wished to have, if they saved as little as their initially high discount rate suggests them to save.

Consumers with a high discount rate, not realizing that this discount rate might be too high, would make suboptimal savings decisions approaching retirement with insufficient wealth. Nevertheless this does not have to happen as according to the theory there is still the possibility that these individuals accidentally increase their future orientation. This could happen through watching TV, reading newspapers, visiting grandparents, increased interest rates, receiving information about retirement planning after being hired or through mandatory retirement savings introduced by the government. Hence there are many measures which could be taken by the government or other parties involved in retirement provision.

An argument which leads to a similar conclusion as the model discussed before, is Thaler and Shefrin' s Economic Theory of Self-Control (1981). Inspired by the

psychological treatment of the concept of self-control and the principal agent theory, Thaler and Shefrin (1981) modeled an individual as having two conflicting selves. Each time individuals have to decide if and how much to save, conflict occurs because one of the self's, the doer, is myopic and the other, the planner, is farsighted. The planner would like to save for retirement but the doer does not. In such a case the planner has the opportunity to discipline the doer. This action generally bears effort costs. One example would be that the planner eliminates choices of the individual. For this purpose Thaler and Shefrin (1981) suggested, among others, self-imposed rules of thumb like not buying consumption goods on credit, a prohibition of dissaving or saving devices which require regular contributions.

All these measures would have a similar effect on savings behavior in the theory of self-control that they would have in the model from Becker and Mulligan (1997) discussed earlier, namely they would increase retirement savings. The endogenous time preference model would predict future orientated capital to increase which in turn would reduce the discount rate and increase retirement savings. The theory of self-control would also predict increasing retirement savings. Based on the theory of self-control Shefrin and Thaler (1988, 1992) devised the Behavioral Life-Cycle Hypothesis. Besides self-control they introduced mental accounts, which demonstrate the non-fungibility of wealth, an assumption of the standard life-cycle model.

These mental accounts are "current income", "current assets", and "future income". The marginal propensity to consume differs between these accounts. It is for example much more tempting to spend out of the "current income" account than from the "current assets" account. In conjunction with self-control it implies that a strong willpower is needed to restrict spending out of the "current income" account. In the case that "current income" is exhausted and the individual would like to invade his/her "current assets" account, the self-control technology produces a fixed disutility penalty for the first unit consumed out of this account. The same holds if the "future income" account is invaded.

As a result, mental accounts support the planner in restricting consumption at low effort costs if the planner is able to convince the doer to place some money aside into long term saving contracts.[21] To relate mental accounts to the theoretical argument above, the "current asset" account and especially the "future income" account have a similar function as the disciplinary devices discussed pre-

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[21] Shefrin and Thaler (1992) argue that it is also possible to exert self-control by formulating internal rules such as the self-imposed prohibition on borrowing to finance consumption. These kinds of self-enforced internal rules require greater willpower than mental accounting.

viously. However, beyond the monetary penalty of withdrawing money from, for example, a private pension account, which is the disciplinary device, Shefrin and Thaler (1988, 1992) argue that there are additional psychological costs. Thaler (1999) found empirical evidence that the marginal propensity to spend a dollar from the "current income" account is nearly one, and the propensity to spend a dollar from a "future income" account is almost zero.

Closely linked to the concept of self-control is the problem of procrastination. People plan, for example, to stop smoking or to join the gym next year but as time goes by and the next year appears, they procrastinate with regards to their new year's resolution. Laibson et al. (1998) reviewed research that found that a minority of the surveyed persons aged 26 and above had tried to figure out their retirement needs and that most consumers think that they save too little for retirement. Since these individuals know that they save too little but do nothing about it, it seems appropriate to assume that they procrastinate in planning and saving for retirement because these are unpleasant tasks.

Such behavior follows as a consequence of present-biased preferences (O'Donoghue and Rabin 1998). Present bias means that individuals discount events in the near future at a higher implicit discount rate than events in the distant future. As with the theory of self-control, present biased preferences entail a conflict between immediate gratification and the long run desire to be patient. O'Donoghue and Rabin (1998) distinguish between two different extremes. On the one hand, there are the sophisticates; people who are fully aware of their self-control problem and thus know that their discount rate will change in the future. On the other hand, there are the naïves, individuals who believe that their current good intentions will definitely be implemented by their future selves (O'Donoghue and Rabin 1998).

An individual's discount function mapping such behavior looks like a generalized hyperbola (Laibson et al. 1998). Most research on intertemporal choice does not use this generalized hyperbola discount function but an approximation of it which is analytically easier to handle. This approximation is the discrete-time quasi hyperbolic function. Formula 4 shows the quasi hyperbolic discount rate as part of an utility function (O'Donoghue and Rabin 1998, 1999).

$$For\ all\ t, U^t(u_t, u_{t+1}, \dots, u_T) \equiv \rho^t u_t + \beta \sum_{\tau=t+1}^{T} \rho^\tau u_\tau \tag{4}$$

where $0 < \beta, \rho \leq 1$

In this model $\rho$ represents time-consistent impatience, whereas $\beta$ denotes the bias for the present. If $\beta = 1$ an individual would simply use time consistent exponential discounting of the future. O'Donoghue and Rabin (1998) examine whether individuals would switch from one retirement savings account into another account because he or she knows that the return on investment would be

higher. They find that naïves would procrastinate, not putting in the effort, to transfer the money, even if their taste for immediate gratification were small. This is because the forgone interest on savings of delaying the transfer for one day is low compared to the immediately incurred effort costs.

Naïves do not realize that they have a self-control problem and believe that future selves will act in the interest of current selves when in fact they will procrastinate again. The same is true if individuals were to receive a higher return on their saving by expending effort to find a better investment. In contrast, sophisticated persons are aware of their present-biased preferences and account for a larger loss of investment returns since they know that they would repeatedly procrastinate: "[K]nowing about future misbehavior increases your perceived cost of current misbehavior, thereby encouraging you to behave yourself now." (O'Donoghue and Rabin 1999). According to the authors' education and, in particular, retirement seminars reduce the effort costs incurred with retirement planning. Reduced effort costs make it more likely that naïves abstain from immediate gratification and save for retirement.

An important result from O'Donoghue and Rabin (1998) is the observation that "[s]evere procrastination does not arise from present-biased preferences per se, but rather from present-biased preferences combined with naivete." This result confirms the model implications from Becker and Mulligan (1997). Individuals who know that they heavily discount the future can compensate for it by investing in future orientated capital. Hence a lack of retirement savings does not necessarily result from a high discount rate. While both models differ in important aspects they nevertheless reach the same conclusion.

Based on the theory above a theoretical decision model and hypotheses will be developed which will be the basis for the empirical part of this thesis. Figure 4 describes the decision process from starting to think about retirement towards actual saving for retirement (see for a process-oriented figure on the decision process of private investors Oehler 2011; see also Kahneman and Tversky 1979, Tversky and Kahneman 1991; Schmidt-von Rhein 1996; Oehler 1995, 2005b, 2006). Each of the decision points in this model will now be described in some detail.

1. The first obstacle towards an adequate retirement income is taking time to think about old-age provision and the desired life during retirement. Since time is a scarce commodity for most individuals, it could also be devoted to much more enjoyable things than old-age provision. Continuing with lessons from Becker and Mulligans' (1997) findings, individuals in the present might ascribe a low utility to consumption as a retiree which may be derived from the negative association with old age and the

unpleasant task of thinking about it. It is possible to change this perception by experiencing certain events which increase future utilities. Such events could be visiting grandparents who might complain about their low retirement income and explain what they could afford if they had put more money aside. The same could be attained by the media if it highlights the importance of private retirement income. Other channels through which future utility could be raised are the introduction of saving incentives or increasing returns on investment. As future utility goes up, the profitability of investments in future orientated capital increases as well, this in turn decreases the discount rate.

**Figure 4: The Path Towards Private Retirment Provision**
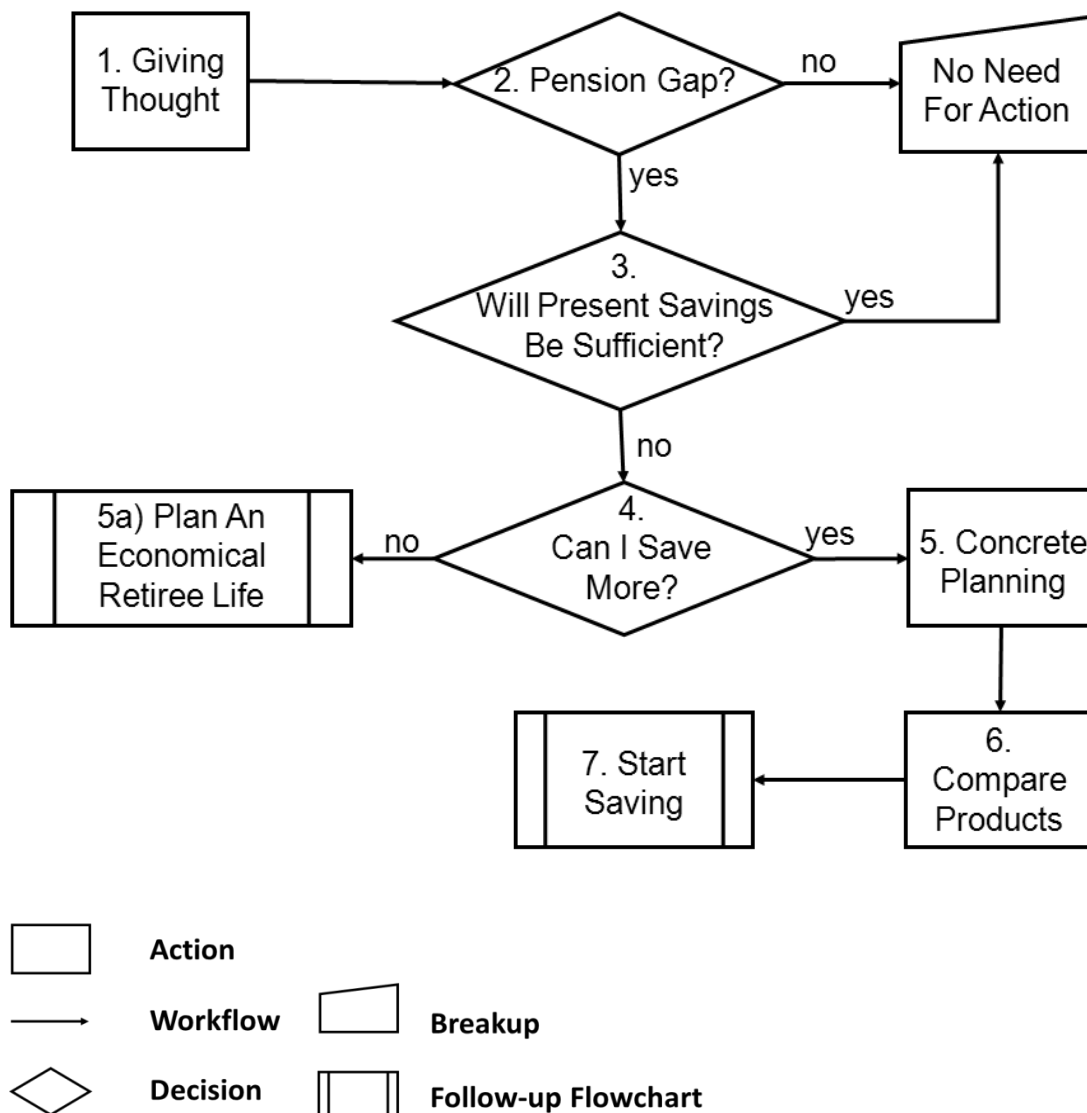


According to the theory of self-control imbedded in the behavioral life-cycle hypothesis and the theory of procrastination, effort costs are important determinants in the decision to think and later to plan for retire-

ment (Thaler and Shefrin 1981, Shefrin and Thaler 1988, 1992). Effort costs are especially high, if someone dislikes dealing with old-age and retirement provision. Decreasing effort costs is essential to encourage, in particular, the so-called "naïve" consumer to think about retirement. Effort costs could be decreased through media reports about retirement life and old-age provision, a talk with experienced friends or a job change which requires employees to think about joining a retirement plan. When this obstacle is resolved, it is time to think about the desired retirement income and about how much of this income will be covered by the statutory pension.

2. Collecting all the relevant information individuals have to estimate if they are going to face a pension gap. The pension gap is that part of the desired retirement income which will not be covered by the statutory pension. People who do not expect a pension gap do not have to take any further action. If a pension gap is to be expected it is necessary to check if this gap can be closed through existing saving plans or other wealth options.

3. This comprises a review of total assets. These are for example expected income from saving plans like life-insurance policies, retirement plans or housing equity. The individual has to determine if these saving measures close the pension gap. Estimating future retirement income, however, is a difficult task and an exact estimation of retirement income is impossible as there are too many uncertainties which can affect outcomes. The statutory pension system is prone to government reforms and the contracts with the private sector are also not immune against government intervention. Additionally there is the volatility of financial markets and asymmetric information between the consumer and the bank or insurance companies. Consumers might be wrongly informed about the costs of their private pension contract or about the rate of return, both of which could decrease their expected pay-off. Furthermore, individuals may act on the assumption that they are able to contribute regularly to the pension or savings plan if they unexpectedly become unemployed or if future pension prospects change. As a result individuals can only roughly assess whether the statutory pension plus present private savings will suffice to secure an adequate standard of living when old. If this is the case and provided that these savings are dedicated for retirement purpose, no further action is necessary. Otherwise the next step has to be taken.

4. Now individuals have to check if they can afford additional retirement savings. This is the second obstacle for many people. If no financial resources are left at first glance then one should think about reducing costs

in other areas. For this purpose it might be beneficial to ask someone like a debt advisor for assistance. Such a counselling session can help to avoid liabilities which could arise by saving at the wrong place to finance old-age provision. Even if no financial sources can be redirected towards retirement savings it is possible to take further action to reduce the pension gap (5a) otherwise planning can continue as described in (5).

5. At this point concrete retirement planning should start. First of all this comprises the collection of information about different savings vehicles in order to find the one which best suits individual needs. This information can be gathered through, for example, retirement seminars, the statutory pension insurance, consumer advice centres, financial advisors, newspapers or the internet. There is a huge variety of products available on the market which starts with "Riester saving plans" to Life-insurance policies and up to homeownership. The theory predicts that too many options to choose from prevent naïve consumers from starting retirement planning.[22] The reason is that the wide range of products increases the effort costs incurred by individuals when collecting information and deciding on the product. Effort costs could be reduced through for example a retirement seminar or a trustworthy person, who gives a hint as to which product is the best idea to choose. For the theory of endogenous time preferences the same issues apply that were discussed earlier. Where individuals have to overcome their temptation to spend their time doing more enjoyable things than thinking about old age provision. (Becker and Mulligan 1997).

5a. Even if no financial resources are left for (additional) private retirement savings, it is still possible to engage in retirement provision. It is necessary to think about retirement and about how it would be possible to live economically. Means of reducing costs could be for example moving into a cheaper flat and living in a town with a good infrastructure for pensioners. It might be possible to sell the car, to organize flat sharing or to move into a multiple generations house ("Mehrgenerationenhaus"). Such living arrangements can save costs in the form of supporting each other like taking care of children, going shopping, cooking, doing minor repairs and so on (Schiekiera 2011). Another possibility would be to join or to

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[22] The theory of procrastination with hyperbolic discounting is not the only theory that predicts that too much choice may deter individuals from engaging in retirement planning. In information economics this relationship has also been confirmed. For empirical evidence see for example Huberman 2006 and Iyengar and Jiang Wei 2003.

found a registered cooperative society (Genossenschaft). As long as the members are young and healthy they help the elderly. Each hour that an individual spends supporting others will be added to his/her time account. In the future the member might need help him-/herself; in this case he/she will receive costless support from younger society members for each hour the needy society member had helped elderly when he/she was young ( Kopp-Wichmann 2010, Bigalke 2009). These are only some examples about how someone can economize his/her life independent of any financial resources. Trying to gather information from the local community, the internet, the government or the debt advisor may also be helpful in gaining advice for an economical retirement life.

6. Having found an appropriate product, individuals have to compare different providers in order to achieve the best possible cost performance ratio. People who decide in favor of a private retirement plan such as the "Riester-Pension" are now confronted with a variety of providers and often hidden contract costs which make a decision difficult (Oehler 2009). In this case it can be an advantage to make use of product and provider comparisons in journals like "Stiftung Warentest" or the "Wirtschaftswoche".

7. After the consumer has chosen a product and provider, he or she can start saving for retirement.

Actually taking out a retirement savings contract is a bumpy road where the temptation to spend time and money for more pleasurable things than for old-age insurance can be a big problem. Most individuals lack the ability and resources to formulate and process a maximization problem which is necessary to arrive at an optimal solution. Instead they try to simplify the choices they have to make. Such simplifications could be, for example, heuristics or rules of thumb. An illustration of this would be if individuals decide to save four per cent of gross income for retirement on the basis that this is perceived as a good deal because the government assigned this amount to be eligible for the full "Riester-Subsidy". These consumers may not be able to arrive at an optimal solution because of limited intellectual capabilities, and so they are termed boundedly rational (Simon 1955, 1959, Thaler 1990, 1994). Many individuals have a self-control problem, even if they would be able to engage in optimal planning, they may not start to save any amount for retirement because they cannot resist the temptation of current consumption (Laibson et al. 1998, Thaler 1994, Thaler and Shefrin 1981). Besides the decision model above which will be relevant for the empirical analysis, four hypotheses shall be developed based on the theory discussed above in chapter 4.3. Within chapter 4.3 it will also be outlined how the hypotheses can be tested empirically.

## 2.2 Pension Reforms and their Impact[23]

The industrial revolution in Germany during the 19th century attracted notice to the economic and social problems of the workforce. 1889 the German Reichstag under Otto von Bismarck approved a law introducing a pension and invalidity insurance. Every employee aged 16 to 70 years had to contribute to the statutory pension insurance. The contribution rate was 1.7% and shared between employer and employee. Contributions have been invested such that each employee accumulates a capital stock. At the age of 70 years employees received their pension if they had contributed at least 30 years. Not many employees received a pension because the average life expectancy was 40 years at that time.

In 1916 the eligibility age had been reduced to 65 years. The first financial problems of the pension system occurred in 1921 in conjunction with the world economic crisis. At that time the pensions have been pay-as-you go financed for a short period. In 1957 Konrad Adenauer abolished the funded pension system completely in favor of a pay-as-you go scheme.[24] In 1986 Norbert Blüm started a campaign to increase the acceptance of the statutory pension insurance within the population. He stated that the pension from the statutory pension insurance would be save. After the German unification the pension insurance was in financial problems again and in 1992 the government changed the pension adjustment formula, such that pension increases would be based on net income instead on gross income, which leads to a decline for future pensions. This reform was not able to able to stabalize contribution rates which had been predicted to increase to about 23% in 2020 (Börsch-Supan and Wilke 2006).

The possible implications of this projected increase were that the working population would bear a disproportionate amount of the increasing imbalance between the working population and the pensioner. Due to the defined benefit character of the statutory pension scheme in 2001, pensioners would not have had to sacrifice income. To divide the burden more equally between generations a major pension reform, named after former labour minister Walter Riester, was enacted in 2001. This reform changed the pension adjustment formula to make a decrease in the pension level possible. Pension increases would be slowed by a fictitious contribution rate assumed to be contributed to a private pension plan. This new part of the pension adjustment formula is called the "Riester-Factor".

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[23] For an overview on different stages in pension reforms in Germany see Wilke 2009 and Oehler 2009.

[24] More information about the history of the German pension system can be found in Ruland 1990.

Additionally, increases in the contribution rate to the statutory pension scheme reduce pension adjustments and therefore reduce the future pension level. The objectives were that contributions to the public pension scheme should stay below 20% until 2020 and below 22% until 2030; and that the pension level should not fall below 46% until 2020 and below 43% until 2030. Both goals are implemented into the Social Security code (Federal Republic of Germany 2009, SGB IV § 154). Additionally, a savings subsidy ("Riester-subsidy") was introduced to make supplemental private and company pensions more attractive.

In principle, everyone saving at least 4% of his or her income within a "Riester-Pension" plan is entitled to a saving subsidy of 308 € plus 185 € for each child. For children born after 2007, the child subsidy has been increased to 300 €. An alternative to the subsidy is receipt of a tax deduction, depending which is more advantageous to the individual. "Riester-Pension" plans are certified products which have to meet certain criteria set by the government. Criteria are, for instance, that the provider has to guarantee at least a retirement wealth equivalent to the contributions (individual plus subsidy) and that he or she has to convert the retirement wealth into a life-long annuity. The self-employed are amongst one of the groups of people that are not entitled to a Riester-subsidy.

Coppola and Reil-Held (2009) calculated how much of yearly savings flowing into the "Riester-Pension" were contributed from the individual and what percentage of total savings were contributed by the government in the form of the "Riester-Subsidy". They found that the percentage contributed by the government is especially high for individuals with low income or families with children. These groups of people often receive a "Riester-Subsidy" which is worth 50% of total savings. Hence the government seems to be able to increase the number of savers among low income individuals with the subsidy.

At present there are several different "Riester-Pension" contracts available: bank savings plan, fund savings plan, classical pension insurance, fund based pension insurance and two further forms with different regulations, especially, concerning the out-payments. These two are the "Company Riester" pension and the "Housing Pension" (Eigenheimrente). Individuals are entitled for a housing pension if they intend to buy or build a house. The "Riester-Subsidies" will be paid either for a certified housing loan or a building savings contract. Instead of filing a company pension with tax deferred contributions it is also possible to receive a "Riester-Subsidy" for most company pension plans. The company pension with "Riester-Subsidy" has one disadvantage over the other "Riester-Pension" plans. This disadvantage is that at the time the pension is due, individuals have to pay health insurance contributions on their out-payments which classical "Riester-Savers" do not have to pay.

In 2004, another pension reform followed which again modified the pension formula by implementing a sustainability factor. This factor accounts for the relationship between the number of individuals paying contributions to the statutory pension system and the number of pensioners. In the case of an increase in the number of pensioners relative to the number of contributors, upward pension adjustments will be slowed. At present, it is predicted that the contribution rate will rise from 19.9% in 2008 to 20.4% in 2022 and the pension level will decrease from 50.5% in 2008 to 46.2% in 2022 (Bundesministerium für Arbeit und Soziales 2008a). Figure 5 depicts the situation for the replacement rate. Additionally the figure shows that under certain assumptions the private "Riester-Pension" is able to stop the fall in the replacement rate.[25]

**Figure 5: The Pension Gap, Replacement Rate before Taxation in Percentage**
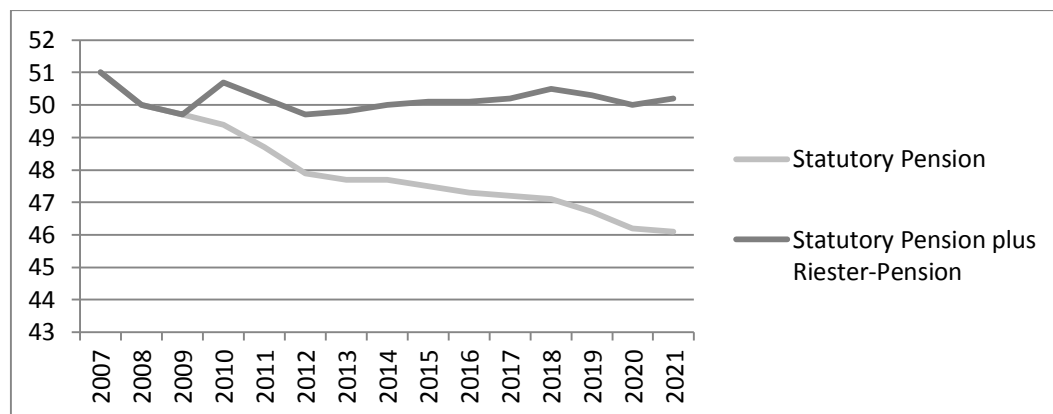


Source: Rentenversicherungsbericht 2007 (Bundesministerium für Arbeit und Soziales 2007)

The German pension system is composed of three pillars. The first and most important pillar is the pay-as-you-go pension scheme. Everyone who is subject to social insurance contributions is covered by this scheme. The contribution rate is 19.9% and divided equally between employee and employer. As described in the introduction, the pension level of the pay-as-you-go scheme has decreased as a result of the pension reforms in 2001 and 2004. Those who are self-employed and individuals earning less than 400 € a month are not covered but could voluntarily participate in the scheme. Another group of employees not covered are civil servants who receive a non-contributory state pension.

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[25] Assumptions for the calculation of the replacement rate were: 45 years of contribution to the statutory pension system, earning an average income, percentage contributed to the Riester-Pension increases from 1 percent in 2002 to 4 percent in 2008, Riester-Pension yields 4 percent interest p.a., Riester-Penison will be adjusted like the statutory pension, assumption that pensioner retirering before 2010 have not filed a Riester-Pension contract.

The term "civil servants" is used here to refer to a specific group of public servants, as in Germany, public servants could be civil servants, white-collar or blue-collar workers (Börsch-Supan and Wilke 2004, Kuhlmann and Röber 2006). The state pension for civil servants has also experienced some reductions in the replacement rate. In 2010, the pension for a civil servant employed full-time who has worked 40 years is 71.75% of his or her last salary. The average pension for individuals subject to social insurance contribution who contributed for 45 years to the statutory pension insurance and always earned an average income, receive a pension (net before taxation) which is 51.6% (1.106€ old federal states) of the average income employees earned in 2010 (German Federal Pension Insurance 2010). A direct comparison of the civil servant pension and the statutory pension is not possible because the pension level of the statutory pension system is not a percentage of the employee's last salary and civil servants enjoy other special privileges and duties aside from their pension system. In general, civil servants receive a pension which is higher than a comparable employee pension (Fuest 2007). Based on the German Socio-Economic Panel 2007, Frick and Grabka (2010) calculated the present value of the ac-cumulated pension wealth for civil servants and blue- and white-collar workers. Civil servants aged 63-67 accumulated on average pensions worth 400,000 euros while a comparable blue- or white-collar worker accumulated only 160,000 euros, a figure that is merely 40 percent of what civil servants were able to accumulate. Hence, there is less need for supplemental retirement savings for civil servants.

Even taking into account recent pension reforms, statutory pensions will continue to be the most important source of retirement income. Nevertheless, in view of the decrease in pension level for most individuals, supplementary measures are necessary to maintain their accustomed standard of living when old. Schmähl (2008) states that it will become increasingly difficult to acquire sufficient pension claims which exceed the need-orientated old-age basic income support. This is especially the case for individuals who have been unemployed for a long time.

Company pension schemes constitute the second pillar of the pension system. Since 2002, every employee has the right to take advantage of deferred taxation for contributions to an occupational pension scheme. This means that employers have to provide a vehicle through which employees can save for their retirement. Employers, however, can decide which type of pension scheme they offer. White- and blue-collar workers employed in the public services are offered a special form of company pension which is generally mandatory. The lion's share of the contributions is paid by the public employer. The majority of employees in the private sector on the other hand have to pay contributions to a company pension plan completely out of their own pocket.

The third pillar is private pension which covers all kinds of voluntary supplemental long-term savings contracts. Among these are for example "Riester-Pension" plans, life-insurance policies and other private pension plans. The pension reforms described above have fundamentally changed the character of German statutory pension system. Before the reforms it was classified as a defined benefit scheme. It could now be classified as a notional defined contribution (NDC) plan (Börsch-Supan and Wilke 2006). For individuals it is now increasingly difficult to predict how much income they can expect from statutory pensions.

For that reason, the statutory pension authority sends out pension statements on an annual basis. Since 2005, everyone who is 27 years old and has been contributing to the statutory pension system for at least five years receives such a statement, which provides information about the expected pension entitlement in the case that one continues to pay contributions which are worth the average of the past five years until one retires. However, the statement also points to the decreasing pension level relative to wage increases as well as to the loss of purchasing power of the accumulated wealth. Therefore, even despite this statement for many individuals it is unclear as to what to expect with regards to the future replacement rate. Not only is the calculation of the pension gap troublesome, choosing the most appropriate product is challenging as well. Soon after the reforms, the financial sector reacted by offering a large variety of pension products. Since many individuals have no experience with such products they are often overwhelmed when attempting to choose the right product.

Nevertheless, individuals who do not save in the form of a private retirement account may have real estate which saves on rent payments during retirement. Indeed, a study on behalf of the Versicherungskammer Bayern (2009) found that 43% of the respondents judge real estate as the best way to provide for one's old age. The "Riester-Rente" was chosen by 30% of the respondents to be a good measure to save for retirement. A Postbank (2012) study supports the previous finding that the demand for real estate as a source of retirement income is increasing and the monthly amount individuals save for retirement decreased from 204€ in 2005 to 185€ in 2012. The reasons put forward are the financial crises and the constantly low interest rates. For similar reasons the attractiveness of the "Riester-Pension" decreased. Only 24% of the respondents in the Postbank study think that the "Riester-Rente" is a good vehicle to provide for retirement compared to 31% in 2007. The Deutsche Bundesbank (2013) has shown that the number of newly filed "Riester-Penison" fond saving plans decreased from 690,000 in 2007 to 139,000 in 2011. According to the Gesamtverband der Versicherer (2013), the newly filed life-insurance plans also declined from 6,900,000 in 2008 to 6,300,000 in 2012. The percentage of indi-

viduals who terminated their contract, however, declined form 4% in 2008 go 3,48% in 2012. While the attractiveness of life insurance plans and the "Riester-Penison" decreases, the number of of filed company pension plans (Direktversicherung, Pensionskasse and Pensionsfonds) is continuously increasing from 2002 to 2012 (Gesamtverband der Versicherer 2013).

## 2.3 Literature Review

The first part of the literature review, chapter 2.3.1, is devoted to literature assessing financial literacy levels. If financial illiteracy would be asserted to be wide spread the follow up question would be if financial literacy influences retirement planning and savings. This is the question which will be pursued in chapter 2.3.2. In the case that research detects an influence of financial literacy on retirement savings decisions it would be advisable to increase financial literacy of the population to avoid suboptimal saving decisions. Since the focus of this thesis are retirement savings, chapter 2.3.4, reviews research which evaluates the effectiveness of retirement seminars. The last part of the literature review, chapter 2.3.5 is devoted to other measures which could be taken in order to increase retirement planning and saving.

### 2.3.1 Is financial illiteracy a problem?

In Germany, the concept of financial literacy gained importance after the decline of the American and German stock market index (DJIA, DAX) and the insolvencies of a large number of major American and German companies in 2002. Many individuals lost their savings, and more importantly, their accumulated pension wealth. An article from a major German newspaper stated that, "[o]nly in times of crises do we realize how much we depend on others. That we are not able to help ourselves. Because we are illiterate: financially illiterate." (Brost and Rohwetter 2002).

The question researchers have to answer is: Who is financially literate and what do people have to know in order to be classified as financially literate? The common procedure to measure financial literacy has been to ask a sample of individuals' knowledge questions concerning finance and retirement provision. The more questions they answer correctly, the more literate they are. There is, however, no consensus about the kind of questions to be asked. As a result the questions individuals have to answer in order to be classified as financially literate vary between studies. This chapter firstly presents research and surveys conducted in Germany in order to assess the level of financial literacy in Germany. Secondly, international evidence will be reviewed and lastly shortcomings which can be observed in the design of most of these studies will be discussed.

The first scientific coverage of the topic followed in 2003 with a book on financial literacy and its effect on preventing poverty (Reifner 2003). The financial literacy level of the German population was assessed in 2003 using a representative survey among 1,000 Germans aged 18 to 65 years. This research was conducted by NFO Infratest Finanzforschung on behalf of the Commerzbank (2003). Respondents had to answer 35 questions related to money management, credit and financial investments. It was found that although 80 per cent felt confident about their understanding of financial issues, 42 per cent were not able to answer at least half of the questions correctly.

A lack of financial knowledge was also confirmed by Reifner, Tiffe, and Turner (2003a), who analysed Data from the Bertelsmann Stiftung old-age provision survey from 2002. Questions about their behavior concerning old age provision have been answered by 2002 respondents born between 1952 and 1972. Additionally, questions were asked to measure financial knowledge. They detected deficits in compound interest calculations among all respondents. The majority of the population overestimated pension entitlements from the statutory pension system and only 44% were able to state which type of investment experienced the greatest appreciation during the past 20 years. All questions were evaluated for subgroups of the population which were classified according to family status and income. They concluded that financial literacy increases with income. Using the same data, Leinert (2004) confirms these results and adds that the fraction of correct responses increases with education.

Further evidence on widespread financial illiteracy in Germany was found by a representative TNS-Emnid study on behalf of Canada Life (2007) among 1012 respondents aged 18 to 60. The study found that about half of the respondents were not able to explain a "Riester-Pension". This result is surprising given that the "Riester-Pension" has been advertised since its introduction after the reform in 2001 and its importance in the second and third pillars of the German old-age insurance system. Using data from the 2007 wave of the German SAVE-Panel, Honekamp (2010) also confirms a lack of financial literacy among the German population. Not even half of the respondents were able to answer three basic financial knowledge questions about inflation, interest calculation and risk diversification correctly.[26] Another study based on the same dataset showed that about 40% of the respondents were not able to approximately give an estimate of their expected replacement rate from the statutory pension system (Honekamp

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[26] These three questions were formerly implemented in the Health and Retirement Study (HRS) 2004 by Lusardi and Mitchell (2006), see also Bucher-Koenen and Lusardi, Pahnke and Honekamp

and Schwarze 2010). A 2011 survey revealed that 26% of the respondents aged at least 18 find it increasingly difficult to manage private finances (Ollrog 2011).

In Germany also several surveys have been conducted to assess financial knowledge of young consumers. The conclusions drawn from most of the surveys is that the financial knowledge of young individuals is low and that about half of the surveyed individuals don`t like to deal with financial matters. Based on the results of a study conducted by Hurrlemann and Gensicke (2010) it has been concluded that many young individuals are unable to cope with financial matters. This conclusion has been drawn because among others they found that only 12% of young individuals aged 17-27 years were able to explain that contributions to a company pension plan are exempted from income tax and social insurance contributions (ability to explain what is meant by "Bruttoentgeltumwandlung").

A German newspaper attested that young individual find financial topics annoying because of the result of a survey conducted by the F.A.Z. Institut (2010) (Oehler 2012b). In this survey respondents aged 18-39 years had to choose between two possible answers "I like dealing with financial matters" and "money is necessary but that they are not interested in money related issues". 44% of the respondents indicated that they are not interested. The F.A.Z. Institut also investigated the responses to some of the questions for subgroups of the sample. One subgroup is individuals who left the parents' home to live for their own during the past two years. In this case 66% of the respondents answered that they like to deal with financial matters. This might be evidence that preferences concerning financial topics change as changes in the life of an individual occur.

Analyzing data from a WDR (2011) study Oehler (WDR 2012) compares the results of a survey among young adults (14-29 years) with the results from a similar survey conducted without an upper age limit. He clarifies that young adults are not less interested in financial matters than the overall population. Additionally young adults see financial matters and money as an important and up-to-date topic. Of course young adults find the topic more exhausting and complicated than adults and they also do not feel as confident when dealing with financial matters as the overall population does. This however, Oehler (WDR 2012) argues, is not surprising and the differences observed today will automatically disappear as young adults' age and gain more experience with financial topics.

Leaving Germany and having a look abroad, several surveys have shown that financial illiteracy is widespread. Lusardi and Mitchell (2011) added a module on financial literacy into the 2004 US Health and Retirement Study (HRS). The respondents of this longitudinal datasets are Americans over the age of 50. They

found that half of these respondents were not able to answer two simple questions about interest rates and inflation correctly. Low financial literacy was especially prevalent among those with low education, women and the elderly. Also based on the 2004 HRS Lusardi and Mitchell (2010) investigated the respondents tried to estimate how much they need to save for retirement, if they made a retirement plan and whether they were able to stick to this plan.

**Table 1: Financial Literacy in the Netherlands, Italy, the USA and Germany**

| | The Netherlands 22-90 years | Germany 22-90 years | | USA[c] >=50 years | Germany >=50 years |
|---|---|---|---|---|---|
| Correct on interest | 90.8 | 71.3 | | 67.1 | 69.1 |
| Correct on inflation | 82.6 | 73.6 | | 75.2 | 78.4 |
| Correct on diversification | 48.2 | 44.9 | | 52.3 | 41.3 |

| | USA[d] 18+ | Germany[a] 20+ | Italy[e] 18+ |
|---|---|---|---|
| Correct on interest | 92.9 | 71.3 | 39.6 |
| Correct on inflation | 91.4 | 72.7 | 60.5 |
| Correct on diversification | 77.0 | 44.4 | |

Source: [a] weighted data, German SAVE Survey 2007; [b] results for the Netherlands taken from Rooij, Lusardi and Alessie (2007); [c] results for the USA taken from Lusardi and Mitchell (2011), Health and Retirement Study 2004; [d] results for the USA taken from Lusardi and Mitchell (2007c), RAND American Life Panel; [e] results for Italy taken form Monticone (2010), Bank of Italy's Survey of Households Income and Wealth 2006[27]

They found that less than one-third of the respondents devised a retirement plan and only two-thirds of these individuals succeeded at the plan. Using among others the same financial literacy questions as Lusardi and Mitchell (2011), Rooij, Lusardi and Alessie (2007) investigated financial knowledge of Dutch households. They implemented basic and advanced literacy questions

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[27] Question from the Dutch and the American survey see Table 6; Questions from the Italian survey: Q 1: Imagine leaving 1,000 euros in a current account that pays 1% interest and has no charges. Imagine also that inflation is running at 2%. Do you think that if you withdraw the money in a year's time you will be able to buy the same amount of goods as if you spent the 1,000 euros today?

*i. Yes ii. No, I will be able to buy less iii. No, I will be able to buy more iv. Do not know*

Q 2: Imagine leaving 1,000 euros in a current account that pays 2% annual interest and has no charges. What sum do you think will be available at the end of two years?

*i.Less than 1,020 euros ii. Exactly 1,020 euros iii. More than 1,020 euros iv. Do not know*

into the 2005 DNB Household survey. Their finding is that most of the respondents got the two questions on inflation and interest rates right (82.6% and 90.8% respectively). When it comes to answering questions on the time value of money and money illusion the percentage of right answers decreases to about 70%. Lusardi and Mitchell (2007c) also added a set of similar questions into the Rand American Life Panel covering respondents who are aged 40 to 60, relatively high educated and earning relatively high income. About 25% of the respondents were not able to correctly answer the questions on interest compounding and the time value of money.

They found that not only gender, education, race and income determines how financial literate an individual is but also the exposure to economics at school and company based financial education programs. A similar set of questions assessing financial literacy had also been implemented in the survey on household income and wealth (SHIW) conducted by the Bank of Italy in 2006. The SHIW is a representative sample of the Italian population and Monticone (2010) reveals a lack of financial knowledge especially for women and low educated. Furthermore, the age profile of correct answers increased up to ages 41-60 and then declined. Since the same three questions have been implemented into surveys in the Netherlands, the USA and Germany a first comparison of financial literacy between countries is possible (Table 1). The results of Italy will also be compared to the other three countries, keeping in mind, that the questions in Italy are similar but not identical to the interest calculation and inflation question of the other countries. Furthermore results have to be interpreted with cautious because even the same questions in different languages may lead to a different response pattern. The high literacy level of Americans in the RAND American Life Panel can be attributed to an oversampling of highly educated individuals (Lusardi and Mitchell 2007).

On the two questions, interest calculation and inflation, the Dutch have the least problems followed by the Americans and Germans who are almost equally knowledgeable. The principle of risk diversification, however, is best understood by Americans, followed by the Dutch and then Germans. These results could be explained by differences in stock market experiences in these three countries. In the US individuals have been responsible for ensuring an adequate retirement income for a long time, since the state pension and the social insurance system in general are less generous than in many European countries. Hence Americans are used to saving for retirement, to privately insure against health problems and unemployment. They have to invest their money wisely and deal with financial markets more often than for example Germans. In the Netherlands individuals also have more responsibility, especially to provide for their retirement than individuals in Germany.

The pillar of most importance in the Dutch pension system is company pension. Here the contributions are likely to be invested in stocks or similar assets. These instances may explain why Germans still lack knowledge of risk diversification. A further explanation for the differences in financial knowledge between countries may also be attributed to the educational system. American and Dutch schools may place a greater weight on financial education than German schools do. Monticone (2010) relates the low levels of financial literacy among the Italian population back to historical and institutional grounds. Italians generally rely on the generous state pension system. Private retirement provision is not necessary. For that reason many Italians are more cautious concerning financial markets than for example the Americans or the Dutch. Monticone (2010) argues that the use of pension funds has been rare and many Italians do not have a debit or credit card.

Besides the knowledge of basic and advanced financial concepts, an understanding of the countries pension system is vital to retirement savings decisions. Gustmann and Steinmeier (2002) found that many individuals are poorly informed about their pensions even though they are already approaching retirement. Only half of the respondents were able to state if their pension plan was defined benefit or defined contribution. 40% reported that they did not know their pension wealth and 80% of those with a defined benefit plan did not know how much pension would be reduced in case of early retirement. Lusardi (2003) found that just over 25% of older respondents in the Health and Retirement Study have ever asked the Social Security authority to calculate their retirement benefits. Moreover, only 18% of workers know at which age they are eligible to full Social Security benefits.

The pension knowledge results discussed so far have been based on American data. Whitehouse and Edward (2000) conducted a survey among 3,800 consumers in the United Kingdom. Their results provide evidence for a lack of knowledge of the pension system. Only half of the respondents knew that the basic pension is price indexed and 75% think that age is the only prerequisite to receive the basic pension. Investigating the German SAVE-panel which focuses on the financial behavior of individuals Honekamp and Schwarze (2010) found that about 40% of the respondents were not able to approximate their expected pension from statutory pension. Knowledge of the expected pension entitlement has been found to increase with age, income, education and working time. Working time implies that full-time workers are better informed than part-time workers and those are more likely to approximate the pension level than individuals who are not or marginally employed. A survey conducted in 2011 on behalf of Fidelity among 1.000 employed individuals aged 18 to 55 supports the findings of Honekamp and Schwarze (2010). The Fidelity study "Old-Age Provi-

sion in Germany" (Fidelity International 2011) states that 71% of the respondents have no or only a vague conception of their future retirement income. Furthermore, 60% have never heard about the three pillars of the German pension system.

The factors determining the level of pension knowledge have also been investigated by Gustman and Steinmeier (2012). Their study revealed that low-income households, African-Americans and Hispanics, women and individuals with low education lack knowledge about social security and pensions. Based on a Chilean population study, Skog (2006) found that older, healthier, higher income and more educated men display greater pension literacy. They also state that individuals are more likely to seek information if that knowledge becomes more relevant for them. More evidence on the widespread financial illiteracy on an international level can be found in Lusardi and Mitchell (2007d) and a study of financial education by the OECD (Organization for Economic Co-Operation and Development 2005) which provide a review of studies conducted in several countries like the US, Australia, Japan and the United Kingdom.

The review of studies attempting to measure the degree of financial literacy among the population leaves the image of countries in which the population severely lacks financial literacy. There are however reasonable grounds to believe that some but not all surveys exaggerated the low level of financial literacy among the population. Firstly, questions have been asked for which the answer coded as wrong must not necessarily be wrong. Secondly, many of the studies focussing on only a subgroup of the population, like some of the cited studies concentrating on young adults, lack a control group. Thirdly, questions have been asked which might even an economist is not able to answer correctly.[28]

An example for the first critique would be the survey conducted by the Commerzbank (2003) asked invidiual how they would handle their life-insurance if the would encounter a financial emergency. The correct answer to this question was that individual should reduce their contributions towards the risk element of premiums (Risikobeitrag). The reason for reducing the contribution instead of cancelling the life insurance contract in order to spend the money accumulated within the contract is the high cost of cancelation. Nevertheless, depending on the nature of the financial emergency it might be even more wisely to cancel the life insurance contract instead of selling a house or taking on an expensive credit. Another survey asked pupils about the purpose of a bank giro account. The correct answer was that it is used for incoming and outgoing payments

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[28] For a critique on financial literacy surveys see Oehler (2012b).

(Forsa 2010). Pupils themselves, however, do not have much incoming and out-going payments. For them it is a free bank account which they may use to safe some of their pocket money in order to buy an expensive shirt the next month. The answer that a bank giro account is needed as a flexible savings account, however, has been counted as wrong.

The two surveys conducted by the F.A.Z. Institut (2010) and Hurrelmann and Gensicke (2010) serve as an example for the second critique mentioned above. Both studies focus on young adults only and the conclusions drawn are that the surveyed individuals are not well informed and not interested in financial mat-ters. What is missing in these studies is a comparison of the youth sample with the whole population. There needs to be a comparison between the answers of young adults and the answers from the whole population in order to draw any conclusions about financial attitudes of the young (Oehler 2012b). The WDR (2011) study providing two samples: a youth sample and a sample without age constraints has been analysed by Oehler (WDR 2012) who did not find, that the young are less interested in financial matters than the overall population.

Several different questions have been asked to assess financial literacy. Is some-one financially literate, if he or she knows what a stock market or a mutual fund is about (advanced literacy questions from Rooij van, Lusardi and Alessie 2007)? Hurrelmann and Gensicke (2010) asked young adults if they knew that contri-butions to a company pension plan are exempted from income tax and social insurance contributions (ability to explain what is meant by "Bruttoentgel-tumwandlung"). The Commerzbank (2003) asked individuals about the inflation rate, about the seat of the European Central Bank and if the Euro was a legal tender in Ireland.

There have been plenty of questions which raise the question if they are suitable to classify individuals into literate and not literate people. Here an alternative way of classifying individuals' as financially literate and not literate will be sug-gested. Oehler argues that generally consumers will never possess competences in all areas of life. Advancements in each of these areas would require the indi-vidual to always be up-to-date. That's why he argues, consumers will be reliant on the competences, judgments, evaluations and advice from independent trustworthy institutions. Individuals should not be required to be knowledgeable in all areas of life, instead individuals should be provided with a tool box which helps them to solve their respective problems (Meta Literacy see Oehler 2004, 2005b, 2006, 2011, 2012a, 2012d-e, 2013a-b, Oehler and Wilhelm-Oehler 2009, 2011).

Individuals who know where to find trustworthy institutions who know to whom they can turn with their problem, who know when they can trust an ad-

vice and who know what they should know before they consult an expert are responsible consumers in the same manner as individuals who have a high financial literacy score are (see also Oehler 2012b). Henceforth these individuals who asked for information at the time they have to solve a problem might also be classified as financially literate consumers.

The following chapter provides a review of research which investigate the influence of financial literacy on variables like wealth, retirement planning and retirement provision. A discussion about the purpose of different modes to assess financial literacy on the one hand and financial ability on the other hand can be found in chapter 4.2., which also describes how financial literacy has been measured in this thesis.

### 2.3.2 The Effect of Financial Literacy on Planning and Saving for Retirement

According to the theory discussed before financial literacy decreases the effort costs connected with retirement planning. Individuals who have a sound financial and/ or pension knowledge will find it easier to search for relevant information and to process it in order to make a retirement plan and stick to it. Financial and especially pension literacy can also be seen as an investment in future orientated capital. As pension literacy increases it becomes easier for individuals to imagine the future. Generally the theory would predict a positive relationship between the extent of financial or pension literacy and behaviors like retirement planning and saving.

While evidence leaves no doubt that there is widespread financial illiteracy in many countries, empirically the results from measuring the effect of financial literacy on wealth accumulation are less clear. The difficulty in measuring the causal effect of financial literacy on variables like wealth, retirement saving planning or stock ownership is simultaneity bias combined with omitted variables and measurement error problems. Research that finds a positive relationship between financial literacy and the above mentioned variables can therefore not easily be interpreted as causal effect. A high degree of financial literacy may induce individuals to save and plan for retirement but it could also the other way round. If individuals are concerned about retirement income and start planning they may become more financial literate because they are planning. The most prominent solution to the above mentioned problems is instrumental variables estimation to assess the causal effect. Indeed several empirical contributions have been emerged which employ this method in their research on financial literacy.

The following part of the literature review first concentrates on empirical evidence which supports the idea that financial literacy influences wealth accumulation, planning, saving or stock ownership and the second part of this review

will then present the research which shows that causality may also run the other way round. Empirical contributions which explicitly address the endogeneiety problem of financial literacy are Rooij, Lusardi and Alessie (2011a) who investigate the relationship between financial literacy and stock ownership, Lusardi and Mitchell (2006) and Rooij, Lusardi and Alessie (2011b) who concentrate on wealth accumulation and Lusardi and Mitchell (2007c, 2011) and Bucher-Koenen and Lusardi (2011) who analyse how financial literacy effects planning

Rooij, Lusardi, and Alessie (2011a) investigate the relationship between financial literacy and stock market participation. The dataset used is the DNB Household Survey (DHS) which is constructed as a panel containing over 2,000 households.[i] For this survey they devised special financial literacy module from which they constructed two literacy indexes. One based on basic literacy questions and the other on more advanced questions concerning the stock market. As an instrument for the advanced literacy index they used the amount of education devoted to economics at school. According to the second stage estimation, the effect of financial literacy on stock market participation is positive and significant. Another variable which is exogenous to stock market participation and therefore a candidate as instrument is if the respondent received advice from parents on how to budget and save money. However, they did not find that this variable influenced advanced literacy. Rooij, Lusardi and Alessie (2011a) argue that this is evidence that earlier cohorts were seldom engaged with the stock market to the extent that they were not able to pass this experience down to their children.

The DNB Household survey has also been used to analyse the effect of financial literacy on wealth accumulation. Rooij, Lusardi and Alessie (2011b) employed the same approach as before, instrumenting advanced literacy index by the amount of education devoted to economics at school. Controlling for other factors potentially affecting saving behavior, such as patience and risk aversion, they find a positively and significant effect of financial literacy on wealth.

Lusardi and Mitchell (2006) confirm a positive relationship between financial literacy and stock ownership with data from the 2004 Health and Retirement Study (HRS). Especially they observe a high correlation between the knowledge of risk diversification and stock ownership. Furthermore, they investigated the effect of financial literacy on wealth and planning. In both cases a positive relationship between these variables was found. The finding of a positive correlation between financial literacy and wealth is significant for the first two quartiles of the wealth distribution. The endogeneity problem of financial literacy was encountered in regressions on quartiles of the wealth distribution. Therefore it is possible to account for different financial literacy levels which could have been the result of experiences in saving and the accumulation of wealth.

An instrument variable approach to analyse the effect of financial literacy on planning was employed by Lusardi and Mitchell (2007c). They use data from the Rand American Life Panel and created a financial literacy index by combining basic and sophisticated financial literacy questions. They estimate the relationship between financial literacy and retirement planning by OLS and two stage least squares thereby considering a set of socio-demographic control variables. Their instrument for financial literacy is the amount of school education which had been devoted to economics, which is the same instrument as in the three studies above. After carrying out the instrumental variable approach, they found the financial literacy index to be significant positive and much larger than it was in the OLS regression. Another instrument employed is the availability of financial education seminars at one of the respondents' previous employers. Using this instrument affirms previous results.

Using self-reported data on the amount of education devoted to economics at school or the availability of financial education seminars might not be reliable instruments for two reasons. The first reason is simply the respondents memory, such that they are not able to remember each subject taught at school and in addition how much time was devoted to it. A similar argument also holds for financial education at previous employers. The second concern with these kinds of instruments is that individuals who are and were always interested in financial matters and/or retirement planning are more likely to remember that this subject had been taught at school. On the other hand, less financially interested individuals with low financial literacy may underestimate the amount of time devoted to economics at school. Additionally, individuals who are not interested in financial matters may overlook offers of financial education from their employer and are therefore unable to report it, despite its availability. The authors above mitigated these concerns by including variables in the regression accounting for some of the heterogeneity accounting for preference differences in dealing with financial matters.

Another variable to instrument financial literacy had been employed in a study by Lusardi and Mitchell (2011) who investigated the effect of financial literacy on planning. They used the information that some states mandated high school financial education and others did not. Besides this information they also used the length of that mandate to instrument financial literacy. This approach confirmed the positive and significant effect of financial literacy on retirement planning.

Bucher-Koenen and Lusardi (2011) use data from the representative German SAVE survey from which 667 non retired individuals are included in their analysis. Within their equation to estimate the determinants of retirement planning they instrument financial literacy with the share of individuals who voted for the

FDP or the leftist party in the region, the respondent lives. Bucher-Koenen and Lusardi (2010) assume that financial information is a determinant of an individual's financial literacy level, therefore they use differences in financial information as an instrument for financial literacy. Since the FDP is associated with free markets and individual responsibility and the leftist party for the opposite, they use the voting shares of these parties in the 2005 national election as the administrative district level as instruments. They furthermore assume that more financial information is available in regions were more individuals vote for the FDP and that these voters are more likely to participate in the stock market. Employing these instruments in their regression Bucher-Koenen and Lusardi (2010) find a positive impact of financial knowledge on retirement planning.[29]

Rooij, Lusardi and Alessie (2011b) argue that financial literacy influences wealth through two channels. One is that a high degree of financial knowledge lowers information costs and facilitates processing new information. The second is that financial literacy is positively related to retirement planning (Lusardi and Mitchell 2007b, 2009). Ameriks, Caplin and Leahy (2003) confirm the positive effect of planning on wealth accumulation. They analyse two econometric models, one explaining how specific attitudes and skills influence financial planning and one which investigates the impact of increases in financial planning on wealth accumulation. They used a survey especially designed for the analysis of these two research questions, such that they were able to use instruments for planning in the wealth equation. They state that, "[t]hose with a high propensity to plan may be better able to control their spending, and thereby achieve their goal of wealth accumulation."[30] Lusardi and Mitchell (2011) also found that households who calculate the income they need during retirement often set up a retirement plan which helps individuals to stick to their plans. Therefore the retirement plan could be seen as a commitment device which controls spending and fosters saving for an individual retirement goal.

An interesting finding concering the potential different effects of financial literacy and financial education has been derived by Pahnke and Honekamp (2010). The underlying data is the German SAVE survey which had also been investigated by Bucher-Koenen and Lusardi (2011) as reviewed before. It has, however, be admitted that Pahnke and Honekamp (2010) did not employ instrumental variable estimation to account for potential endogeneity. There dependent varia-

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[29] F-value of the eluded instruments: 4,38, Prob>F = 0,0125. Instruments are jointly significant.

[30] For a general psychological discussion about the effect of planning on goal achievement see Gollwitzer 1999.

ble is binary and measures if someone engages in private retirement saving or not. They devided the sample into two subsamples. One of the subsamples included individuals with earning below the mean income and the other individuals with earnings above the mean income. They find that the effect of financial literacy, measured by an index of the three knowledge questions desiged by Lusardi and Mitchell (2006), significantly influences retirement savings for high income earners but not for low income earners. Furthermore, they investigated the effect of consulting an expert from a bank or insurance company on the probability to save for retirement. Receiving advice from an expert was assumed to be similar to receiving finanical education. It is likely that these counselling sessions not necessarily increase the financial literacy of individuals with below the mean income (Mandell 2003) but empirical evidence has shown that it increases the probability of retirement savings (Pahnke and Honekamp 2010).

It has been argued that the fact that financial literacy has not effect on the decision to save for retirement for below average income individuals can be explained by the high will-power these individuals have to exert. Saving 100€ a month for someone earning 4,000€ a months is associated with a much lower will-power effort than for someone who only earns 2,000€ a month. Educational events like a councelling session or a retirement seminar are likely to help the individual to overcome inertia and a lack of will-power. This explains the positive effect of the councelling session on retirement savings for individuals with below average income (Pahnke and Honekamp 2010).

Making an optimal retirement savings decision does not only depend on basic and advanced literacy rather an optimal decision also depends on the knowledge of the countries pension system. In chapter 2.3.1 it has for example been shown that many individuals do not know which kind of pension plan they own and that many Germans have never heard about the three pillars of the German pension system (Gustmann and Steinmeier 2002, Fidelity 2011). Retirement plans which are based on wrong or incomplete information may not to be optimal in the sense that they maximize an individual's life-time utility. Since there is much less literature on pension literacy than there is on financial literacy, the part of the literature revue devoted to pension knowledge is rather small.

Clark, Morrill and Allen (2010) have conducted a survey among 1,500 workers nearing retirement at three large companies. They find that wrong information about the official retirement age and retirement income influence the workers planned age of retirement. Furthermore, knowing the pension plan type (defined contribution, defined benefit) is positively associated with wealth holdings relative to lifetime earnings (Gustman and Steinmeier 2004). Further evidence which suggests that pension knowledge effects retirement decisions has been provided by Chan, Huff and Stevens (2008).

Measuring the effect of pension literacy on retirement savings behavior poses the same problem of reverse causality as financial literacy. To account for the potential endogeneity of pension literacy Landerretche and Martinez (2011) employed an instrumental variable estimation. Their instrument for pension literacy was, having a parent pensioner in the household. A pensioner in the household is assumed to increase the understanding of the pension system. They found that higher pension literacy increased the probability of fund switching but not fund administrator switching. Having additional savings was also positively influenced by pension knowledge. In contrast to this result, the participation in voluntary pension plans offered by the pension authority itself were not influenced by pension knowledge. Lastly, the self-employed were more likely to join the pension system voluntarily if their pension knowledge was high.

Until now the review has concentrated on research which underlines the fact that financial or pension literacy influences stock ownership, retirement planning and wealth. There are, however, also several researchers who were able to show that the way of causality could also be the other way round. Ameriks, Caplin and Leahy (2003) discuss reasons why wealth might influence financial knowledge and offer one reason that, namely, wealthy people have access to more investment opportunities and hence they have to deal with more complex financial matters and also spend more time on it. Another reason is that wealthy people enjoy planning because they look forward to a prosperous life after retirement. On the other hand they argue that the reasoning could also be the other way round. Individuals having not accumulated much wealth may profit more from increased financial knowledge, planning and the efficient use of resources in terms of utility than wealthy people. Furthermore wealth is often also correlated with a high income which increases the opportunity costs of planning. Therefore wealthier people may hire financial advisors and therefore do not engage in planning themselves.

Bernheim's (1998) findings support the idea that individuals with more resources have a greater incentive to learn about finances. This conclusion was based on the empirical finding that financial scores rose with the earnings of respondents, while macroeconomic scores, however, did not. Empirical evidence that wealth influences knowledge also comes from Gustman, Steinmeier and Tabatabai (2010) who based their analysis on the 2004 HRS data, concentrating their analysis on individuals aged 51-56. They found that individuals having a more valuable company pension are more knowledgeable about their pension than employees with less valuable pensions. Furthermore they have shown that cognition and especially numeracy is associated with greater retirement wealth. However, they did not find evidence that more numerate people also necessarily have a greater pension knowledge. They conclude that the causality

is more likely to run from pension wealth to pension knowledge than the other way round.

Based on the Italian survey on household income and wealth (SHIW) Monticone (2010) employs instrumental variables regression to remove wealth endogeneity and finds that households holding larger financial assets are more likely to invest in financial knowledge. The effect of financial literacy on wealth was very small but significant. Guiso and Jeppelli (2006) and Peress (2004) arrived at similar results. Guiso and Jappelli (2006) find that financial wealth positively influences the investment in information and Peress (2004) shows in his theoretical model that the demand for information increases with wealth.

Furthermore, Donkers and van Soest (1999) show that interest in financial matters increases with income. This finding is supported by Meier and Sprenger (2008) who detect a positive relationship between financial knowledge and the income level. These findings support the indication that investments in financial education or information is more profitable for high income and wealthy individuals. Skog (2006) similarly found that seeking information has been found to become more likely as the specific knowledge becomes more relevant to the individual.

The conclusion reached from reviewing this literature is that causality can indeed go in both directions. On the one hand financial literacy induces individuals to plan and save for retirement and on the other hand wealth and also more specifically pension wealth fosters the acquisition of financial knowledge. This problem has to be accounted for in the empirical literature. Since it is often problematic to identify appropriate instruments and to limit unobserved heterogeneity, results have to be interpreted carefully.

Further evidence which highlights the importance of financial literacy with respect to retirement savings has been presented by Börsch-Supan et al. (2006) and Oehler (2009). Analysing data from the German SAVE-Panel Börsch-Supan et al. (2006) found that the number of "Riester-Savers" in the two lowest income quintiles was very low during the first years after the introduction of the "Riester-Pension". Only since 2004 the number of contracts filed by low income individuals increased slowly. Their argument is that it takes longer until the new information about the pension reforms and new products reaches this group of low income and low educated individuals. High educated seem to be much likelier to file a "Riester-Pension" than low educated individuals. Additionally, they detect that the knowledge of an individuals expected statutory pension level is more important for the decision to save for retirement than the ability to save.

Oehler (2009) investigated the quality of advice given by financial advisors and detected important deficiencies which were likely to negatively influence the

monetary outcome of investment decisions. For example about half of the "Riester-Plan" providers which were tested did not provide appropriate information about the costs of the plan. He also found that deficiencies were most prominent for individuals with low financial literacy, who would need high quality counselling most. Customers who are financially literate receive higher quality advice and more time is spent with their counselling session. Similar results have also been presented by Bucher-Koenen and Koenen (2011), who confirm that advisors provide better service if the customer is financially sophisticated. Furthermore, they find that individuals with a high degree of financial literacy are more likely to seek advice from financial experts but at the same time they are less likey to follow this advice than individuals with a lower degree of financial literacy. This means that financially literate individuals are less prone to follwow the advice of a financial expert who intends to steer the choice of the customer towards savings vehicles which are most profitable for the advisor himself.

Müller and Weber (2010) also conclude that financially less knowledgable customers seek assistance from a fincial advisor and rely on their recommendation because they are more likely to chosse an actively managed fund which often entails high fees. Financially sophisticated consumers instead rely more on other information channels, like the internet and avoid sales commissions. While they find that the number of sophisticated indivudals holding an actively managed fund is still surprisingly high, none the less sophisticated individuals are more likely to choose a passively managed fund than financially less sophisticated consumers. In general research in behavioural finance shows that less financially literacy consumers' are more prone to investment biases which often entail significantly lower returns on their investments.[31] Kotz and Weber (2007) reviewed research which investigates the influence of individual biases on market outcomes. They conclude that these individual biases could also translate into general or overall market outcomes or impact social welfare via the social security system such that these individual biases are not only a private but also a social problem.

The question raised at the beginning of this part of the literature review was whether everyone has to be financial literate in order to make appropriate retirement decisions or is it sufficient that financial experts possess this knowledge. The evidence reviewed so far has shown that individual financial literacy is an important determinant of retirement planning and fosters wealth accumulation. Furthermore, research has shown that financial literacy is even

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[31] See for example Brown et al. (2007), Dhar and Zhu (2006) and Shapira and Venezia (2001)

beneficial when consulting financial experts. However, research also shows that people are often uncertain about where to go to get trustworthy advice about pension issues. Whitehouse and Edward (2000) state that more than half of the respondents of their survey among 3,800 consumers in the United Kingdom stated that they found it to be at least somewhat difficult to get independent advice.

### 2.3.3 Private Retirement Provision a Case for Governemnt Intervention

The reviewed behavioural economics and finance research suggests that an appropriate decision concerning private old-age provision can be seen as merit good. Additionally, evidence has shown that individual biases are likely to become a social problem besides the negative effects biases have on individual decisions concerning retirement provision. According to Barr (2012) government intervention can be justified either for efficiency reasons or for equity reasons. In the case of private retirement provision both justifications apply. Information asymmetries entail market failure and together with information overload, self-control problems and procrastination it is likely that individuals end up with a suboptimal savings decision. Some individuals may never start to save, choose the wrong product, or save too little for retirement. In this case they would rely on social assistance during retirement. Government intervention in this case may increase efficiency by reducing information asymmetries and biases which consumers encounter.

There are also equity reasons which justify state intervention. Consumers are heterogenic and even if all consumers where equally interested in private retirement provision there would be differences in the ability with which they gather and process information. While one consumer joins a retirement seminar and afterwards feels confident when looking for an appropriate retirement product, another consumer might not have been able to follow the advice provided in the seminar. Since the evidence in chapter 2.3.2 has shown that individuals who are confident and signal a high level of financial literacy will receive higher quality advice than individuals with a low level of financial literacy. This can be seen as unfair because everyone should be provided the same high quality of advice.

One approach of government intervention is libertarian paternalism. Within this approach Behavioural Law and Economics favours political strategies which improve individual welfare without limiting choice.[32] Thaler and Sunstein

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[32] Further approaches with different degrees of governmental intervention have been discussed in Werner (2009) see also Sunstein (2003).

(2003) suggest nudging, meaning to steer individuals in their best interest to a behaviour which maximizes their welfare. This can for example be reached by introducing defaults. This kind of intervention can be subsumed under the concept of libertarian paternalism (see also O´Donoghue and Rabin 2003).

The following example showing how libertarian paternalism has been pursued in the market for private retirement plans is leaned on an example discussed in Kotz and Weber (2007). An average consumer would not know how much to invest and which allocation between bonds and stocks would be optimal in his or her situation. He or she would choose something that is "normal". Hence an average individual turns to a financial expert from a bank or insurance company for advice. The financial advisor is therefore the one who determines what is "normal". Without effective rules and regulations provided by the government, the advisor defines what is "normal" as to maximize his or her profits instead of maximizing the utility of the consumer. The German government acting in a liberal paternalist fashion would suggest a "normal" default portfolio, optimizing an average consumer's welfare. Examples which can be seen as such suggestions are the "Riester-Rente" or the "Rürup-Rente". Individuals are not forced to join these plans, however, if they join these plans they will receive a state subsidy or tax advantages.

In order to correct for market inefficiencies and to decrease equity problems in the market for private retirement provision measures to increase the financial literacy of the population have been pursued widely. To achieve a higher literacy level of the population, several measures have been applied. Many American companies offer regular retirement seminars for their employees or distribute written information material. In Germany the number of companies offering retirement seminars is also growing rapidly.[33] Focusing on Germany after the pension reform in 2001 the media (TV, Internet, Newspapers and Journals) has also highlighted the decreasing pension level which is expected for future cohorts and the importance of private retirement savings. Furthermore the subsidised "Riester-Pension" had been advertised by insurance companies and banks and in this instance a lot of information about the size of the subsidy and eligibility had been distributed. In 2007 the government initiated a large scale retirement education campaign in cooperation with German pension insurance companies, the German adult education centre (Volkshochschule, VHS) and others, to provide objective information on the three pillars of the German old-age insurance system.

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[33] I am grateful to Pension Solutions, a company offering retirement seminars for companies and administering their pension plans, for sharing this information with me.

### 2.3.4 The Effectiveness of Retirement Seminars and Other Information

Theoretically, retirement seminars promise to improve and increase savings behavior. The extent to which seminars are effective depends on the individuals taking part in the seminar. If participants are generally interested in retirement issues and may already have a private pension plan then the effect of the course in terms of behavior change will be smaller than if the participants were not previously engaged in any form of retirement provision. Bernheim and Garrett (2003) have shown that it is even possible to observe a negative effect of seminar participation and savings because of such selection effects.

Research has shown that a lack of financial and pension literacy is likely to entail sub-optimal retirement decisions. In Germany and many other countries a school subject called financial or pension education is seldom part of the school curriculum. Young people who leave school may underestimate the importance of dealing with retirement issues because they may still believe that the statutory pension will provide for an adequate retirement life. While many good savings habits are passed on from parents to children this is not the case for retirement savings behavior.[34] The replacement rate of the statutory pension system is decreasing slightly year by year to the extent that many older individuals are not able to pass on their experience with private retirement provision because private retirement provision was not necessary to secure for an adequate retirement life.

The present situation in Germany and many other countries makes retirement seminars for adults an important tool for increasing consumer awareness and knowledge of the pension system and the products offered to supplement statutory pensions. A recent research project to evaluate the effect of the retirement seminar "Altersvorsorge macht Schule" on behalf of the German pension insurance research network, found that many course participants were highly educated and aged between 50 to 60 years (Honekamp and Uehleke 2012), implying that there is a problem motivating the lower educated and individuals aged between 30 and 40 years to join the course. The effectiveness of the course has been analysed by using a propensity score matching which makes it possible to circumvent the counterfactual situation that it is not possible to observe how the behavior of the participant had changed, had he or she not participated in the course. Each of the course participants were matched with a person with similar characteristics such that as a result causal inference about course effects was possible. It has for example been found that objective and subjective knowledge

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[34] One habit past on from parents to children would be to save money before buying a mobile phone, a TV or the like and abstain from buying on credit.

increased, more people are able to assess if their present retirement savings suffice for an adequate retirement life and more people value fixed interest bonds, real estate, the "Riester-Pension" and the company pension as appropriate vehicles to provide for retirement than before the course. A further result was that 31% of the individuals adjusted their pension age up or down after the course.[35]

A previous study by Oehler and Wilhelm-Oehler (2011) evaluate the seminar "Altersvorsorge macht Schule". Two questionnaires had been distributed among the course participants, one right after the course and another after three months. Based on the findings from the first questionnaire they conclude that women, the young and individuals with low income could not be reached adequately by the course. The expectations of these individuals were often not met, their perception that they have been well informed is below average and they often find that the course was not a useful planning add. Retirement seminars should theirfore be adjusted in order to meet the requirements of these target groups.

They furthermore found that women, low income and the young (<30 years) are less likely to have a kind of private retirement provision when joining the course than men, high income or older individuals. The questionnaire distributed three months after the course, however, revealed that women especially and individuals with low income took action concerning private retirement provision (see also Frommert 2008).

Based on the American Health and Retirement Study (HRS) Lusardi (2004) investigated the behavior of retirement seminar participants. The study comprises detailed information on individual characteristics of the participants like information about the past, future expectations, preferences and social security information. It has been shown that seminar participation led to increased savings activities especially for individuals with low income and low education. Duflo and Saez (2003) conducted an experiment and randomly assigned departments of a university to a treatment and a control group. The treatment group received an invitation for a benefit fair which provides information about company pension plans and 20$ if they attended the fair. They found only modest effects of participation on the participants. An interesting result was the observed peer effect. Colleagues of individuals who received an invitation were also more likely to attend the seminar than individuals who did not receive an invitation.

Peer effects have also been detected by Duflo and Saez (2000, 2003) who observed that plan participation varied between 14 and 73% across libraries of a

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[35] See also Honekamp (2011)

large university. Since employees were randomly assigned to one of the libraries, the vast difference in participation rate can be interpreted as strong peer effect. Benartzi (2007) evaluated the observations of plan provider who noticed that plan participation and investment strategies were heterogonous between supermarkets of a supermarket chain but homogenous in each of the supermarket. The explanation of this observation was that employees turned to the supermarket butcher for advice on retirement provision.

A further experiment testing the effectiveness of financial education had been conducted by Howlett and Kees (2008). In their experiment the experimental conditions were much stricter than the ones in the analyis conducted by Duflo and Saez (2003).[36] The strict experimental character of the analyis and the random allocation of individuals to different treatment groups or to the control group of the analyis conducted by Howlett and Kees made it possible to isolate the effects of financial education and time preferences from other factors influencing retirement decisions. They found that the information about a 401 (k) plan which had been provided to one of the experimental groups positively influenced the intention to invest in a 401 (k) plan. The drawback of this research it that is measures only the intentions to invest and not acutal investments.

Clark et al. (2006) analysed the effect of a financial education seminar. Their empirical strategy does not allow to account for the possible selectivity of seminar participants, hence the results can be interpreted as conservative. To assess the effectiveness of the seminar they distributed three questionnaires among the participants, one before the course, one afterwards and one three month later. They found that the desired income replacement rate changed after the seminar but the estimated retirement age was not influenced due to participation. 40% of those who did not save for retirement before the seminar decided to start saving afterwards, however, three months after the seminar only a modest number of individuals have put their plans into action. A similar observation was also made by Choi et al. (2006) who found that at the employee seminar everyone expressed to save more but actually only 14% joint the plan, compared to 7% who join the plan without participating in the seminar. Moreover they find little correlation between time after the seminar and behavior change. Seminar participants either changed their behavior immediately or not at all. Hence

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[36] Strict means that the participants, 89 graduate seniors at a public university were allocated to the experimental conditions just in time and that they did not know that there were also other experimental conditions, furthermore, the purpose of the study was not communicated in advance.

they conclude that seminars are not effective in the sense that they encourage 401(k) savings.[37]

A different conclusion concerning the effectiveness of retirement seminars can be found in the research of Bayer et al. (2009). While the previous research on seminar effectiveness was based on individual level data, it is also possible to use firm-level data as Bayer et al. (2009) did. However, using firm-level data entails an additional selection treatment effect. The authors argue that seminars are more likely when employees show insufficient interest in the plan instead of offering seminars because employees ask for information concerning the company pension plan. Bayer et al. (2009) found that retirement education influences the saving behavior of participants especially if the seminars are offered frequently. The seminars had a strong effect for non-highly compensated workers of whom the likelihood of participating in a 401k plan increased after the course.

Hathaway and Khatiwada (2008) review literature which evaluates the effectiveness of financial education programs. They find that research so far was not able to establish the extent of benefit provided by financial education seminars and that they cannot conclude that there is any effect of financial education programs at all. According to Hathaway and Khatiwada (2008) the diverse picture which the research conveys could be attributed to poorly designed and administered education programs or to the inability of the evaluation technique to determine if course was effective or not (see also Atkinson 2008). These findings have also been supported by Collins and O'Rourke (2010) who argue that future research using field experiments to analyse the effects of financial education may be more promising than many of the evaluation techniques they encountered in their review.

The research presented so far found mixed evidence on the effectiveness of retirement seminars. Clark, Morril and Maki (2011) do not evaluate a retirement seminar, instead they conduct a controlled experiment with one employer investigating the effect of written information. Employers, hired between 2008 and 2010, not currently participating in the 401(k) plan were randomly assigned to the treatment or the control group. Individuals allocated to the treatment group received a flyer which was send to them. This flyer provided information about the wealth that could be accumulated with small contributions over a long time. Some months later the employer provided information about the enrolment status of the respective employees. 6.8% of those receiving the flyer started to con-

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[37] More evidence of financial and retirement planning seminars can be found in Atkinson (2008) who provides a review of financial education evaluations.

tribute to the retirement plan and 5.9% of those who did not receive this information. The difference is not significant for the overall sample but when concentrating only on the employees aged 18-24 the difference was significant. 7.7% of the individuals who received the flyer decided to participate and 3.3% of the individuals who did not receive the flyer. This research has shown that even a flyer might have the potential to influence retirement savings decisions.

Since 1995 the Social Security Administration in America sends out an annual social security statement. Mastrobuoni (2011) found that this information had a significant impact on the workers' knowledge about their pension entitlements but the statement did not have any effect on retirement behavior. Mastrobuoni (2011) argues that the statement might not affect savings behavior either because most workers already behave optimally such that the statement constitutes only a minor benefit for these individuals or that the information in this statement is not sufficient to improve retirement savings behavior.

In Germany the statutory pension insurance also provides a pension statement, a one DIN A4 piece of paper, with information about among other a pension projection stating the monthly pension someone would receive if he/she continues working as he/she did the last five years and if he/she worked until the statutory pension age. Individuals who are member of the statutory pension system for at least 60 months and 27 years or older receive this information on a yearly basis. In order to improve and to evaluate the acceptance of this information within the population, questionnaires were sent out to some of the individuals who received a pension information (Drechsler 2006). 31% of the respondents stated that the pension information is a very valuable source of information concerning retirement planning and 58% found that the pension information is at least of some use. Furthermore 16% of the respondents planned an additional private or company pension because of the information provided through the statutory pension insurance. The group of people, however, for whom the risk of a low statutory pension is highest, stated that they would not provide for retirement privately because they do not have sufficient financial resources to do so. Both studies above have shown that even short information like a flyer could have a positive effect on retirement decisions.

### 2.3.5 Other measures to induce people to save for retirement

Researchers, especially behavioral economists, find it doubtful that financial education could be the solution to the lack of financial capability (Chater et al. 2010, Meza de et al. 2008). They instead argue that it is not information or knowledge which limits financial capability but instead cognitive biases. In recent years the findings related to the status quo bias and choice overload have been used to formulate heuristics for consumers in order to simplify their

choices and to direct their choice to an outcome which is socially desirable. Sunstein and Thaler (forthcoming) argue that "[...] libetarian parternalists should attempt to steer people's choices in welfare-promoting directions without eliminating freedom of choice."

That it is in the interest of consumers to be provided with suitable heuristics has been shown by Lyengar and Kamenica (2006), who found that individuals' desire for simple easy-to-understand options increases with the number of choices. Heuristics often used in this sense are called *Default heuristics*. If an individual comes across a default, which is for example a predefined asset allocation, he/she accepts the default without doing anything about it. This behavioral implication has also been observed with automatic enrolment in pension plans. [38] Once enrolled, few people take action in order to leave the plan (Madrian and Shea 2001, Choi et al. 2006).

Default options are found to be very successful for several reasons. Firstly they reduce effort costs which individuals would incur if they had to make an active choice. Secondly individuals may trust a default because they believe that it is a suggestion in their best interest by the policy maker or the company. Lastly, individuals who are automatically assigned to a default perceive this state as their status quo and each action which has to be taken to opt out or to change the default are associated with costs.[39] Johnson and Goldstein (2003) describe the power of defaults in the case of organ donations. They compare the fraction of organ donors between different countries and find that countries which launch campaigns in order to change public attitudes towards organ donation are less successful in increasing the rate of donors than countries who have chosen the opt-out variant for organ donations.[40]

Several theoretical models have been developed which allow for behavioral anomalies to be taken into account, whereby anomalies means behavior that is not in line with the assumptions and predictions of the traditional life cycle model of saving. Thaler and Shefrin (1981) were dealing with the self-control problem, Becker and Mulligan (1997) investigated the endogeneity of time preferences, Shefrin and Thaler (1992) developed the behavioral life-cycle hypothesis

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[38] For experiments supporting the "Status Quo Bias" see Samuelson and Zeckhauser (1988); Kahneman et al. (1991)

[39] Automatically assigned to a default, means that individuals do not have to take any action to be assigned to, for example, a pension plan. They can, however, choose to opt-out, if they do not wish to participate in the plan. For this reason these plans are also called opt-out plans as opposed to opt-in plans in which case individuals have to take action in order to join the plan.

[40] For an overview about campaigns to increase the number of organ donors see Wolf et al. (1997).

and O'Donoghue and Rabin (1998) showed that hyperbolic discount rates are able to explain procrastination behavior. What all these models have in common is their implication that every intervention that reduces effort costs, increases future utility of savings or increases the psychological costs of not planning would increase the likelihood of planning and saving for retirement.

Iyengar and Jiang (2003) found that the number of investment choices was negatively correlated with the participation rate in the pension plan. The participation rate decreased by 2 percentage points, when 10 more funds were added from which the employees could choose. Just as decreasing the opportunity set of the individual it is also possible to simplify investment products and to introduce a few common quality criteria which individuals can use to compare products in order to decrease the costs of retirement saving (Leinert 2005, Oehler 2009, Oehler 2012a). Choosing an appropriate savings rate and investment can also be simplified by providing heuristics (Thaler 1990, 1994). The German government for example signals that saving four per cent of gross income is appropriate since this is the percentage to be eligible to the full "Riester-Subsidy" and additionally the statutory pension will be reduced accordingly. Nevertheless it has been found that many individuals do not employ this heuristic and save less than four per cent or not at all (Coppola and Gasche 2011, Oehler 2012c). Another heuristic which can be used is to save as much as to receive the full employer match or picking the maximum deferral rate allowed by the plan.[41] Furthermore, individuals could adopt the round number heuristic, saving for example 5% of gross salary instead of 4% (Benartzi and Thaler 2007).

Gigerenzer and Gaissmaier (2011) argue that even though heuristics process less information they can result in more accurate decisions than more complex decisions (see also Gigerenzer 2008). The accuracy of a heuristic, they argue, depends on the structure of the environment, namely the specific situation in which the heuristic is suitable. People may learn to select an appropriate heuristic from their "adaptive toolbox". Gigerenzer et al. (1999) proposed the notion of an "adaptive toolbox" containing several special tools (heuristics) for different tasks. Bröder and Newell (2008) admit that it might be appropriate to characterize individuals as intelligent if they are able to select the right strategy out of the "adaptive toolbox" depending on the specific situation (the structure of the environment). Gigerenzer et al. (1999) provide the following analogy for their con-

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[41] In America it is common that employers match contributions paid by employees at a rate 50% up to some cap threshold, which could be 6% of salary (Benartzi and Thaler 2007). The maximum deferral rate refers to the maximum tax deferred contributions possible. This is for example a regulation for company saving plans in Germany.

cept of the "adaptive toolbox": "Just as a car mechanic uses specific wrenches, pliers and spanners in maintaining a car engine rather than hitting everything with a hammer, so too the mind relies on unique one function devices to provide serviceable solutions to individual problems."

Oehler (2004, 2009, 2011, 2012a, 2012d-e, 2013a-b) has introduced a similar concept, the "Meta Bildung" (Meta Literacy) which can also be perceived as a box containing information which helps to solve problems and to make a decision in a specific circumstance.[42] However, "Meta Bildung" does not mean that the box is full of heuristics which can be employed for each specific piece of information. „Meta literacy" in this sense means that it is more important to know methods or people which/who can solve the problem than increasing information and teaching each individual to become an expert (Oehler and Wilhelm-Oehler 2009, 2011; Oehler 2011, 2012a, 2012d e, 2013a-b)." Instead they recommend a practice-oriented, case-based financial education as well as a „meta education" to improve the „meta literacy" as shown by Oehler (2004, 2009, 2011, 2012a, 2012d-e, 2013a-b).

One example of translating among others the idea of "meta-literacy" into praxis has been provided by a study by Oehler (WDR 2012). This study is based on the data gathered in connection with a survey conducted on behalf of the German television broadcasting transmitter WDR (2011). Oehler (WDR 2012) argues that an analysis of individual consumer behaviour is necessary if radio and television broadcasts about household finances shall be successful in reaching a specific group of consumers. Based on the data he arranges the young adults into five types of behaviour according to their expressed attitudes towards finances.[43] According to Oehler (WDR 2012) television or radio broadcast about finances addressing these specific types of consumers should try to provoke consternation about a specific topic and then provide practical advice about how to tackle that problem. The broadcasts should be on a modular basis reflecting the concept of "meta-education" and provide support in order to solve the problem in principle.

Lusardi at al. (2009) take a Social marketing approach and developed a seven point instruction to file a savings plan. They addressed three barriers which they identified in in-depth interviews with low income employees. These barriers included insufficient information on how to save, insufficient income and self-control. In order to address this information they provided a simple and con-

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[42] For an application and discussion of „Meta-Bildung" see also Micklitz et al. (2010)

[43] These five types are "careless", "resurgent", "sensitized", "problem-conscious", "informed"

crete seven point planning tool for filing a company pension plan. This tool provides information on the minimum amount necessary to start savings, information which will motivate individuals with a low income to get started with retirement savings. It has been argued that the plan in itself reduces the self-control problem. This effectiveness of planning had also been acknowledged by Gollwitzer (1999) who suggests that individuals who are planning or who are provided with a planning aid are more likely to follow through their intentions than without any specified plan. Lusardi et al. (2009) find that the planning tool significantly motivated employees to start saving for retirement.

In conjunction with the German initiative "Altersvorsorge macht Schule" a small, 12 page leaflet, was provided as a planning tool for starting private retirement saving (Bundesregierung 2009). Firstly, this tool provides information about the facts a bank or insurance agent needs to know in order to suggest appropriate products. Secondly it tells the consumer what information the agent has to provide before a contract can be filed. Thirdly, the planning tool suggests how to identify an appropriate product and how to make an informed decision. Presently there is no evidence of the effectiveness of this planning tool since an evaluation has not taken place.

Carrol et al. (2005) simplified the decision for employers to join the retirement plan, which reduces the effort costs of filing a plan even more than providing a planning aid. They provided an enrolment form on which new employees only had to check a yes box for joining the plan. The savings rate (2%) and the asset allocation was set at a default by the employer. Carroll et al. detected an increase of participation from 9 to 34% in the first four month.[44]

While employees still have to make an active choice to join the plan in the example of Carrol et al. (2005), an emerging literature especially in the US has also examined the effects of retirement plans with automatic enrolment. This means that at the time an employer is eligible for the plan, he/she will be notified that he/she has been enrolled in the plan. He/she also receives information about the pre-selected contribution rate and the fund selection. Retirement plans with automatic enrolment are also called opt out plans because the individual can only choose not to participate (opting out) after he/he has been assigned to the plan. Opting in on the other hand would imply that individuals have to make an active choice to join the plan as it is the case in Germany.

Benartzi and Thaler (2007) provide evidence from the UK employers who pay the complete contributions to a defined benefit plan. The plan, however, re-

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[44] Lusardi et al. 2009 developped a short instruction about how to file a company pension plan.

quires the employees to sign in. It was found that only half of eligible employees joined the plan. In such and many other cases, opting out plans could help individuals to improve their retirement savings decisions. Choi et al. (2001) provide evidence that the introduction of automatic enrolment leads to a dramatic increased participation rate. Before its introduction between 26 and 69% of the employees had joined the plan, depending on job tenure. After the introduction more than 85% participated, independent of job tenure. Generally research provides evidence that participants join sooner and that eventually also more participants join (Madrian and Shea 2001, Choi et al. 2002, 2004). Madrian and Shea (2000) detected that increasing participation were especially high for women and individuals with low income. Leinert (2003) found that the statutory right for deferred contributions in connection with a company plan implementation within the opting in framework increased participation especially for individuals with higher income and men.

Researchers, however, also point to the risks and problems associated with automatic enrolment. Benartzi and Thaler (2007) for example discuss a study that asked individuals working at employers with opting in plans why they would not participate. Many answered that they would not have any money left or that they would prefer repay dept. In the case that individuals participate in a opting out plan despite having a low income such that they have to take on expensive consumer credits or have to repay debt, the participation in the plan would certainly decrease utility for these individuals. To avoid this to happen, employers have to provide clear information about how much is deducted from employees' salary.

Benartzi and Thaler (2007) also point to the low default savings rate of 2-3% which is often chosen in opting out retirement plans. Madrian and Shea (2001) report that many employees continue to save at the default. The reason for this finding is the same as the reason for not joining the plan if individuals have to take action, the effort costs to change something are too high and the path of least resistance is to stay in the plan. Saving at such a low rate until retirement would imply an undersaving.

One proposed solution to the problem of undersaving has been proposed by Choi et al. (2003). They suggest to choose an extreme value like the maximum deferral rate as the default contribution rate. Such a high rate they argue would induce employees to take action to think about an appropriate savings rate because the costs of contributing such a large monthly amount would be even more painful. A second solution, "Save more Tomorrow" has been developed by Benartzi and Thaler (2004). Individuals starting to save in a retirement plan commit themselves to increase contributions in the future. The costs of increased contributions are therefore deferred into the future because individuals prefer to restrict themselves in the future rather than today. Leinert (2005) pro-

vides evidence for procrastination based on two surveys conducted in Germany in 2002 and 2003. He found that 8% of those who thought they should save more, planned to do so during the following three month and in 2003 this were 12% of the participants respectively. The rest of the individuals postponed the starting date to some later point in time.

The concept of the "Save more Tomorrow" plan draws on the finding that individuals tend to procrastinate and that individuals value losses more than gains. Losses have almost twice the impact of gains (Kahnemann and Tversky 1979, 1992). Based on the finding of Kahnemann and Tversky (1979, 1992) and Benartzi and Thaler (2004) decided that the savings increase should take place each time, the employee gets a pay rise. In this respect he/she never sees is take home pay to decrease and he/she does not experience any losses. The dropout rate of these plans is fairly low. There are some individuals who drop out or suspend the automatic increases of their contribution but overall most employees remained in the plan for the whole period (Benartzi and Thaler 2007). In combination with automatic enrolment, "Save more Tomorrow" plans can increase participation and contributions rates. Choi et al. (2001) point to the risk of oversaving which could lead individuals to take out expensive consumer credits.

### 2.3.6 Discussion

The preceding discussion of the literature indeed suggests that financial education and financial literacy itself are likely to be only one piece of the cake necessary to support individuals on their way towards an appropriate amount and type of retirement provision. For various reasons there was only weak evidence that retirement seminars foster savings. Oehler and Kohlert (2008), however, found that financial literacy has a significant effect on the advice a consumer receives in an investment counselling session at a bank or insurance company.[45] Individuals with a higher degree of financial literacy received a higher quality of counselling than individuals with a low degree of financial knowledge. The counselling sessions for the more literate individuals lasted longer, more products were presented, even products which could not directly be assigned to the banks' own products, and these consumers were better advised concerning their individual retirement needs.

Furthermore, Chater et al. (2010) argued that several of the biases or deviations from rational behavior of the homo oeconomicus which have been discussed in chapter 2.1.3 would affect behavior more strongly, or even only when people

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[45] See also Oehler and Kohlert (2009a), (2009b); Oehler et al. (2009); Oehler (2009)

lacked the necessary knowledge and skills to make an informed decision. An example would be that retirement education or seminars induce people to think about the problem from a different angle which he or she would not have done without this information. It might be that a present-orientated, myopic individual starts placing more weight on his or her future consumption than he or she did before (Becker and Mulligan 1997). Another example would be that a retirement seminar at the time employees face the decision to join the retirement plan may enable them to assess whether choosing a predefined default is appropriate in their individual circumstances. Providing information at the time the consumer needs it is also important because at that time they need information and they are more willing to follow advice and suggestions from neutral experts.[46] In the context of informational programs on television or radio, Oehler (WDR 2012) suggests the need to provoke consternation about a specific topic and then provide practical advice about how to tackle that problem.

A survey on behalf of the ING-DiBa (ING-DiBa AG and Kauselmann 2010) found that 87% of the 2.500 respondents aged 16-64 would have liked simple and easy to understand investment opportunities. Oehler (2012b) advocates the demand for simpler products and more transparency, especially concerning the costs which come with each product.[47] A further step towards simplifying decisions for German consumers would be if they received information about their pension entitlements from the statutory pension, the company pension and any private pension within one account statement instead of separate statements for each retirement savings device. Oehler (2009) goes even further and suggests a regular statement comprising of entitlements within the whole social insurance system and not just old age insurance.

The measures presented in the discussion so far leave the decision to save for retirement by the individual. If such measures are not found to be effective in encouraging individuals to save sufficiently for retirement, an alternative strategy has to be thought about to foster retirement savings. This strategy could then be one of automatic enrolment. The potential problems with this mechanism, however, have to be taken into account. Individuals who would never have started to save for retirement may find themselves contributing to a company pension plan while taking out a loan, for instance, to finance a new washing machine. The same behavioral phenomenon of inertia, also called status quo bias which has been used to increase life-time utility through automatic enrolment,

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[46] See also Whitehouse (2000), Oehler 2004, 2009, 2011, 2012a, 2012d-e, 2013a-b.

[47] See also Zentrum für Europäische Wirtschaftsforschung (2010), Bundesministerium für Ernährung (2012).

can also work in the opposite direction. Targeted information connected with automatic enrolment would be more likely to enhance welfare.

Oehler and Reisch (2008) propose different strategies to use the knowledge of behavioral economics in consumer policy. Besides defaults and consumer education they suggest making private retirement savings mandatory. Mandatory private retirement savings, however, is problematic, because it may override individual preferences, if for example capital-life insurance is considered as retirement savings while another investment (e.g. housing, stocks, bonds), which may be the preferred retirement savings vehicles of some individuals, is not. Recently, an increasing number of German researchers and politicians have criticized the reforms and suggest strengthening the statutory pay-as-you go pension system in order to prevent poverty in old age (ARD 2012).

# 3 Data

In a venture of the project to evaluate the effectiveness of the adult education seminar "Altersvorsorge macht Schule" (Retirement provision goes to school), two data sets have been generated. The first data set should refer to everyone who attended the education seminar in the year 2010. Each received paper and pencil (PAPI) questionnaires and had to answer several questions concerning their behavior and attitudes towards retirement savings. The highly selective nature of the seminar participants made it difficult to conclude anything concerning the effectiveness of the seminar, and so a computer-assisted telephone interview (CATI) was conducted. This sample was generated from randomly chosen individuals with landline or mobile phone connections and was used as the control group, while the seminar participants were the treatment group. The following analysis is restricted to the data generated by the telephone interview because the response rate from the adult education seminars was very low and a detailed analysis can be found in the project report (Honekamp and Uehleke 2012). Since the research project had been founded by the "Forschungsnetzwerk Alterssicherung" (FNA), the research department of the German statutory pension authority, I will refer to the data as FNA-Data. The following paragraphs describe how the data was generated, if there was a problem of item non-response and how missing data is to be handled.

The design of the questionnaire and the wording of the questions was partially influenced by previous evaluations of the course. The questionnaires distributed among seminar participants needed to encompass the exact wording of the questions which have been employed in previous course evaluations (Frommert 2008, Oehler and Wilhelm-Oehler 2011). The remaining space has been filled with questions which where necessary to meet the requirements of the new and extended course evaluation (Honekamp and Uehleke (2012)). These additional questions consisted of already approved questions taken from either the SAVE-Study (Börsch-Supan et al. 2008) or the Old-Age Provision Report from the Bertelsmann-Stiftung (Reifner et al. 2003) and of questions especially designed for the course evaluation by the authors. In general, the design of the questionnaires of both CATI interviews had to be designed in the same way as the questionairse for seminar participants because the participants of the CATI interview had the purpose to serve as the control group. The CATI guildelines and questions of both questionnaires can be found in the appendix.

## 3.1 Telephone-Survey

The survey participants of the randomly selected households in the telephone survey were interviewed in two waves. The first wave of the survey took place from May-June 2010 and the second wave exactly one year later, May-June 2011.

In both surveys the subjects were asked about their knowledge of pensions and their retirement savings and attitudes.

### 3.1.1 Survey Method CATI

The two surveys were administered using computer-assisted telephone interviews (CATI). Since Germany has a particularly dense grid of landline and mobile phone connections, the problem of selectivity seen in the interview mode reduced (Diekmann 2010), and therefore generating a representative survey would be possible if the majority of individuals participated. Households which could not be reached were placed on resubmission for different days and times. The advantage of a telephone survey compared to sending a written questionnaire is that knowledge questions can be asked as respondents are not able to look up the solution in books or the internet during the telephone interview. A disadvantage of telephone interviews is the selectivity of the participants. Individuals, who are bothered by telephone marketing, may also refuse to participate in the survey.

### 3.1.2 Sample

The selected sample consisted of 54,602 telephone numbers including mobile and unlisted numbers. The sample was stratified after the 16 German federal states. At the beginning of the interview everyone was filtered and so only those aged between between 20 and 60 years old or already retired were interviewed. The elderly were not considered because private retirement provision plays a less important role for these individuals and it had also been assumed that it would be unlikely that these indiviudals would attend the retirement seminar "Altersvorsorge macht Schule". To evaluate the program as intended in the project, it was desirable that the telephone respondents had similar characteristics as the participants in the seminar. For the analysis in this work, however, the similarity is not important since the focus is only on the data generated through the CATI. Individuals who are younger than 20 years have not been taken into account, because many are still in school or vocational training and hence are less likely to be dealing with retirement issues or to invest in private pension plans.

### 3.1.3 Response Rate

In the first wave, 1,016 usable telephone interviews were conducted. Of these individuals 565 persons also participated in the second survey. However, three people stopped the interview during the first fifth of the survey. Another three respondents discontinued the interview when they were asked to answer the pension knowledge questions.

In order to detect a possible selection process in the data, some general demographic variables are compared directly to the micro-census data, which is a representative survey of the German population. The breakdown of respondents into high, middle and low educational achievement shows that 55% are highly educated.[48] In the micro-census only 31% of the population aged between 20 to 60 years has a high educational degree. The average age of respondents is 45, and the sample is composed of 622 females and 394 males. The telephone sample is therefore rather well educated and women are oversampled, and for this reason a weighting variable based on the micro-census data has been generated which takes into account age, gender and education. These weights have been generated separately for both telephone interviews. For descriptive statistics in this work weights will generally be used in order to mitigate the selection. In the case were descriptive statistics are presented as the first step in the process of generating a new variable, weights will generally not be applied.

The interviewers reported that many of those who participated in the interview revealed a special interest in pension issues. There were also some respondents who were employed in insurance companies or banks which operate pension products. It is possible to account for this kind of selection in multivariate analysis by including the variable "How happy are you dealing with financial matters" in the regression or by controlling for the subjective and objective pension knowledge of the participants.

## 3.2 Imputation

In surveys it is common that participants refuse to answer one or other of the questions. Refusal rates are particularly high for sensitive question relating to income or wealth. Non-responses were coded as missing values in the data set (.). Table 2 shows the variables which will be of interest in the empirical analysis and the respective number of missing values. In this survey there are several variables with missing values, which would considerably reduce the sample in empirical estimations because many estimation procedures use only complete cases (respondents who answered all the relevant questions).

There are various methods to replace missing values. Here I opted for multiple imputation because it produces estimates with less bias compared to the "mean imputation" or the "conditional mean imputation". The two imputation methods which will not be considered here generate imputed values by employing models that use only observed data. The imputed values are then treated as if

[48] Low education: no school degree or Hauptschule; middle education: Realschule or comparable; high education: Abitur or comparable.

they were observed, but estimates are in fact imputations. Such an approach reduces the variance and possibly destroys the relationship between the variables, and the standard errors obtained are too small (University of California, Los Angeles (UCLA): Academic Technology Services). In order to achieve a greater variation, multiple imputation (MI) is proposed in which the imputed values are drawn from a distribution. Using this method takes into account the uncertainty associated with the replacement of missing values. Each missing value will be replaced by a set of imputed values taking into account the information in the original dataset. For this project ten imputed data sets have been generated. The variance between the imputations ensures that the standard error will not be underestimated in such a way as in the two other methods described above. For the calculation of standard errors not only the variance within the imputations, but also the variance between imputations will be used. With an appropriate imputation model, MI coefficients will be obtained, which are less biased than the coefficients resulting from an analysis based only on complete cases.

Multiple imputations will be performed, like all other analyses conducted in this work, using STATA. This software on the one hand provides imputation using the "multivariate normal approach" and on the other hand "multiple imputation by chained equations (MICE)" (Little and Rubin 2002). I opted for the imputation via MICE, because almost all variables of interest in the following analyses are ordinal or binary, such that the underlying assumption of a multivariate normal distribution underlying the "multivariate normal" approach cannot be met.

Now the question emerges concerning which variables should go into the imputation model. In this work an imputation will be carried out for each specific analysis containing the variables, occurring in this analysis. Thus interaction terms and other non-linear terms were included in the model. Additionally, the respective dependent variable is part of the imputation model.[49] In the analysis with imputed data sets, however, the imputations of the dependent variable will again be treated as missing, as suggested by Hippel (2007). Thus, the inclusion of the dependent variable in the model is used only to improve the estimation of the independent variables.

After imputation, the data sets are ready to be analysed using the conventional methods. The estimates of the individual data sets are then merged. Thus, the regression coefficients are calculated, for example, by determining their mean

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[49] A detailed discussion of the treatment of interaction terms and other non-linear terms in imputation models see von Hippel 2009, Wagstaff et al. 2009.

values over (in our case) all ten imputed data sets. Overall, this procedure makes it possible to account for the uncertainty of the imputed values.

In the following section those variables and their missing values which are relevant for the main analysis of this work will depicted in Table 2. Overall 1016 respondents have taken part in the first telephone interview and all variables having more than 100 missing values will now briefly be discussed. The most item non response have been counted for wealth with 324 (32%), and income with 253 (25%) missing values. 15% of the respondents exhibited missing values in both cases.

**Table 2: Missing Values**

| Variable | Missing | Complete |
|---|---|---|
| Like dealing with financial matters | 17 | 999 |
| Sufficient time to deal with financial matters | 3 | 1,013 |
| Care only about urgent matters | 13 | 1,003 |
| I fear that I fall into disuse when retired | 10 | 1,006 |
| I associate aging with illness and care dependency | 13 | 1,003 |
| procrastinate on financial matters | 7 | 1,009 |
| Savings suffice for adequate retirement live | 117 | 899 |
| Planning concrete measures concerning retirement provision | 17 | 999 |
| Thought about adequate retirement income | 12 | 1,004 |
| Subjective knowledge index | 39 | 977 |
| Objective knowledge: Pension Reduction | 23 | 993 |
| Objective knowledge: Company Pension | 6 | 1,010 |
| Objective knowledge: "Riester-Pension" | 65 | 951 |
| Objective knowledge: Interest | 12 | 1,004 |
| Objective knowledge: contribution rate | 27 | 989 |
| Objective knowledge: statutory pension | 23 | 993 |
| Objective knowledge index | 110 | 906 |
| Individual net income | 253 | 763 |
| Wealth | 324 | 692 |
| Age | 2 | 1,014 |
| Married/cohabiting | 1 | 1,015 |
| Children | 1 | 1,015 |
| Education | 11 | 1,005 |

Concerning income and wealth the question often arises whether the MAR (missing at random) assumption is met or whether the missing values are not random, but in the nature of the variables (MNAR missing not at random). One might assume, for example, those with a high income are less likely to answer questions concerning income than middle-income people. The two previously described imputation methods in STATA are both subject to the MAR assumption. A test of whether a variable is MNAR is not possible because the infor-

mation necessary to confirm this assumption cannot be observed. However, investigating the relationship between an indicator variable for missing income and other variables implying a high income, does show that here these variables are only moderately correlated. These variables are, for example, housing equity (-0.14), wealth (-0.13) or the monthly contributions to private retirement plans (0.04). Assuming that only individuals with a high income are more likely to refuse to answer, the low correlation could support the MAR-assumption. Generally MAR will be assumed for all variables which will be part of the multiple imputations.

Furthermore, there are many missing values in the question relating to whether private savings suffice for an adequate retirement life if the individual continues saving as before. There are 117 missing values for this question which could be explained by uncertainty and a lack of knowledge. Some individuals may not know how much they save each month, how much wealth they have already accumulated or how much they would need for an adequate retirement life. Additionally there is the uncertainty of financial markets especially in the light of the financial crises. This uncertainty makes it difficult to predict how much a pension plan would be worth in, say, 20 years time.

Finally, with regards to this brief overview of missing values, the objective knowledge questions resulted in three people stopping the telephone interview and a further 110 people refused to answer at least one of six knowledge questions. This high number of missing values might be explained as reflecting the sensitivity of the issue. Some people may want to avoid admitting that they don't know the answer to the question and therefore refuse to answer it instead of stating that they do not know the answer, as admitting this might be difficult for them.

# 4 Methods

The methods section describes how theoretical concepts outlined in chapter 2.1 will be operationalized using the data introduced in the previous chapter. All available variables to measure time preferences, procrastination and pension literacy will be presented. Furthermore, it will be shown how the hypothesis developed in chapter 2.1 can be tested. The last part of the method chapter is devoted to the estimation technique applied and an assessment of the potential problems.

## 4.1 Measuring Time Preferences and Procrastination

Shane, Loewenstein and O'Donoghue (2002) point to the difficulties faced by attempting to measure pure time preferences. They doubt that there can be a stable discount factor that can be applied to all sources of utility. The discount rates for money and health for example are only weakly correlated (Chapman, Nelson and Hier 1999). Therefore, Shane Loewenstein and O'Donoghue (2002) suggest unpacking time preferences into more fundamental concepts. These motives are "impulsivity" (the degree to which an individual acts spontaneous, unplanned fashion), "compulsivity" (the tendency to make plans and stick with them), and "inhibition" (the ability to inhibit the automatic or "knee-jerk" response to the appetites and emotions than trigger impulsive behavior)" (Shane, Loewenstein, and O'Donoghue 2002, 392). They argue that the best way to predict discount rates for saving behavior is the conventional measure of discount rates, but impulsivity and compulsivity may also be significant predictors. Arrondel and Masson (2005) and Arrondel (2009) suggest using question batteries with 20 or more questions in order to retain a valid instrument to measure time preference. However, because of the limited number of questions which could be implemented in the FNA-Survey, it had been decided not to implement an extensive question battery to measure time preferences. Instead proxies for time preferences have been added that have been used in other surveys such as the "German SAVE-Survey" or the "Pension Provision Survey" conducted by the Berthelsmann Stiftung.[50]

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[50] The German-Save-Survey is a stable panel since 2003 and collects detailed information on household's financial structure and socio-psychological aspects. This survey is administered at the Mannheim Research Institute for the Economics of Aging. The "Pension Provision Survey" was administered at the Berthelsmann Stiftung in the context of their Retirement-Provision Report (Vorsorgereport Reifner et al. 2003b) and asked questions about the financial situation and individual behavior concerning old-age provision.

Procrastination is a concept which is closely related to time preferences since procrastination is represented by a hyperbolic discount function in the theory of consumption (Laibson 1988). Laibson (1988) assumes that individuals, who know that they save too little but do nothing about it, procrastinate in planning and saving for retirement because these are unpleasant tasks.

In the FNA-data several items exist which capture time preferences or procrastination. It is likely that these variables are correlated with one another, which implies that there could be some redundancy in those variables. There are several approaches to encounter this situation. Firstly, it is possible to use only some of these variables in the regression analysis, secondly it is possible to create an aggregated index by summing measured variables and thirdly it is possible to created principal component scores. If applicable, principal component scores would be the method of choice, since it explains more of the variance than the other two methods.

**Table 3: Questions Measuring Time Preferences or Procrastination and Correlation Matrix**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1 I care only about urgent matter, future problems often resolve themselves (0 not true - 10 true) | 1.0000 | | | | | | | | |
| 2 Actions with immediate results are more important than actions with results far in the future (0 not true - 10 true) | 0.3417 | 1.0000 | | | | | | | |
| 3 How important is Saving for old age for you individually? (0 not important - 10 very important) | -0.1201 | -0.0603 | 1.0000 | | | | | | |
| 4 How importnat is Saving for care dependency when old for you individually? (0 not important - 10 very important) | -0.0516 | 0.0374 | 0.4988 | 1.0000 | | | | | |
| 5 How willingly do you deal with financial matters (1 do not like it - 4 like it very much) | -0.1408 | -0.0806 | 0.1110 | 0.0579 | 1.0000 | | | | |
| 6 Do you have sufficient time to deal with financial matters (1 not at all - 4 yes) | -0.0268 | 0.0143 | 0.0330 | 0.0502 | 0.2346 | 1.0000 | | | |
| 7 I fear that I fall into disuse when retired (1 agree - 4 do not agree at all) | -0.0530 | -0.0524 | 0.0627 | -0.0440 | 0.0604 | 0.0607 | 1.0000 | | |
| 8 I associate aging with illness and care dependency ( 1 agree - 4 do not agree at all) | 0.0024 | -0.0070 | 0.0058 | -0.0767 | 0.0683 | 0.0389 | 0.2978 | 1.0000 | |
| 9 I procrastinate on financial decisions (1 agree - 4 do not agree at all) | -0.2058 | -0.1240 | 0.1122 | 0.0479 | 0.3403 | 0.2245 | 0.1607 | 0.1061 | 1.0000 |

Source: FNA-Data, first telephone interview, unweighted.

The nine questions related to time preferences and the corresponding correlation matrix, are presented in Table 3. Questions 7 to 8 have been introduced with the following sentences: "Now we have prepared some statements about retirement and retirement provision. How much do you agree with the following statements?" Hence financial decisions in the statement, "I procrastinate on financial decisions," are likely (and intended) to be interpreted as indicating the decision to prepare for retirement.

Contrary to what has been expected the correlation between the variables seems rather low. Even the highest correlation of 0.50 is no reason to be concerned about multicollinearity when using both variables as separate explanatory variables. This is also supported by the Variance Inflation Factor (VIF) which is less

than 1.36 in this case. A common rule of thumb is that only VIFs of at least 10 give a reason of being concerned about multicollinearity (O'Brien 2007). The VIF indicates how much the variance of the coefficient estimate is being inflated by multicollinearity. As the VIF increases also the standard error increases. Hence the coefficient would need to be lager to be significant in the case of high VIFs as compared to a low VIF. Larger sample sizes decrease standard errors and produce more precise estimates of regression coefficients while adding more variables can increase the size of standard errors. More variables increase standard errors especially if they do not entail increases in the adjusted $R^2$. Hence there could still be a case to reduce the number of variables if their inclusion in the regression model does not lead to an increase in the adjusted $R^2$.

**Table 4: Rotated Factor Loadings, Time Preferences**

| | Variable | Factor1 | Factor2 | Factor3 | Factor4 | Uniqueness |
|---|---|---|---|---|---|---|
| 1 | I care only about urgent matter, future problems often resolve themselves (0 not true - 10 true) | | | 0.5986 | | 0.607 |
| 2 | Actions with immediate results more important than actions with results far in the future (0 not true - 10 true) | | | 0.5834 | | 0.650 |
| 3 | Saving for old age (0 not important - 10 very important) | 0.722 | | | | 0.442 |
| 4 | Saving for care dependency when old (0 not important - 10 very important) | 0.7217 | | | | 0.449 |
| 5 | How willingly do you deal with financial matters (1 do not like it - 4 like it very much) | | 0.5812 | | | 0.620 |
| 6 | Do you have sufficient time to deal with financial matters (1 not at all - 4 yes) | | 0.4447 | | | 0.772 |
| 7 | I fear that I fall into disuse when retired (1 agree - 4 do not agree at all) | | | | 0.5781 | 0.636 |
| 8 | I associate aging with illness and care dependency ( 1 agree - 4 do not agree at all) | | | | 0.5376 | 0.691 |
| 9 | I procrastinate on financial decisions (1 agree - 4 do not agree at all) | | 0.5383 | | | 0.605 |

Source: FNA-Data, 1. Telephone interview, N=956, iterated principal factor analysis.

Even though the correlations are lower than expected an iterated principal factor analysis (ipf) will be conducted. The variables investigated above are theoretically closely related concepts. Therefore it might be that the variables presented above have some underlying common factors like future orientation or a tendency to procrastinate. Besides the common aspect of for example future orientation, each item also captures a unique aspect that is not addressed by any other item. Henceforth, the factors will not extract all variance from the variables, but only that proportion that is due to the common factor which is shared by several variables.[51] Generally factor analysis requires metric data hence it requires the ordinal scale of data at hand to be interpreted as interval scale.

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[51] This implies that the communality will be less than 1.

Table 4 shows the rotated factor loadings after ipf analysis. While the factor loadings are all very high, the uniqueness is not close to zero. Hence there is considerable variability left over after extracting four factors. Extracting one factor out of this analysis has been suggested by the Kaiser (1960) criterion, which recommends retaining factors with eigenvalues greater than 1. Another test, the scree test, to decide on the number of factors to be extracted has been proposed by Cattell (1966). In this case one has to find the place where the smooth decrease of eigenvalues appears to level off to the right of the plot. The scree plot is depicted in Figure 6 and suggests the extraction of four factors. In fact four factors have been chosen.

**Figure 6: Scree Plot Time Preferences**
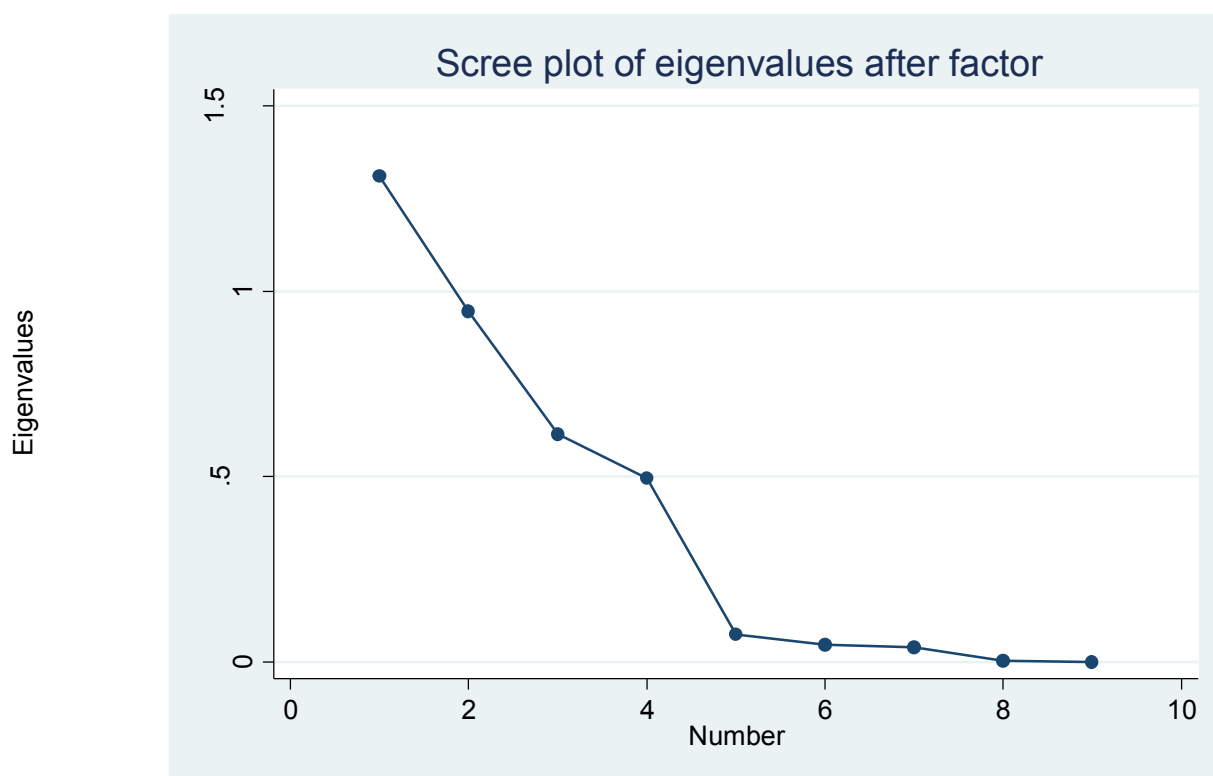


Scree plot after ipf, would suggest three to four factors.

The second factor retained comprises the variables "like dealing with financial matters", "time to deal with financial matters" and "procrastinating on financial matters". Following the reasoning from Laibson (1988) individuals procrastinate because dealing with retirement provision is an unpleasant task. Therefore, individuals who do not like to deal with financial matters should be more likely to procrastinate. Furthermore, it could be that individuals who do not like dealing with financial matters also feel that they do not have time for their financial matters because they like to spend their time otherwise.

Another reason which makes private retirement provision an unpleasant task is a negative association with old age which according to Leinert (2005) leads to

procrastination. Individuals who associate aging with illness, care dependency or who think that they will fall into disuse, place less utility on their life during retirement. The most robust implication of Becker and Mulligans (1997) model on endogenous time preferences is that decreasing future utilities also lower the advantage of low discount rates. Hence low future utilities discourage investments in future orientated capital. Therefore the equilibrium discount rate would be higher for someone who has a negative feeling when thinking about old-age than for someone who has some positive associations with old-age. On theoretical grounds the variables measuring the association with old-age could have been assigned to Factor 2 in the case that the negative association entails procrastination or it could just influence the general discounting of future pleasures in which case it could have also been assigned to Factor 2 or 3. The variables measuring the discomfort when thinking about old age, however, are classified within factor 4.

The items "How important is saving for care dependency" and "How important is saving for old age" are assigned to Factor 1, while "Care only about urgent matters" and "Actions with immediate results more important" are assigned to Factor 3. The factor loadings are higher for Factor 1 than for Factor 3 and also the uniqueness is smaller. Both factors are intended to measure time preferences with respect to savings decisions. The questions underlying Factor 3 are more general statements about the utility placed on the present as opposed to the future while the questions underlying Factor 1 are directly targeted to savings for old-age. Besides measures which may lead to procrastination of retirement savings like "like dealing with financial matters" or "negative association with old-age", theoretically, a model predicting saving or planning for retirement should also control for some kind of initial time preferences like Factor 1 or 3. The variable "How important is saving for old age" as well as the variable "How important is saving for care dependency" could be answered on a 11 point scale from 0 "not important" to 10 "very important". In both questions the "0" can be interpreted as very present orientated while "10" would be very future orientated. For both questions most respondents rated the importance with 7 or above (78%, 65% respectively, weighted). The questions underlying Factor3 also have a 11 point scale from 0 "not true" to 10 "true". As before, in both questions the "0" can be interpreted as very present orientated while "10" would be very future orientated.

The pattern of answers to these two questions is completely different to the one of the questions discussed before. The question "Actions with immediate results more important" has two peaks at 0 with 18% of responses and at 5 with 17 % of the responses. Remaining responses are allocated rather equally over all categories with two valleys at 1 and 9. "Care only about urgent matters" also has a peak

at 5 with 26% of the responses. Furthermore, much more individuals agree with the statement (43% values above 5) than not agreeing with the statement (31% values below 5).

Since all four questions are thought to measure time preferences on the same scale it is surprising that there is almost no correlation between the variables underlying Factor 1 and the variables underlying Factor 3 (Table 3). A reason could be that both pairs are not able to measure pure time preferences (Shane, Loewenstein, and O'Donoghue 2002). There could be other individual considerations which influence answering behavior. Answering behavior to the questions underlying Factor 3 is likely to be biased towards choosing the middle (category 5) and the answers to the questions underlying Factor 1 could suffer from interviewer bias and the social desirability to save for retirement and care dependency.

**Table 5: Measures for Time Preferences and Procrastination**

| | | |
|---|---|---|
| timepref_urgent | (0 not true - 10 true) | I care only about urgent matters, future problems often resolve themselves |
| timepref_results | (0 not true - 10 true) | Actions with immediate results more important than actions with results far in the future |
| timepref_old_age | (0 not important - 10 very important) | Saving for old age |
| timepref_care | (0 not important - 10 very important) | Saving for care dependency when old |
| likefimatters | (1 do not like it - 4 like it very much) | How willingly do you deal with financial matters |
| timefimatters | (1 not at all - 4 yes) | Do you have sufficient time to deal with financial matters |
| retire_disuse | (1 agree - 4 do not agree at all) | I fear that I fall into disuse when retired |
| retire_illness | ( 1 agree - 4 do not agree at all) | I associate aging with illness and care dependency |
| procrastination | (1 agree - 4 do not agree at all) | I procrastinate on financial decisions |
| factor1 | (-3.05 - 1.18) | ipf comprising timepref_care and timepref_old_age |
| factor2 | (2.07 - 1.37) | ipf comprising likefimatters, timefimatters and procrastination |
| factor3 | (-1.89 - 1.93) | ipf comprising timepref_urgent and timepref_results |
| factor4 | (-2.10 - 1.27) | ipf comprising retire_disuse and retire_illness |

Note: ipf=iterated principal factor

Some problems with the factor analysis have been encountered. Firstly, factor analysis requires the variables to be metric but they are only ordinal and interpreted as interval. Secondly, the correlation between the variables is not extremely high so the communalities are rather low. And thirdly the allocation of items to different factors is not perfectly in line with theoretical considerations. Table 5 comprises all variables which could be employed in the empirical analysis following in chapter 6. On theoretical grounds it would be necessary to include a variable approximating procrastination of retirement saving decisions and a variable measuring time preferences with respect to future orientation.

Procrastination on retirement saving decisions could be approximated by the second factor variable, by the direct question if someone procrastinates on financial matters or through the inclusion of the variable "like dealing with financial matters" and one of the variables measuring the negative association with old-age. Both an aversion against financial matters and an aversion concerning retirement can lead to procrastination (Leinert 2005). An aversion concerning retirement, however, could also have an effect on future orientation in general. Future orientation could be measured by either of the four variables which are

part of Factor 2 or 3 or the factors themselves.[52] The concrete decision of which variable will be chosen is part of the empirical analyis of chapter 6 considering each of the analysed topics separately. These decisions will be based on theoretical considerations on the one hand and on the Baysian and Akaide information criterion (BIC and AIC) on the other hand. The detailed analysis will generally be deferred to the Appendix.

## 4.2 Measuring Financial and Pension Literacy

The approach chosen to measure financial literacy depends on the purpose of the study. Studies testing financial knowledge may help to formulate or improve knowledge-based financial education seminars. Research which instead tries to capture skills, perception of knowledge or attitudes might be more useful when designing behavioral interventions (Hung et al. 2009). Hung et al. 2009 have conducted a study to examine the validity of different measures of financial literacy. For this research they used the RAND´s American Life Panel (ALP) which has filed four surveys assessing financial literacy between the years 2006 and 2009. The first module was designed by Lusardi and Mitchell and consist of five multiple choice basic literacy questions and eight multiple-choice sophisticated financial literacy questions. The second module was written by Hung and his colleagues and constituted an experiment on allocating a hypothetical investment portfolio among four different index funds. Financially literate were those individuals who minimized their investment fees by allocating their entire portfolio to the lowest fee fund. The third module had been designed by Miles Kimball and Robert Willis who asked 70 true/false questions about compound interest, portfolio diversification and institutional knowledge like how annuities work (Delavande, Rohwedder and Willis 2008). Furthermore, the participants were asked to rate how certain they are that their answer to each of those questions is correct. The fourth and last module employs the questions designed by Lusardi and Mitchell as well as five questions on investment markets and products.

Hung et al. (2009) use Cronbachs alpha, to address the reliability of individual measures of financial literacy and Pearson correlations to assess the stability of financial literacy across waves and measurement strategy. The three financial literacy modules (experiment excluded because alpha could not be computed) showed reasonable internal consistency, reflecting a single underlying factor. The Pearson correlation between those three measures is high (above 0.60) and

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[52] To shortly repeat the questions depicted in Table 4, the four variable are: „Care only about urgent matters", „Achtions with immediate results more important", „Importance of saving for old-age", „Importance of saving for care dependency".

the experimental measure is also significantly correlated with a coefficient of 0.33. Hung et al. (2009), furthermore, find that financial literacy consistently predicts retirement planning behavior but not actual savings in the form of aggregate savings. They conclude: "[…] although these financial literacy measures may be strongly predictive of consumers' intentions, they do not have the same predictive power when applied to long-term outcomes. This may reflect that contextual and other factors can interfere with translating knowledge and intention into action."

Which questions to choose in a literacy module is a difficult task and also depends on the context to be investigated. In different countries there are different institutional frameworks such that the kind of knowledge which is necessary to make an informed decision may vary between countries. An important aspect to consider is also if individuals have to know everything or is it sufficient to know where to get advice. As Oehler (2011; 2012b; WDR 2012) put it, not everybody needs to be an economist, it is not necessary that individuals are all-encompassing informed, instead it is sufficient that individuals are provided the relevant information at the time they need it. If individuals would start to gather information only at the time they need it, this would mean that the causality runs clearly from planning private retirement provision to financial literacy. On the other hand there could also be the government or the employer who thinks that it is the right time to start saving and therefore providing the individual relevant information. This information may induce people to think about and plan for retirement; hence the causality would run from financial literacy to planning.[53]

It might also be possible to divide knowledge into two classes. On the one hand there is basic knowledge which is knowledge everyone should possess and on the other hand there is more advanced knowledge which could be acquired at the time it is needed. Basic knowledge would for example be three of the basic knowledge questions chosen by Lusardi and Mitchel (Lusardi and Mitchell 2006) which have been implemented into several surveys around the world. One question tests an understanding of inflation the second tests knowledge on interest compounding and the third question tests the understanding of risk diversification.

Knowledge of compound interest makes individuals aware about the advantages of starting to save early in life and the knowledge of inflation is among others important with respect to pension entitlements from the statutory pension sys-

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[53] How the causality problem has been encountered in this work will be the subject of chapter 4.4.

tem. A pension entitlement worth 1.000€ today will have a considerably lower purchasing power in 20 years than today. This knowledge helps people to estimate their retirement needs and may motivate individuals to think about retirement earlier, than if they would without an understanding of compound interest and inflation. The third questions generally assesses if someone knows that risk diversification is usually better than relying only on one product.[54] This knowledge can directly be transferred to old-age insurance. In this case retirement income is less volatile if it comes from different sources like government pension, funded pension and home ownership instead for example only relying on government pension. This basic knowledge is necessary to decide when it is necessary to acquire more information about for example specific products.

**Table 6: Basic Knowledge Questions (Lusardi and Mitchell 2006)**

| 1 | Compound interest | Suppose you had $100 in a savings account and the interest rate is 20% per year. After five years, how much would you have on this account in total: more than $200, exactly $200, less than $200? |
|---|---|---|
| 2 | Inflation | Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, would you be able to buy more than, exactly the same as, or less than today with the money in this account? |
| 3 | Risk diversification | Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund. |

The data employed in this work contains two sources to measure financial and pension literacy. These are on the one hand questions which are based on self-reports to assess knowledge and on the other hand a module which assesses knowledge with questions of the kind designed by Lusardi and Mitchell (2006). Self-reports are clearly subjective and will be distinguished from knowledge that can be judged against a normative standard. I will therefore refer to the self-

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[54] The question on risk diversification has been criticized since there exist also cases in which the single company stock has provided a saver return than a stock mutual fund (Oehler 2012b). Nevertheless, having a look at all existing company stocks and stock mutual funds, generally it is the stock mutual fund which is less risky.

reports by talking about subjective or perceived knowledge and when I refer to the second set of knowledge questions I will use the term actual knowledge.[55]

Many of the questions used to assess pension literacy in the FNA-Survey were open questions, but the problem with these questions was that the number of individuals able to give the correct answer was very small, and even by extending the range of correct answers to "acceptable" answers did not help increase the number of correct responses to any extent. In designing the questionnaire for the FNA-Survey it was found to be essential to know approximately the contribution rate of the statutory pension system, the amount of pension someone receives if he or she has earned an average income throughout his/her life, the percentage of pension reduction if someone retires early, and the percentage of savings necessary to receive the full "Riester-Subsidy" to be able to make a retirement plan. Surprisingly the number of correct answers was very low even though the range of correct answers had been increased. It will now be described how financial and pension knowledge has been measured in this survey and how one might use this information in regression analysis. Furthermore, it will be shown how subjective and objective knowledge vary with demographics and other factors.

### 4.2.1 Actual Pension Literacy

Actual knowledge has been measured using six questions. One measures basic literacy (Question 4) as decribed by Rooij, Lusardi and Alessie (2011a) and the other five questions measure the knowledge of the German pension system. All six questions are presented below. Since only one question refers to basic literacy and the remaining to pension knowledge I will refer to all six questions as pension knowledge.

Reading through all six questions makes it easier to recap the degree of difficulty when looking at the figures. For the interpretation of the results it is also important to know which answers have been counted as correct if an open response was required. The correct answer to question 1 is that the pension would be reduced by 3.6%. All answers between 3% and 4.1% were counted as correct. This interval has been chosen because estimates within this interval seem fairly

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realistic and are therefore a good estimate of the pension reduction. Further-more, 0.6% more or less does not change monthly pension a lot.

Question 3 asks the respondent to state the percentage of income which has to be saved to receive the full "Riester-Subsidy". The correct answer since 2008 is 4%. The percentage of savings increased gradually from 1% in 2002 to 4% in 2008. Any savings rate between 3 and 5% has been rated as being correct. This range has been chosen because of the gradual increase of the savings rate. Individuals may have thought that it is still 3% or that it already increased to 5%. Individuals are therefore roughly right and have at least some knowledge about the "Riester-Pension". The next open question is the question concerning the contribution rate to the statutory pension system. This question is not easy insofar that the contribution rate could change each year. In 2010 the correct answer was 19.9% but any estimate between 18.9 and 20.9% was counted as correct.

**Table 7: Questions about Subjective Knowledge**

| 1 | If an individual who is insured by the statutory pension insurance decides to retire one year before the statutory pension age, he/she has to face a pension reduction. By which percentage would his or her monthly pension be reduced?<br><br>(percentage) (don't know) (refuse) |
|---|---|
| 2 | Do you think the following statement is correct: Everyone, subject to social insurance contributions, is entitled for a company pension (deferred compensation) by law. This means, that if an employee wishes to use this saving mode, the employer has to offer one.<br><br>(yes) (no) (don't know) (refuse) |
| 3 | Do you know how much as a percentage of income you have to save in order to receive the full "Riester-Subsidy"?<br><br>(percentage) (don't know) (refuse) |
| 4 | Suppose you have 100 € in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?<br><br>(more than 200€) (exactly 200€) (less than 200€) (don't know) (refuse) |
| 5 | How much is the contribution rate to the statutory pension system today (2010) for individuals who are subject to social insurance contributions (employers'' plus employees' share)? If you are not sure about the exact contribution rate, please estimate it.<br><br>(contribution rate) (don't know) (refuse) |

| 6 | What do you think: how much retirement income does someone receive from the statutory pension scheme if he/she worked for 45 years, continuously paid contributions to the pension scheme and always earned an average income? |
|---|---|
| | (...€) (don't know) (refuse) |

The last open question asks the respondents to estimate the statutory pension someone receives today if he or she fulfils certain criteria. In this case the range of correct answers differs depending on the region where the individuals live. The reason is that the correct answer for those in the old federal states (west Germany) was about 1,224€ and in the new federal states (east Germany) it was about 1,085.85€ in 2010. For that reason any estimate between 989€ and 1,185€ was regarded as being correct for individuals living in the eastern part of Germany and estimates between 1,124€ and 1,324€ was regarded as being correct for those living in western Germany.

Question 4, assessing if someone recognizes the concept of interest compounding is clearly a question counting to basic literacy which someone should know regardless of any specific context. For most of the pension specific questions, however, it would be sufficient if individuals received this information when they need it. Exceptions would be question 2, testing if individuals know that they have a statutory right for obtaining a company pension to take advantage of deferred contributions. Company pension is the second pillar of the German pension system besides the statutory pension and private pension. Without this knowledge individuals may ask for advice and products at banks and insurance companies whose financial experts have an incentive to sell their products but not company pensions. Knowing approximately the amount of pension someone receives who earned an average income and contributed 45 years, is an important reference to get an idea of how much pension is to be expected, even though this reference point is less accurate for young individuals. This is the case, because the pension level is allowed to decrease from 46.4% in 2009 to 43% in 2030 and what individuals can expect after the year 2030 is an open question.[56]

The question about the pension reduction seems to be too advanced. The knowledge that pensions will be reduced if someone retires early and increased if someone retires later is an important piece of information, when individuals

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[56] These figures are net before taxation for someone who always earned an average income and contributet 45 years to the statutory pension plan.

think about their retirement age and private retirement provision. Nevertheless, it is not important to know by how much the pension would be reduced or increased. This kind of knowledge could easily be obtained at the time the decision is due. Question 5, asks for the contribution rate. This knowledge should not be relevant for a decision about retirement planning and saving and the percentage of income which has to be saved in order to receive the full "Riester-Subsidy" should also easily be obtained from banks and insurance companies who offer these products. The more surprising is the finding from finanzen.net (2012) that many individuals do not take advantage of the full "Riester-Subsidy". To conclude, there is information which would not be provided by financial advisors who work for a bank or insurance company.

A clear picture about different products which are available for private retirement provision and the extent by which the pension would be reduced if someone retires early would only be provided by independent institutions like consumer advice centres, the statutory pension authority or through school education. The problem which will be encountered in this and many other works on financial literacy is causality. The question is, if knowledge causes planning and saving for retirement or the other way round. This problem will be discussed in more detail in chapter 4.4.

**Figure 7: Answers to six Pension Knowledge Questions in Percentages**
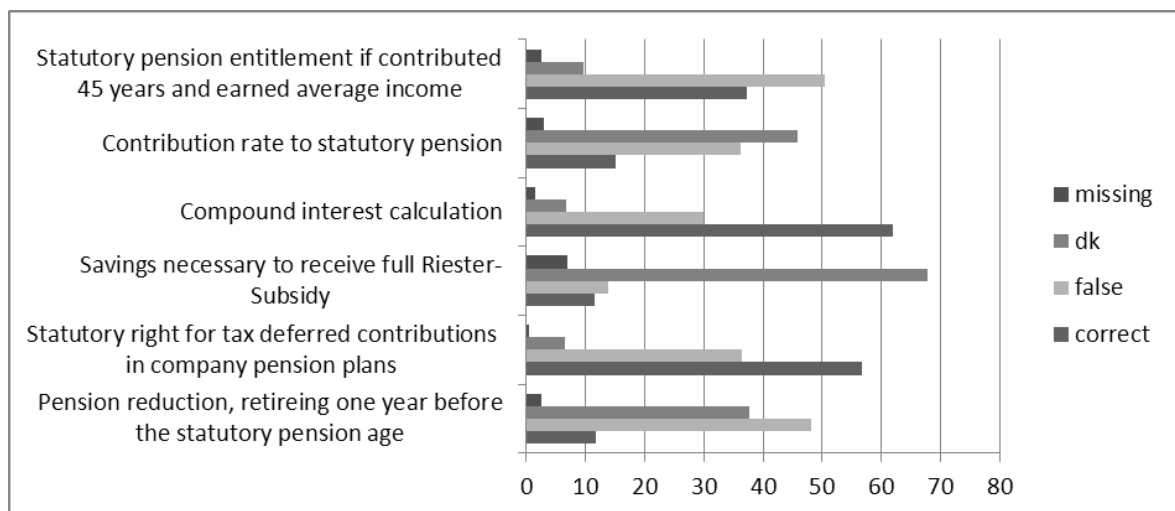


Source: FNA-Data, first telephone interview, weighted, N=1016, FNA-Data.

Lusardi and Mitchell (2011) argue in their empirical analysis that it is important to distinguish between "don't know" (abbreviated DK) and giving an incorrect answer. They find that the proportion of DK answers varies according to the question. Furthermore they find DK responses vary with education and other demographic factors. Another finding is the high correlation between DK responses. They report a 70% correlation between the DKs resulting from the interest compounding question and the inflation question. In contrast, giving

wrong answers have only a correlation of 11%. Hence they suggest that one should account for DK in empirical analysis to differentiate between degrees of financial knowledge.

The FNA-Data depicted in Figure 7 shows a very diverse DK pattern ranging from 6% (question about statutory right for tax deferred contributions) to 68% of respondents who do not know how much savings are necessary to receive the full "Riester-Subsidy". Generally the open questions (no predetermined set of answers), with one exception, have a very high rate of DK's. Similarly scattered are the incorrect answers. Only the question about the "Riester-Subsidy" has less than 15% incorrect answers all other questions count more than 30% incorrect answers. It seems that many people guessed the answers to the open question. This is, however, different for the "Riester-Subsidy" question since most individuals admitted that they do not know the answer. It remains an open question why so many individuals choose the DK option instead of guessing.

**Figure 8: Don't Know (DK) and False (f) Answers to Six Pension Knowledge Questions by Gender in Percentages**
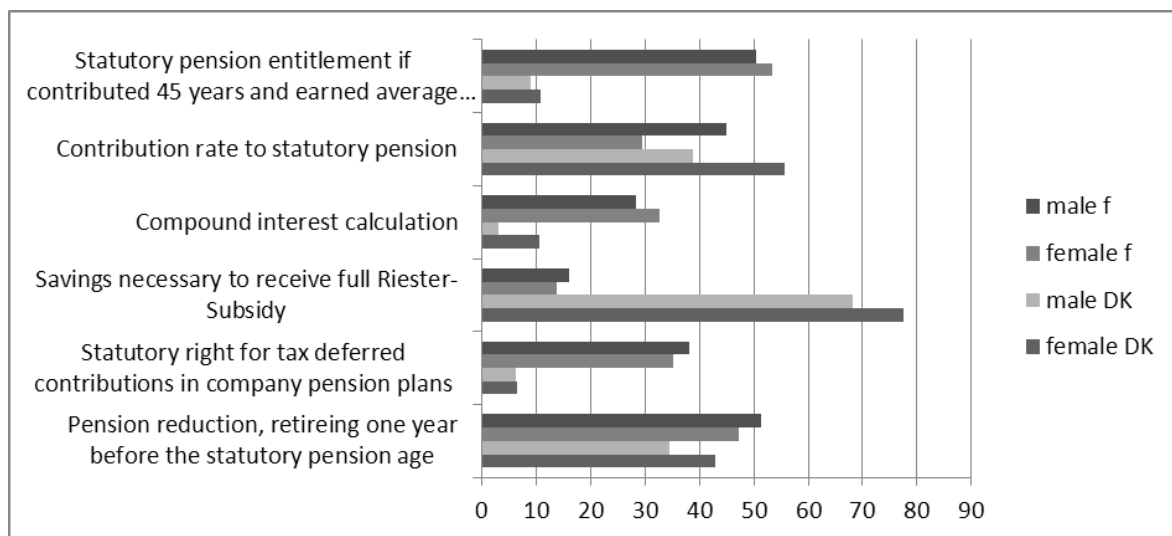


Source: FNA-Data, first telephone interview, weighted, Number of observations range from 951 to 1010, depending on the question.

The correlation between DK's had also been examined, with the result that the highest correlation is 0.28 which is the correlation between not knowing the contribution rate and not knowing the pension reduction. False answers are even less correlated with the highest correlation being 0.16. Comparing DK's and false answers across demographics reveals that women more often admit that they don't know than men (Figure 8). Men on the other hand gave generally more incorrect answers than women. Hence men seem to be more confident in their financial and pension knowledge and are therefore less likely to state that they do not know. Analysing answering behavior with respect to education gives a very diverse picture (Figure 9). In three out of six questions the number of

false answers increases with education and the number of DK's decreases respectively. The pattern of the remaining three questions is a little bit trickier. Generally, a higher percentage of low educated individuals gave a false answer than high educated individuals. Additionally the percentage of don't know answers was higher for the low educated individuals compared to the high educated.

In contrast to Lusardi and Mitchell (2011), I do not find a high correlation among DK's. However, women and low educated are more likely to answer DK than men or high educated. It is not quite clear if this is the result from a general confidence concerning financial matters or if it reflects knowledge. As a result from these findings, multivariate analysis will be carried out without DK's as explanatory variable if they do not add any additional information to analyse the effect of financial literacy. The results with DK's as explanatory variable can be found in the Appendix 9.4 and the following.

**Figure 9: Don't Know (DK) and False (f) Answers to six Pension Knowledge Questions by Education in Percentages**
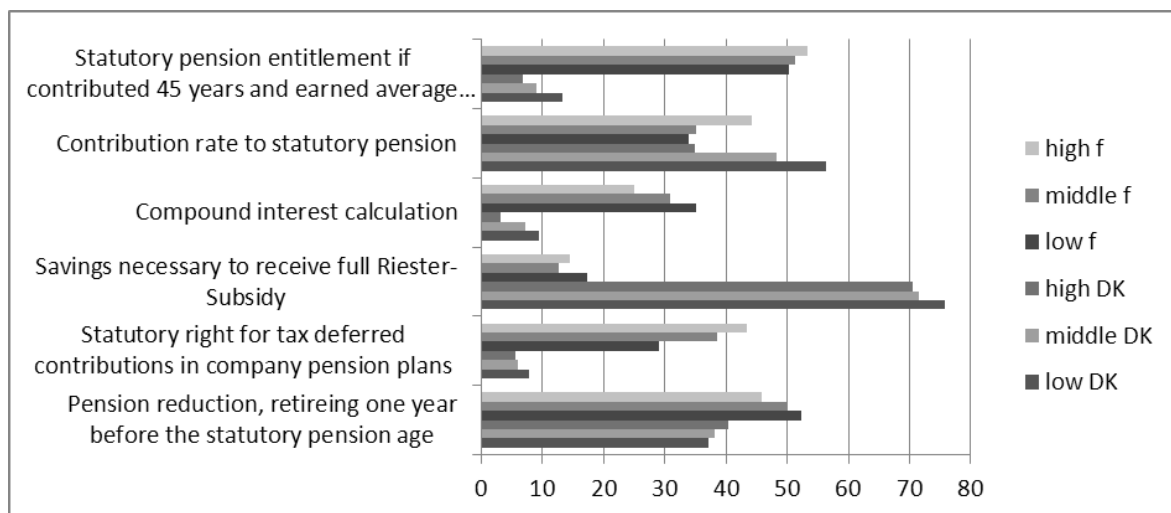


Source: FNA-Data, first telephone interview, weighted. Number of observations range from 951 to 1010, depending on the question. Low education: no degree, Hauptschulabschluss or equal, middle: Realschulabschluss or equal, Abitur or equal.

Rooij van et al. (2011a, b) employ factor analysis and obtain two factors. One of the factors displays basic literacy and the other advanced literacy. They use the iterated principal factor method and also account for DK's in their analysis. The factor loadings range from 0.24 to 0.66 for the basic literacy questions and exceed 0.4 for all advanced literacy questions.

Following a similar approach, I tried to extract information about common factors on actual and perceived pension literacy and Don't know (DK) answers. Table 8 shows the results of a principal component analysis. All subjective knowledge questions have been assigned to one factor. The actual knowledge

questions, however, are allocated to different factors which they share with their DK response. Conducting an iterated principal factor analysis shows the same picture for actual knowledge but even more factors to which objective knowledge and the DK answers are allocated. There seems to be no common underlying component among objective knowledge questions, this suggests that internal consistency is weak. An explanation for these results could be that factor analysis requires metric data which the binary variables for objective knowledge are not. The subjective knowledge questions are measured on an ordinal scale from 1 to 7, hence they are much closer to a metric scale than the objective knowledge questions.

**Table 8:** Rotated Factor Loadings, Subjective Knowledge, Objective Knowledge, DK (pcf)

| Variable | Factor1 | Factor2 | Factor3 | Factor4 | Factor5 | Factor6 | Factor7 | Uniqueness |
|---|---|---|---|---|---|---|---|---|
| Financial Matters (S) | 0.7539 | | | | | | | 0.4033 |
| Statutory Pension (S) | 0.7304 | | | | | | | 0.4357 |
| Company Pension (S) | 0.6566 | | | | | | | 0.5172 |
| Capital Life Insurancs (S) | 0.7095 | | | | | | | 0.4758 |
| "Riester-Pension" (S) | 0.5484 | 0.4389 | | | | | | 0.4806 |
| Pension Reduction (O) | | | | | 0.8351 | | | 0.2879 |
| Company Pension (O) | | | | | | 0.7921 | | 0.3218 |
| "Riester-Pension" (O) | | 0.8688 | | | | | | 0.2053 |
| Interest (O) | | | | -0.8126 | | | | 0.3221 |
| Contribution Rate (O) | | | -0.8287 | | | | | 0.2750 |
| Statutory Pension (O) | | | | | | | -0.7320 | 0.4357 |
| DK Pension Reduction (O) | | | | | -0.7380 | | | 0.3702 |
| DK Company Pension (O) | | | | | | -0.7772 | | 0.3334 |
| DK "Riester-Pension" (O) | | -0.8700 | | | | | | 0.1867 |
| DK Interest (O) | | | | 0.8060 | | | | 0.3325 |
| DK Contribution Rate (O) | | | 0.7837 | | | | | 0.3139 |
| DK Statutory Pension (O) | | | | | | | 0.7284 | 0.4319 |

Source: FNA-Data, 1. Telephone interview, N=880.
Note: Principal component factor analysis. Rotated factor loadings (pattern matrix) and unique variances, blanks represent loading<0.3.

In Table 9 and Table 10 "DK" responses have not been considered. The first table shows the results after principal component factor analysis and the second shows the rotated factor loadings after iterated principal factor analysis. Both tables subsume all subjective knowledge questions less than one factor, hence there is a substantial amount of variance which these variables have in common. This common variance, which can be interpreted as subjective knowledge is the concept of interest. For that reason a factor score for objective knowledge will be generated after iterated principal factor analysis.

For objective knowledge it is not possible to retain a meaningful factor out of the iterated principal factor analysis. As mentioned before, the reason might the binary character of the variables. Looking at Table 9 (principal component factor analysis), the objective knowledge questions are allocated between the three factors. Factor 2 contains four out of six objective pension knowledge questions. The two which are not part of factor 2 are the knowledge that employees have a

right for tax deferred contributions in connection with a company pension and the knowledge of the amount of pension a representative individual receives from the statutory pension system.

The reason why the company pension is not part of the common factor 2 could be that this question was significantly more likely to be answered by the lower educated respondents while the remaining questions were more likely to be answered correctly as the level of education among respondents increased.[57] On the other hand why the question about the statutory pension is not part of factor 2 remains an open question. One possible reason could be that this question was more likely to be answered by older respondents, but this also holds for the pension reduction question which is part of factor 2. It has to be considered that factor analysis generally requires metrical variables. The objective knowledge variables, however, are not even ordinal.

**Table 9:** Rotated Factor Loadings, Subjective Knowledge, Objective Knowledge (pcf)

| Variable | Factor1 | Factor2 | Factor3 | Factor4 | Uniqueness |
|---|---|---|---|---|---|
| Financial Matters (S) | 0,7481 | | | | 0,4217 |
| Statutory Pension (S) | 0,7478 | | | | 0,4338 |
| Company Pension (S) | 0,6631 | | | | 0,523 |
| Capital Life Insurancs (S) | 0,702 | | | | 0,4683 |
| "Riester-Pension" (S) | 0,5802 | | | | 0,6313 |
| Pension Reduction (O) | | 0,5573 | | | 0,6849 |
| Company Pension (O) | | | | 0,9135 | 0,1629 |
| "Riester-Pension" (O) | | 0,6343 | 0,3444 | | 0,4262 |
| Interest (O) | | 0,3474 | | -0,3165 | 0,7533 |
| Contribution Rate (O) | | 0,6952 | | | 0,4646 |
| Statutory Pension (O) | | | 0,9252 | | 0,1385 |

Source: FNA-Data, 1. Telephone interview, N=880.
Note: Principal component factor analysis. Rotated factor loadings (pattern matrix) and unique variances, blanks represent loading<0.3.

Even though iterated principal factor analysis would have been more appropriate to extract information about objective pension literacy, the common underlying idea, I am going to extract a factor after principal component analysis. The screeplot depicted in Figure 10 suggests retaining two factors, the first one would measure subjective knowledge and the second on objective knowledge. Since subjective knowledge has already been retained from the more appropriate ipf analysis, this factor will not be retained here again.

[57] See chapter 5.1.

**Table 10:** Rotated Factor Loadings, Subjective Knowledge, Objective Knowledge (ipf)

| Variable | Factor1 | Factor2 | Factor3 | Factor4 | Factor5 | Factor6 | Factor7 | Uniqueness |
|---|---|---|---|---|---|---|---|---|
| Financial Matters (S) | 0.6753 | | | | | | | 0.4656 |
| Statutory Pension (S) | 0.6835 | | | | | | | 0.4417 |
| Company Pension (S) | 0.5725 | | | | | | | 0.5594 |
| Capital Life Insurancs (S) | 0.5033 | 0.3113 | | | | | | 0.5126 |
| "Riester-Pension" (S) | 0.3036 | 0.6077 | | | | | | 0.5243 |
| Pension Reduction (O) | | | | | | 0.3023 | | 0.8762 |
| Company Pension (O) | | | | | 0.3880 | | | 0.8446 |
| "Riester-Pension" (O) | | 0.3443 | 0.4005 | | | | | 0.5193 |
| Interest (O) | | | | | | | 0.3231 | 0.8851 |
| Contribution Rate (O) | | | 0.4887 | | | | | 0.7250 |
| Statutory Pension (O) | | | | 0.4277 | | | | 0.8100 |

Source: FNA-Data, 1. Telephone interview, N=880, iterated principle factor analysis.

In chapter 4.2.2 it will be shown that the factor score for subjective knowledge (factor 1) is highly correlated with a variable which aggregated the answers over all five questions and then divided the sum by 5. Similarly, I will proceed with the objective knowledge questions. Even though adding up all questions is not supported by the factor analysis this approach will be followed.

**Figure 10: Screeplot for Subjective and Objective Knowledge after pcf**
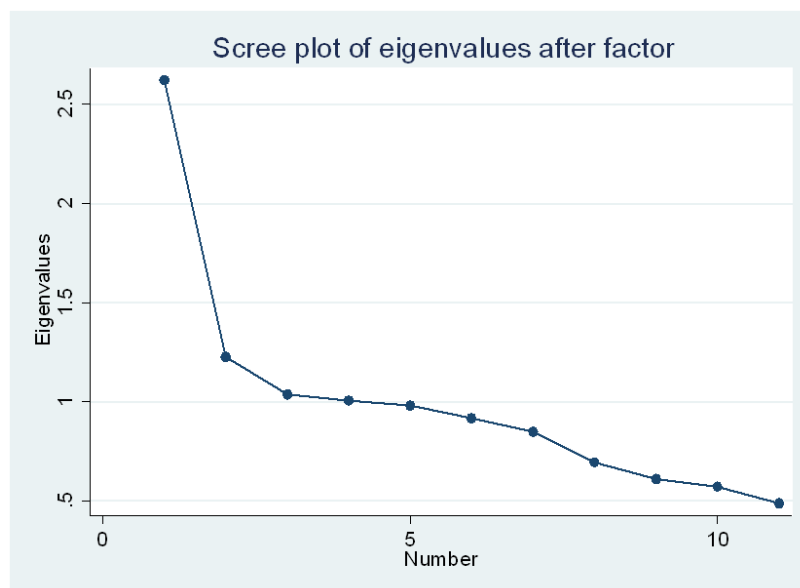


Theoretically, the knowledge of all six questions could influence retirement decisions hence the more questions someone is able to answer the nearer his or her savings decisions should be to the optimum. All questions will be aggregated and will result in a variable which takes on the number of correctly answered questions.[58] Figure 11 shows the distribution of this index for objective pension

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[58] Other research using measures for financial literacy in their analysis either include each question separately or aggregate all correct answers and sometimes reduce this variable to just a dummy taking on the value 1 if financial literacy is good (Bucher-Koenen and Lusardi 2010; Lusardi and Mitchell 2007a, 2008).

literacy. It can be seen that hardly anyone was able to answer all six questions correctly and even answering five questions correctly was unlikely. Consequently individuals who are able to answer at least four questions correctly will be combined. Therefore the financial literacy index can take on five values from 0 "low pension literacy" to 4 "high pension literay".

To make the interpretation of econometric analysis easier it is also conceivable to generate an index with only three values, namely, low, middle, and high knowledge. In this case the ability to answer none or one question correctly would be counted as low knowledge, two questions answered correctly would be middle knowledge and three and more correct answers as high literacy. This recoding has been chosen so that the number of respondents is evenly distributed among the categories. Another option would be to use equal spaces, which would mean for example taking zero and one correct answers as low knowledge, two and three correct answers as middle knowledge and four to six correct answers as high knowledge.

**Figure 11: Percentage of Individuals Answering x Objective Pension Knowledge Questions Correctly**
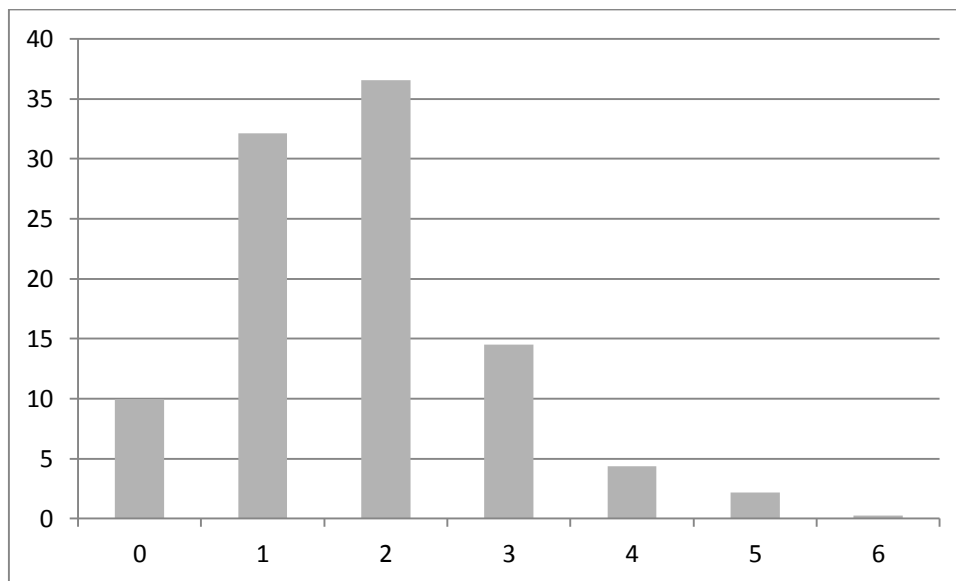


Source: FNA-Data, first telephone interview, N=906, weighted.
Note: Horizontal axis represents number of correct answers (*x*)

A correlation coefficient has been calculated for the variables which have been created to approximate high, middle and low literacy and the factor score. The correlation coefficient is 0.684. Hence there is a high correlation between those variables, but still the correlation is not high enough in order to conclude that both variables could be used interchangeably without affecting the results.

| Pension Reduction | binary | 0-1 | 1: individual gave correct answer |
|---|---|---|---|
| Company Pension | binary | 0-1 | 1: individual gave correct answer |
| Riester | binary | 0-1 | 1: individual gave correct answer |
| Interest | binary | 0-1 | 1: individual gave correct answer |
| Contribution Rate | binary | 0-1 | 1: individual gave correct answer |
| Statutory Pension | binary | 0-1 | 1: individual gave correct answer |
| Objknowledge | ordinal | 0-6 | Sum of correct answers |
| t3_objknowledge | ordinal | 1-3 | recode of tobjwissenneu 0-1 = 1, 2= 2, 3-6= 3, even distribution of respondents between categories |
| t3_objknow_space | ordinal | 1-3 | recode of tobjwissenneu 0-1 = 1, 2-3= 2, 4-6= 3, equal spaces |
| Factorobjknow | continous | -1.458-3.662 | factor two from iterated principal factor analyis |

For the analysis in the following chapters the considerations above would have as a consequence four ways of including financial literacy as an independent variable that could be pursued (Table 11). Firstly, all variables could be included separately, secondly, the six category index could be used, thirdly one of the three category indexes could be used and lastly the factor variable could be used. Furthermore, it will be tested if "Don't know" answers will add any additional information to the models analysed in chapter 6.

### 4.2.2 Perceived Pension Literacy

Subjective knowledge has been assessed using the following question battery. The first item of the battery "knowledge regarding financial matters" measures financial literacy in general. The other five questions are more concerned with old-age provision and therefore measure pension literacy. While the statutory pension insurance, company pension, capital life insurance and "Riester-Pension" all affect individuals subject to social insurance contribution, the "Basis-Pension/Rürup-Pension" is designed for private retirement provision for the self-employed and the pension for civil servants is paid as retirement income by the government to its civil servants.

Table 12: Questions about Subjective Knowledge

| | Imagine a scale from 1 "very low" to 7 "very high". The values in between can be used to grade your opinion. How do you judge your personal knowledge on this scale regarding... |
|---|---|
| 1 | ...financial matters? |
| 2 | ...statutory pension insurance? |
| 3 | ...the company pension? |
| 4 | ... capital life insurance |
| 5 | ...the "Riester-Pension"? |
| 6 | ...the "Basis-Pension/Rürup-Pension" |
| 7 | ...the pension for public servants (Beamtenpension) |

Not all information is necessary for everyone to make optimal decisions concerning retirement savings. Knowledge about the contribution rate and knowledge about the size of statutory pension might be not be relevant for civil servants who have their own pension system. The main group of interest in this work are individuals who are subject to social insurance contributions because they are directly affected by the declining replacement rate of the statutory pension system. Among the different knowledge questions, having good knowledge about financial matters, the statutory pension system, the company pension, the capital life insurance and the "Riester Pension" is important for making an optimal retirement saving decision. The group of individuals for whom this knowledge is important is composed of blue- and white-collar workers, unemployed and not yet employed. Here it is assumed that the unemployed and not yet employed either had a job or will start a job where social insurance contributions have to be paid.

Table 13 shows that subjective knowledge variables exhibit correlations which range from 0.27 to 0.48. Because of this rather high correlation and because using one index instead of five variables facilitates the use of subjective knowledge in regression analysis, all variables will be combined into one index. For this reason two approaches have been chosen. The first one is factor analysis and the second is just aggregating the variables to create an index for subjective knowledge. Factor analysis has been performed on the five subjective knowledge questions as well as on the objective knowledge questions.[59] Applying the iterated principal factor method one factor has been retained with a meaningful interpretation. This factor comprises the five subjective knowledge questions. Factor loadings range from 0.30 for the "Riester-Pension" to loadings above 0.5 for all other variables.

The second option used to create a single index out of the five subjective knowledge questions is sometimes also called the naïve option. In this case the index for subjective knowledge has been created by aggregating all five variables and then dividing the sum by five so that a variable will evolve which represents the average knowledge over the five questions. Looking at the correlation between the factor retained from the factor analysis and the index as a result from the naïve method shows that both are highly correlated with a correlation coefficient of 0.92. As a result it should not make a huge difference which index will be used in regression analysis.

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[59] The description and analysis concerning objective knowledge can be found in chapter 4.2.1.

**Table 13: Subjective Knowledge Correlation Matrix**

|  | F m | S p i | C p | C l i | R P |
|---|---|---|---|---|---|
| Financial matters | 1.00 | | | | |
| Statutory pension insurance | 0.48 | 1.00 | | | |
| Company pension | 0.40 | 0.43 | 1.00 | | |
| Capital life insurance | 0.40 | 0.34 | 0.31 | 1.00 | |
| "Riester-Pension" | 0.27 | 0.31 | 0.27 | 0.37 | 1.00 |

Source: FNA-Data, first telephone interview, weighted. The number of individuals who answered the item battery range from 981 to 1013, depending on the item.

Instead of including a variable measuring subjective financial knowledge directly, Rooij, Lusardi and Alessie (2011b) created dummy variables for overconfidence and under confidence with respect to an individual's financial knowledge. They argue that the perception of one's knowledge could have an effect on financial outcomes in addition to objective financial literacy. Rooij, Lusardi and Alessie (2011b) construct their relative measure of overconfidence as an assessment of subjective knowledge based on the question: "How would you assess your understanding of economics (on a 7-point scale; 1 means very low and 7 means very high)?" This self-assessment of financial literacy was contrasted with actual literacy, which is a literacy index constructed from five basic literacy questions.

In a first step they grouped both variables into four categories. Respondents were ranked from the top category to the lowest. They chose the groups of self-assessed financial literacy to be about equal size and then divided the literacy index so that it mimics the size of the subjective-knowledge groups. In a second step the relative rankings of actual versus self-reported knowledge were compared so that individuals with a ranking in self-assessed knowledge which is higher than their ranking in actual knowledge were labelled overconfident. On the other hand individuals were deemed under confident if their self-reported knowledge ranking was lower than their actual knowledge ranking.

Rooij, Lusardi and Alessie's (2011b) reasoning has been that the perception of one's knowledge could have an effect on financial outcomes in addition to objective financial literacy (2011b). They argue that individuals who have a high confidence in their financial knowledge may be less risk averse concerning their portfolio choice than individuals who feel less confident.[60] On the one hand individuals may be over-confident and buy products which they do not fully understand. This could have serious negative consequences. On the other hand

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[60] The question to assess self-reported knowledge is: „How would you assess your understanding of economics (on a 7-point scale; 1 means very low and 7 means very high)"?

individuals who are under-confident about their financial knowledge might be reluctant to use new financial products and potentially forego benefits. Rooij, Lusardi and Alessie (2011b) find that the coefficient of basic financial literacy increases and remains significant when adding the confidence measures into the regression estimating total net wealth. The over-confidence measure is negative but insignificant and the under-confidence measure is significant and negative.

Hung et al. (2009) argue that perceived knowledge or confidence had predictive ability of its own, above and beyond actual knowledge. Usually individuals do not know the extent of their actual knowledge and at the time a decision has to be made, they have to decide if collecting additional information is necessary based on how much they think they already know (Lusardi and Mitchell 2007b). Research found that an accurate confidence about one's knowledge is an important determinant of decision-making competence (de Bruine Bruin et al. 2007, Parker and Fischhoff 2005).

Hardly any research investigating financial literacy shows the predictive power of financial literacy when actual and self-assessed knowledge are considered simultaneously. Rooij et al. (2007) estimated the likelihood that individuals participate in the stock market. They included both, perceived financial literacy and actual basic financial literacy into their regression and found both to be positive and significant. Nevertheless, their second measure for actual advanced literacy has not been considered in this model. When this working paper appeared in a journal in 2011, this regression disappeared completely (Rooij van et al. 2011). Lusardi and Mitchel (2007b) show parallel regressions, one with actual financial literacy and the other with self-reported economic understanding but no regression, where both variables have been considered simultaneously.

Following the approach described above, I will also create a measure for over- and under-confidence for the following analysis. The correlation between subjective knowledge and objective knowledge in this work is 0.227 when considering the correlation between objective knowledge with four categories and subjective knowledge which results from summing up all questions and dividing them by five. Measuring the correlation between the other variables, which have been suggested for measuring perceived and actual knowledge, yields an even lower correlation. Including actual knowledge into the regression is therefore likely to add additional information.

The measure of self-reported knowledge which is used to construct the relative measure of overconfidence is the subjective pension knowledge index created by aggregating the five knowledge questions and dividing the sum by five as described before. The measure for actual knowledge that is used is the index

which represents the number of correct answers (Figure 11). Instead of choosing four categories to group both variables, three categories had been chosen because of the difficulties many respondents had in answering the pension knowledge questions. With four categories it would not have been possible to create variables for relative comparison with an approximately equal number of respondents in each category. Hence, the variable for subjective knowledge has been recoded so that values between 1 to 3.5 are combined to 1 (low self-assessed knowledge), values between 3.6 to 4.9 are combined to 2 (middle self-assessed knowledge) and values between 5 to 7 are combined to 3 (high self-assessed knowledge).

**Figure 12: Percentage of Respondents Assigned to Subjective and Objective Knowledge Rankings**
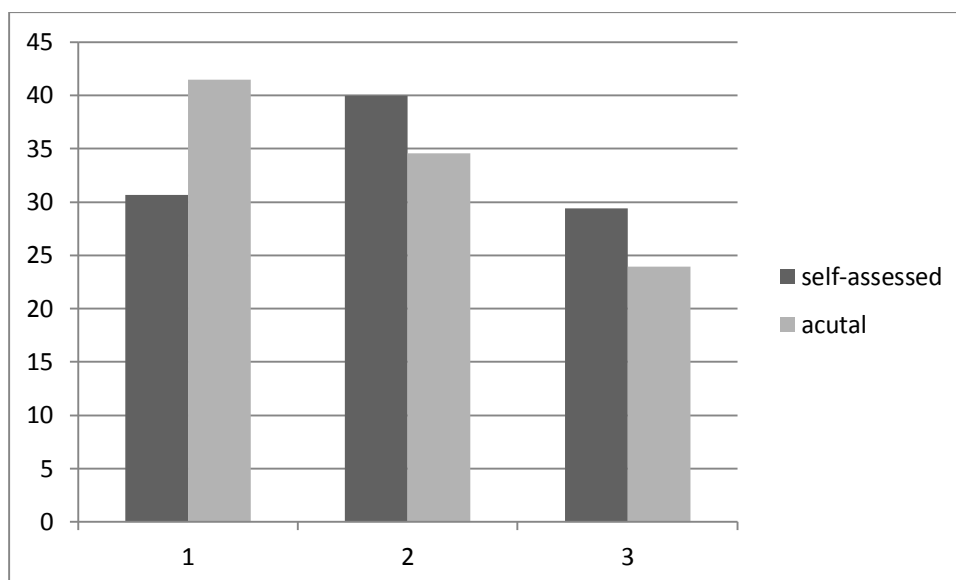


Source: FNA-Data, first telephone interview, N=880. y-axis: percentage of individuals, x-axis, 1=low knowledge, 2=medium knowledge, 3=high knowledge.

The objective knowledge index has been recoded so that 0 to 1 is combined to 1 (low actual knowledge), 2 remains 2 (middle actual knowledge) and 3 to 6 are combined to 3 (high actual knowledge). Figure 12 shows the percentage of respondents who are assigned to these categories. The comparison of the relative rankings resulted in 313 individuals being classified as overconfident, 222 individuals as being classified as under confident and 345 individuals with an equal ranking for actual and self-reported literacy.

**Table 14: Operationalisation Subjective Pension Literacy**

| subknowledge | continous | 1-7 | Agregatting self-assessed knowlege questions and deviding sum by five |
|---|---|---|---|
| overestimate | binary | 0-1 | 1: individual overestimated his pension literacy |
| underestimate | binary | 0-1 | 1: individual underestimated his pension literacy |
| correctestimate | binary | 0-1 | 1: individual correctly stated his pension literacy |
| factorsubknowledge | continous | -2.687-2.430 | factor one from iterated principal factor analyis |

Table 14 summarizes the variables which have been generated based on the batteries of self-assessed and actual knowledge questions. These variables will serve as proxies for both kinds of knowledge in all subsequent empirical analyses based on the FNA-Data.

## 4.3 Testing Hypotheses

In this chapter four hypotheses will be developed based on the theoretical considerations outlined in chapter 2.1. Furthermore, it will be discussed how these hypotheses can be tested empirically using the FNA-Data. The first hypothesis tackles the question which has been dealt with throughout the literature review in chapter 2.3. This is the question about the influence of financial knowledge on retirement planning and wealth. Firstly, the theory predicts that financial knowledge decreases the effort costs which the planner incurs if he/she tries to discipline the doer (Shefrin and Thaler 1981). Secondly, the theory predicts that financial literacy is a kind of future orientated capital which makes the future less remote (Becker and Mulligan 1993) and thirdly it reduced the costs of retirement planning (O'Donoghue and Rabin 1999). The first hypothesis can therefore be formulated as follows:

*Hypothesis 1:*

*If financial literacy reduces the effort costs incurred through retirement planning, then (all things being equal) individuals who are financially literate are more likely to plan and save for retirement than financially illiterate people.*

*Of course, retirement saving does not directly follow from retirement planning but I assume that each individual who engages in retirement savings has at least made some planning efforts.*

The FNA-Data offers a set of questions testing financial and pension knowledge of the respondents. The wording and conceptualization of these variables has been discussed in chapter 4.2. In order to test hypothesis 1, a variable measuring the degree of pension knowledge will be included in all regressions with dependent variables which are related to planning and savings for retirement. Variables to be considered as explanatory variables will be discussed in chapter 4.5. To verify the hypothesis, the coefficient of the pension knowledge index should be positive and significant. For the next hypothesis I will shortly recap the theory forwarded by Becker and Mulligan (1997) who argue that "even rational people may 'excessively' discount future utilities, but we assume that they may partially or fully offset this by spending effort and goods to reduce the degree of overdiscounting." (Becker and Mulligan 1997, 730). This spending, they argue, increases the "future orientated capital of the individual" which helps them imagine the future.

Future orientated capital is affected for example by reading newspapers, listening to the news on TV or participating in a retirement seminar. Hence there is a link between financial literacy and time preferences. Individuals who heavily discount the future may invest in acquiring financial knowledge or disciplinary devices. If they do so it might be possible that financially literate people save for retirement despite having a high discount rate. Furthermore, their model assumes that an additional piece of future orientated capital is more effective in reducing the discount rate if the initial time preference rate is high. The time preference rate, however, should not exceed the rate at which it would be beneficial for the individual not to invest in future orientated capital at all. The implications for a hypothesis would be as follows:

*Hypothesis 2*

*If the discount rate is high but still allows for at least some investment in future orientated capital, then, all other things being equal, an additional amount of future orientated capital would increase the likelihood, for example, of saving for retirement, by a greater amount for individuals with an initially high than for an individual with an initially low discount rate.*

**Figure 13: Hypothesis 2: The Interaction of Time Preferences and Financial Literacy**
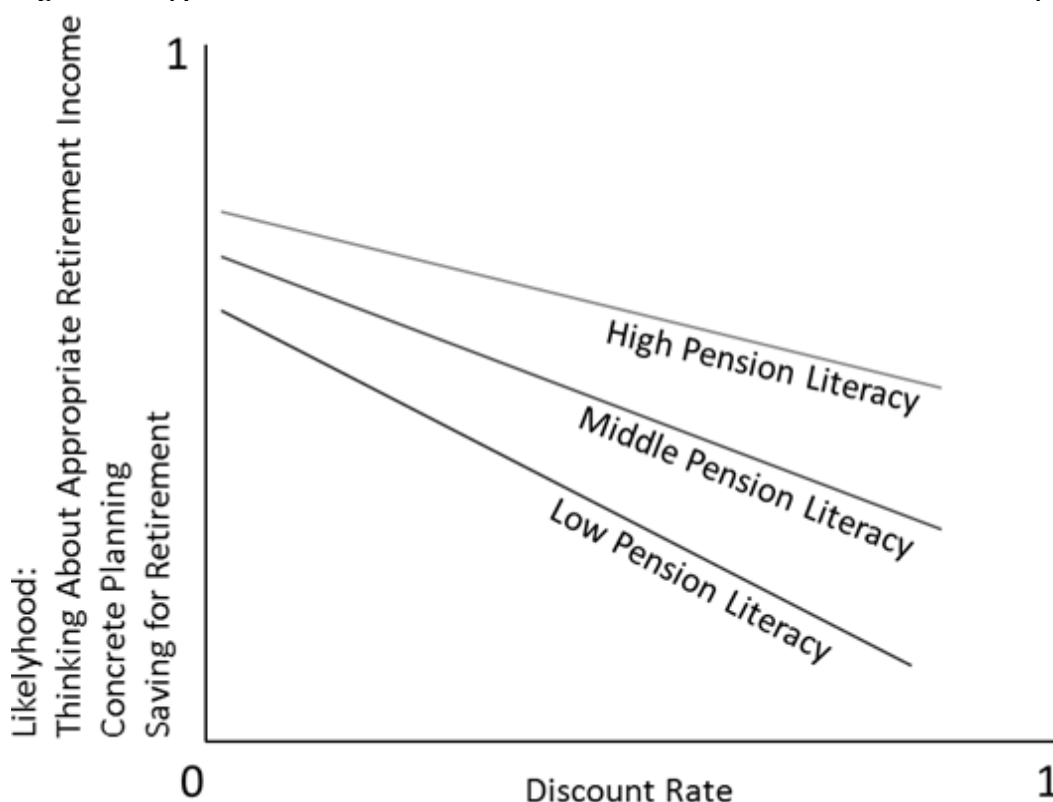


This hypothesis is depicted in Figure 13 which also shows that for individuals who are very future orientated (discount rate near 0) an additional piece of fu-

ture-orientated capital, which increases pension literacy from say "low" to "middle," only marginally increases the likelihood of saving for retirement.

An interaction between financial literacy and time preferences has already been detected in an empirical analysis using an experimental design by Howlett and Kees (2008). They conducted an experiment with graduating seniors at a public university to measure the effects of self-regulation, future orientation and financial knowledge on the intention to contribute to a 401(k) plan. Due to the experimental character, endogeneity of financial knowledge was not a problem in this setting. The 89 graduating seniors were allocated to one out of eight different experimental conditions. Financial knowledge was introduced via the presentation to the treatment group of a written summary describing how a 401(k) plan works. The consideration of future consequences was not manipulated but measured by a 12-item measure as described by Strathman et al. (1994). How the self-regulatory state was manipulated will not be described here since the variable of main interest is financial knowledge and future orientation.

**Figure 14: Moderating Effect of Knowledge on the Consideration of Future Consequences**
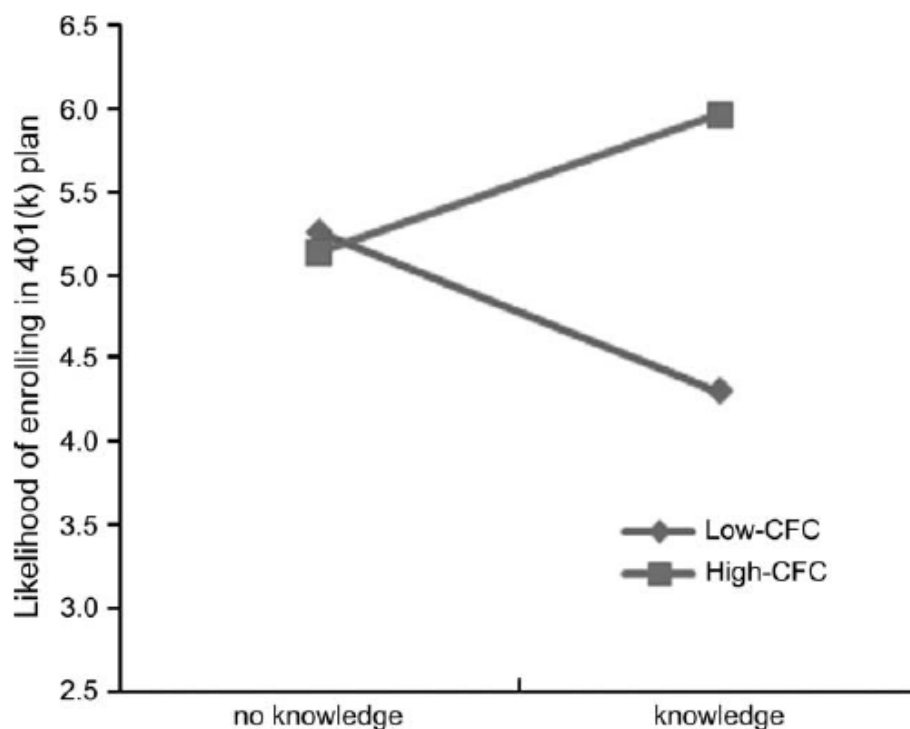


Source: (Howlett et al. 2008)

Each of the three effects was found to influence the intention to invest in a 401(k) plan. Consumers' financial knowledge and their orientation to the future positively influenced the likelihood of investing in a retirement plan. They also included an interaction term between financial knowledge and future orientation, which showed that in the absence of financial knowledge future orientation did not influence the likelihood to contribute. This is an interesting finding

since it validates the interaction effect between financial knowledge and future orientation, but it has been found that in the absence of financial knowledge an individual's discount rate has no influence on the likelihood of contributing to a 401(k) plan.

Figure 14 is taken from the paper by Howlett and Kees (2008) and shows that the likelihood of enrolling in a 401(k) plan decreases for individuals with "low consideration of future consequences" (high discount rate). Only for individuals who are already future orientated does financial literacy increase the probability of enrolling in 401(k) plans. Their hypothesis which they validated with this finding is as follows:

*"In the absence of basic financial knowledge, the consumers' CFC will have little influence on the likelihood of contributing to a 401(k) plan. However, among participants with some basic knowledge, consumers with higher levels of CFC will express higher likelihood of contributing to a 401(k) plan..." (Howlett et al. 2008).* This hypothesis was based on their reasoning that basic financial knowledge is essential for making appropriate retirement savings decisions. Furthermore they proposed: "that not only is knowledge about the benefits of sound retirement planning important but also consumers need to have a future-orientated outlook in order to make sound long-term financial decisions. That is, consumers must be motivated to put that knowledge to good use."

Figure 14 implies that the likelihood of contributing to a 401(k) plan for an individual who has "no knowledge" is higher for someone with low consideration of the future than for someone with high consideration of the future. Using the German SAVE survey, Honekamp (2010) used a similar procedure and found evidence that an additional piece of financial literacy is more effective for individuals with an initially low degree of future orientation than for someone who places great weight on the future.

An interesting result is that the degree of future orientation had almost no effect for individuals with the second highest degree of financial literacy and even a negative effect for individual with the highest degree of financial literacy. An explanation could be that financially literate individuals are less guided by time preferences because they tend to base their retirement decisions on facts and figures. They calculate their expected pension from the statutory pension insurance, compare investment returns and then compute their optimal savings decision required to maintain their standard of living when old. Furthermore, financially literate people who are very present biased may prefer to invest in other saving modes to prepare for retirement than the ones from which the dependent variable had been generated (Honekamp 2010).

Generally the conclusion contradicts the findings by Howlett, Kees, and Kemp (2008) who detected that the orientation towards the future did not influence the likelihood of 401(k) participation in the absence of financial knowledge. Such a direct comparison should, however, be avoided because the research design of the two studies is very different. While Howelett, Kees, and Kemp (2008) conducted in experiment among 89 graduating seniors which could circumvent the endogeneity problem of financial literacy, this was not possible based on the survey data used by Honekamp (2010). The variables measuring financial literacy and future orientation also differ between both studies which could be an explanation for the different results. Moreover the analysis conducted with the SAVE-survey cannot claim that financial literacy is completely absent, even if individuals were not able to answer one of the three literacy questions correctly, hence the three questions chosen to measure financial literacy might not be sufficient to be a valid instrument of financial literacy.

Concerning the issue of *hypothesis 2* there remains the question of how it can be tested for based on the available data in this work. Here a procedure similar to the one chosen by Howlett and Kees (2008) will be employed. In each regression with dependent variables measuring concepts related to planning and saving for retirement, an interaction term between time preferences and pension knowledge will be included besides other explanatory variables. If *hypothesis 2* is correct the predicted probabilities of the interaction variables and the interaction term itself should produce a similar picture to the one in Figure 13. Furthermore, these coefficients should be significantly different form zero.

*Hypothesis 3:*

*If "procrastination does not arise from present-biased preferences per se, but rather from present-biased preferences combined with naïveté" (O'Donoghue and Rabin, 1998), then, all other things being equal, sophisticated individuals are equally likely to save for retirement regardless of initial time preferences because procrastination only arises if present-biased preferences are combined with naïveté.*

*Hypothesis 3 (relaxed):*

*Interpreting the theory less strictly, Hypothesis 3 could also imply that, all other things being equal, individuals who know that their long term self will not act in the interest of their present self are more likely to plan and save for retirement than naïve individuals.*

**Figure 15: Hypothesis 3: The Interaction of Future Orientation and Sophistication (light interpretation)**
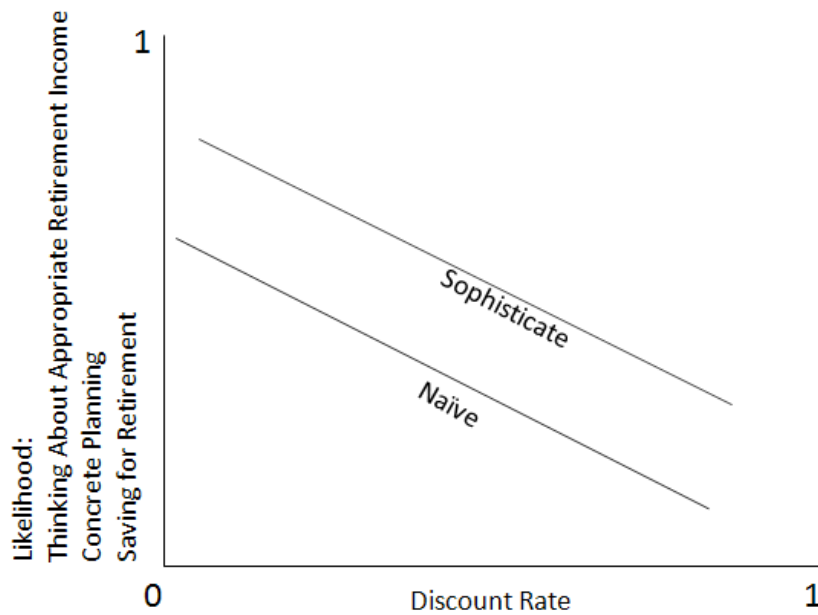


As a result, hypothesis 3 is split into a light and a strict formulation both of which can be tested empirically. Figure 15 shows that the probability of planning and saving for retirement decreases as the discount rate increases. This means, that individuals with a high future orientation save more than individuals with less future orientation. This effect, however, can be mitigated (light version of the hypothesis) if individuals know that they would repeatedly procrastinate on retirement savings decisions.

**Figure 16: Hypothesis 3: The Interaction of Future Orientation and Sophistication (strict interpretation)**
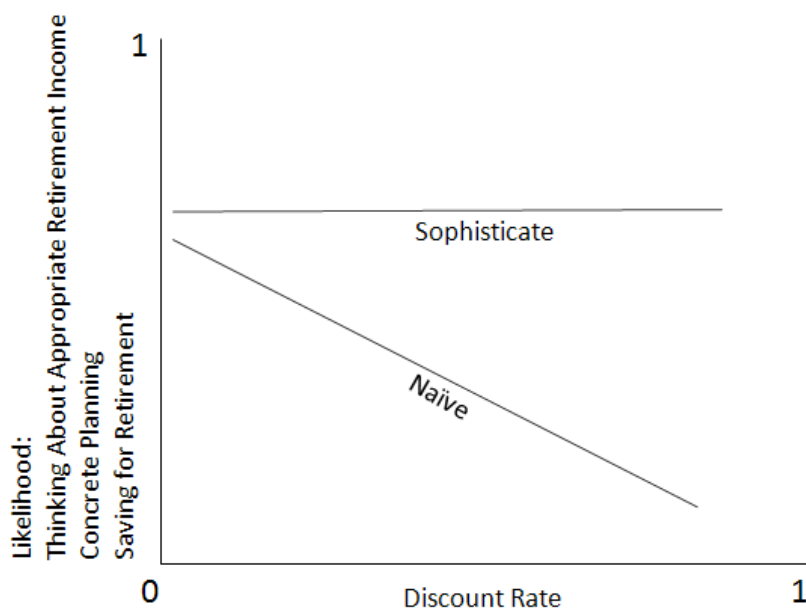
O'Donoghue and Rabin (1999) argued that knowing about future misbehavior would increase the perceived cost of current misbehavior and as a result encourage the individual to behave in the present. Individuals who possess this knowledge will be called sophisticates according to the definition introduced by O'Donoghue and Rabin (1998). Therefore the predicted probability line is marked "sophisticates" and runs parallel to and above the line for "naïves".

The strict interpretation of the theory is presented in Figure 16. It can be observed that the probability of engaging in any private retirement activity declines with an increasing discount rate for naïve individuals. The predicted probability line for sophisticates instead is parallel to the x-axis implying that an increasing discount rate does not decrease the probability to plan and save for retirement.

It would also be conceivable that the predicted probability lines look like the ones depicted in Figure 13 describing hypothesis 2. This would mean that being a sophisticate and having a high discount rate increases the probability of saving for retirement to a greater extent than for someone who has a low discount rate. Generally, this reasoning also applies to Figure 16 above, but it would also allow the predicted probability line of sophistication to decline as the discount rate increases. The sophistication line, however, would need to be less steep than the naïve line in order to fit the reasoning that being sophisticated has a greater influence on high discounters than on low discounters. If such a picture is observed in any of the empirical estimations, then hypothesis 3 would not be verified. Instead the result implies a solution which is somewhere between the strict and the relaxed version of hypothesis 3.

**Table 15: Questions about Saving Commitment**

| | |
|---|---|
| 1 | Often it has been suggested that employees should be committed to save 4% of their gross income, for additional private retirement provision. Do you evaluate such a duty as |
| | (rather good) (rather bad) (don't know/don't mind) (refuse) |
| 2 | Why do you think such a commitment is rather good? (Only individuals who chose (rather good) in the previous question received this question. Multiple answers allowed.) |
| | (because otherwise I would not provide for retirement, although I should) |
| | (because otherwise I would postpone the decision again and again) |
| | (because everyone would be forced to save for retirement such that less people would rely on social assistance when old) |
| | (other reason, open answer) |
| | (refusal) |

| 3 | Why do you think such a commitment is rather bad? (Only individuals who chose (rather bad) in the previous question received this question. Multiple answers allowed.) |
|---|---|
| | (because I would like to decide how much save) |
| | (because I would like to decide how to save) |
| | (because home ownership is my old-age provision) |
| | (other reason, open answer) |
| | (refusal) |

In order to test the hypothesis empirically, the first step is to think about how it would be possible to distinguish between naïve and sophisticated consumers. A sophisticate consumer knows that his/her future self would not act in the interest of the present self. Individuals in the telephone interview were asked if they agree with the statement "I procrastinate on financial decisions". Does this knowledge make them a sophisticate to the extent that they engage in concrete retirement planning and translate these plans into action? Or do they interpret the question as meaning they only procrastinate today and start saving tomorrow? In the first telephone interview this variable is the only variable which can be used to approximate the sophistication of the consumer. Before the advantages and disadvantage of using procrastination are discussed in more detail, I will present a second variable which might be useful to measure sophistication. The second measure would be taken from the second telephone interview, the drawback is that only about half of the respondents who completed the first telephone interview also participated in the second telephone interview. The wording of the two questions, taken together, can be considered to be an approximation of sophistication and are presented in Table 15.

Firstly, Figure 17 shows that slightly more individuals evaluate a duty to save for retirement as rather good as compared to rather bad. These and the following results are based on the unweighted data because at this stage it is not the aim to produce representative results but rather to demonstrate how the responses to questions, which will be used as variables in further analysis, emerge.[61]

21% of respondents rate mandatory savings as rather good because they otherwise would not provide for retirement and 11% say that they would repeatedly postpone starting saving for retirement if saving were not a duty (Figure 18). Both of these statements refer to individuals who know that they would procras-

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[61] Weighting would increase the number of (don't know/don't mind) answers and equally decrease the number of respondents who answered (rather good) or (rather bad).

tinate on retirement savings and for this reason they would be willing to accept a law which would commit them to save 4% of gross income for retirement. While the variable measuring procrastination in the first telephone interview might only be interpreted as postponing a decision now but not in the future, these variables can measure repeated procrastination of retirement decisions. The sophistication variable generated out of question 2 would then be 1 if the respondent either stated that he or she would not provide for retirement without this savings device or that he or she otherwise would postpone the decision again and again.

**Figure 17: How Do You Evaluate a Duty to Save 4% of Gross Income?**
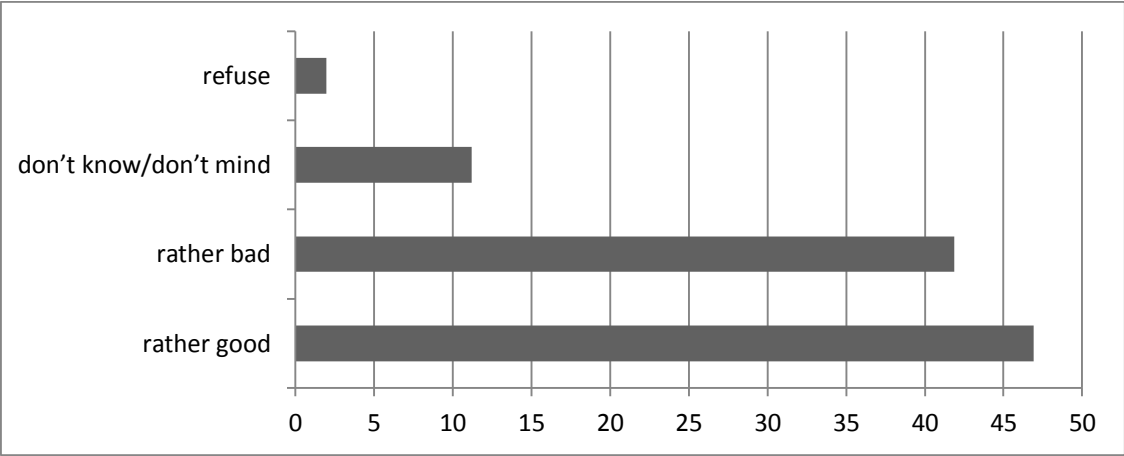


In conclusion the datasets provide two potential means of measuring sophistication. The use of each of these variables, however, presents problems which are likely to bias estimation results. For that reason it is necessary to discuss the possible shortcoming of using these variables in a regression now.

**Figure 18: Why is a Commitment to Save Rather Good?**
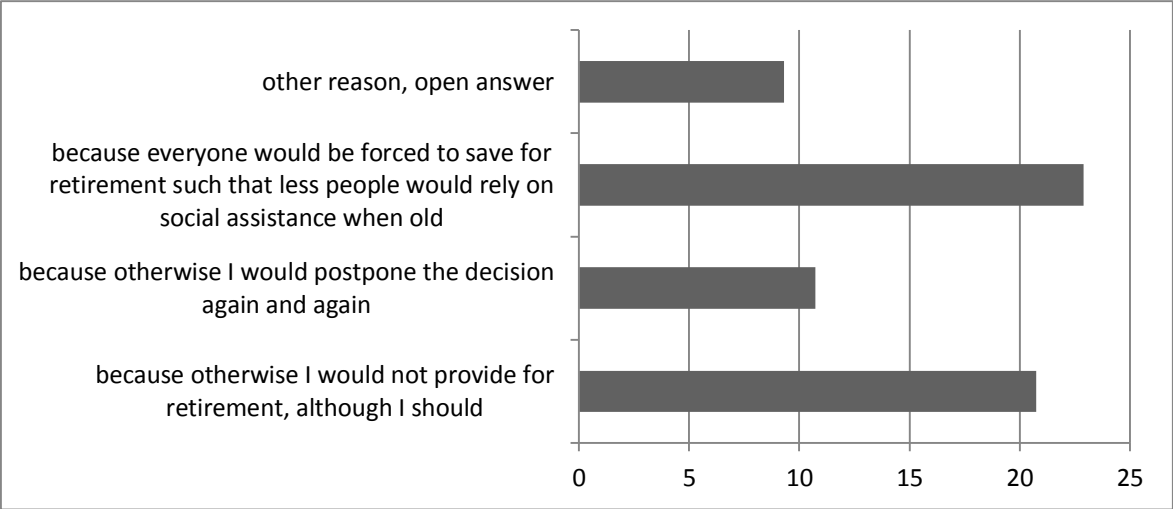


Concerning the variable "I sometimes procrastinate on financial matters" it could be that the question has been interpreted such that: "Yes I sometimes de-

lay decisions to the next day or next week in order to make a decision then."[62] Against the background theory the measure of sophistication needed to test the hypothesis, however, would need a question like the following: "I continously delay decisions and may never reaching a decision if nobody forces me to do so." In the case that many indivduals interpreted the question so that they admit to procrastination but only once, they are not sophisticated according to the theory, but are still classified as sophisticated in this analysis. Hence the effect of being sophisticated will be underestimated.

Another problem arises with the variable "sophistication." Someone is coded as a sophisticate if he or she is in favor of introducing mandatory private retirement savings and motivates his or her decision with the statement, that otherwise he or she would not save for retirement or delay the decision again and again. Hence that person knows that there is a self-control problem and would like to "buy" a savings device to overcome this problem. Being sophisticated in this case is therefore well defined. The question would be, if all the remaining respondents are naïve. Just because someone is not in favor of the introduction of a mandatory savings device does not have to mean that that person is not aware of potential self-control problems.

It could just be the case that he/she found another solution than mandatory savings to control the problem. Hence it would be necessary in this case to find another way which more explicitly distinguishes between sophisticates and naïves. Since such a distinction is not possible given the data at hand, I will refrain from using the variable "sophistication" to test hypothesis three in the analysis of the following chapters. For hypothesis testing, the variable "I sometimes procrastinate on financial matters" will be used bearing in mind that the effect of this variable is likely to be underestimated.

In order to test the hypothesis that individuals who know that their long run selves will not act in the interest of present selves are more likely to plan and save for retirement than individuals who are naïve (light hypothesis), it is necessary to include two variables into the regression. These variables are the one measuring sophistication and one variable measuring future orientation.[63] In order to verify the hypothesis sophistication would have to have a significant positive influence on retirement planning or saving.

For the test of the stricter formulation of the hypothesis sophistication and a time preference variable alone are not sufficient to test the hypothesis. Similar

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[62] See also chapter 4.1 Measuring Time Preferences and Procrastination

[63] How time preferences are to be measured has been described in chapter 4.1.

to the test for *hypothesis two*, an interaction term needs to be part of each regression with dependent variables measuring concepts related to planning and saving for retirement. In this case, however, the variables of interest are time preferences, sophistication and the interaction term of both. If *hypothesis three* is correct the predicted probabilities of the interaction variables and the interaction term itself should produce a similar picture as the one in Figure 15 or Figure 16. Furthermore, these coefficients should be significantly different form zero.

**Figure 19: Why is a Commitment to Save Rather Bad?**
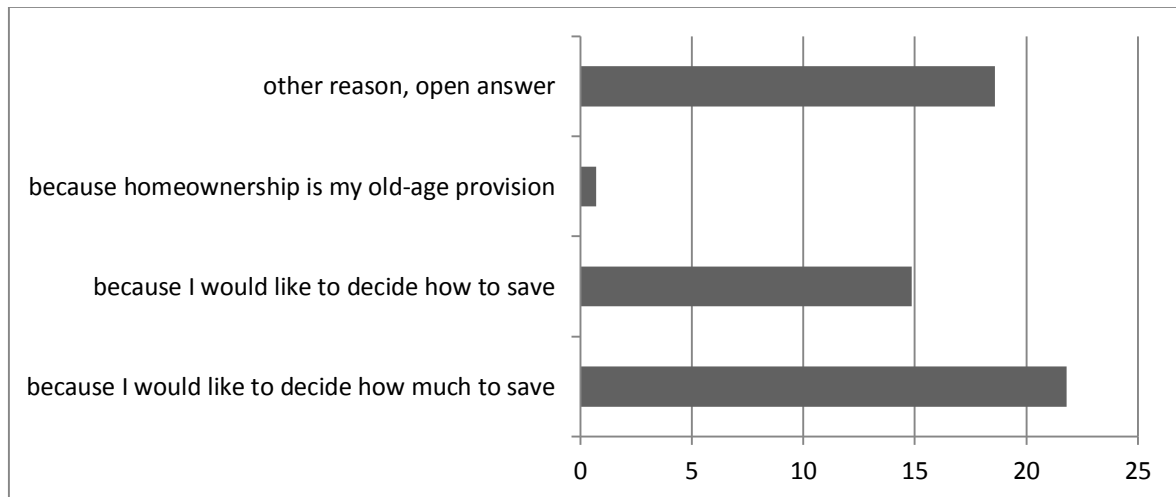


For completeness, Figure 19 shows the reasons why individuals would not choose to make savings mandatory. Many individuals like to have more flexibility about how much to save and where to invest their money. Individuals who gave an open answer most often argued that a commitment to save would not be a good idea because many individuals would not due to their financial situation be able to save 4% of gross income. Findings which either verify or falsify these hypotheses 2 or 3 could influence the decision if providing information to individuals who are present orientated is reasonable and if it is, which kind of knowledge should be provided to these individuals. In the case that an additional piece of financial literacy is more effective for individuals with an initially high discount rate than these individuals should be a target group of financial education seminars in order to increase their future orientation (hypothesis 2).

If individuals who are aware of their self-control problem, meaning that they know that they tend to delay decisions concerning retirement provision, are (given their present-biased preferences) at less likely to procrastinate, than retirement information campaigns should also focus on the problem of procrastination and provide advice and support to overcome procrastination. Such information increases the awareness of this problem such that it is likely that naïve individuals become sophisticated and try to overcome their problem. The fourths hypothesis is about the effectiveness of retirement seminars. Such sem-

inars can be beneficial at each stage on the path towards private retirement savings. Looking at retirement seminars from a theoretical point of view, it is to be expected that seminars increase future orientated capital (Becker and Mulligan 1997) and decreases effort costs (Shefrin and Thaler 1992). Individuals who joined the seminar are directly confronted with ageing and retirement for 12 hours such that the ability to imagine the future should increase as compared to non-participants. This in turn decreases the discount rate of the future and fosters retirement planning and saving. Effort costs are also reduced for several reasons. Firstly, individuals do not have to search for the information themselves, which is time consuming and bears the risk of trusting information which is in fact advertisement for pension products. Secondly, individuals with low education often have problems in searching for relevant information and processing this information, course instructors partly do this work for them. Course instructors provide all relevant information in a comprehensible way such that even the weakest participant can follow. If this would not be the case, participants would still have the possibility to ask the instructor for further clarification.

So far it has been discussed that joining a retirement seminar has the potential to increase individual utility and retirement savings. Most people have not treated retirement issues at school and learning from the experience of parents and grandparents is not yet possible because the pension level is only decreasing slightly such that there was no necessity for many elderly to save for retirement privately. As long as individuals are not provided with the essential knowledge of the pension system and the skills to make informed retirement decisions at school, it is necessary to provide this sort of information later in their lives. Such information could be implemented through different channels. Two of the most common channels would be the retirement seminar offered by employers, which provides information about retirement in general and company pension plans or retirement seminars offered from the adult education centre or others.

*Hypothesis 4:*

*If retirement seminars lead to increases in future orientated capital or decreasing effort costs incurred through retirement planning, then, all things being equal, individuals who join a retirement seminar will be more likely to save for retirement than individuals who do not complete the seminar.*

In the FNA-Data individuals have been asked which sources of advice they have consulted in order to receive financial and pension specific advice. Participation in a retirement seminar is assumed to increase pension knowledge. Instead of adding variables measuring actual and perceived pension knowledge, these sources of advice have been implemented into regressions which explain, for

example, the probability of having capital life insurance, a company pension, etc. More details about the sources of advice and the respective analysis to test hypothesis 4, can be found in chapter 6.6.

## 4.4 Estimation Techniques and Potential Problems

The aim of this thesis is to analysize the effects of pension knowledge and time preferences on different variables concerning retirement planning. Among these variables are for example "thought about appropriate retirement income" or "saves for retirement." A detailed description of the dependent variables and how they fit into the theoretical model of chapter 2.1 can be found in chapter 6. Dependent variables are generally binary and the underlying data is a cross-section. For that reason the probit regression will be the estimation method of choice.

The problem which could arise when conducting estimations with pension knowledge as regressor are already evident. Perceived and actual knowledge may entail an endogeneiety problem. Such a problem could arise if the way of causality is not clear. In the case at hand it is for example not possible to determine if a sound perceived or actual pension knowledge leads to planning for retirement or if planning improves the understanding of issues concerning retirement and hence entails a better subjective and objective knowledge. Looking again at Figure 4, the variable "I plan concrete measures for private retirement provision" would take place as step 5. Before step 5 it is necessary to think about an appropriate retirement income and to collect and process a great deal of information in order to calculate a possible pension gap and to determine if actual savings may be sufficient to close this gap. Even in this preliminary stage it could be that perceived and actual pension knowledge has increased. This improvement in pension knowledge is then entailed by the intention to engage in concrete retirement planning. The extent of knowledge acquisition varies between individuals, as some individuals collect a lot of information before coming up with a plan and at the other extreme individuals may have no plan before filing a retirement savings contract. If the planning process was successful and the individual has reached a decision to save in one of many vehicles for retirement provision, he or she has to compare offers from banks and insurance companies. Here again is a point were pension knowledge could be influential depending on how conscientiously individuals compare products.

There are some solutions to mitigate the endognity problem. Generally, with ordinary regression analysis it not possible to account for this problem. There are two approved ways of encountering endogeneiety. On the one hand there is instrumental variable estimation and on the other hand there is the causal analysis which resembles an experiment, comparing the behavior of a treatment

group with a control group. In the course of the "FNA-Project" to evaluate the effectiveness of adult education seminars questionnaires and samples had been designed to make a causal analysis possible (Honekamp and Uehleke 2012). Causal inference was then possible because each individual who participated in the seminar (treatment group) was matched with an individual with similar characteristics, who participated in the telephone sample (control group). This research design makes it possible to estimate how the seminar participant would have changed his or her savings behavior, if he or she had not participated in the seminar (counterfactual situation). If the individual would not have changed his or her savings behavior without participating in the seminar, observed changes in retirement savings behavior after the seminar could be attributed to the course.

Rather than evaluating the effectiveness of a retirement seminar, the aim of this work is to investigate why individuals fail to start saving for retirement. In Figure 4 the obstacles on the way of private retirement provision have been outlined. Each of these obstacles will be analysed in order to find out more about the factors which prevent individuals from saving for retirement. For this kind of analysis, instrument variable estimation would be the method of choice.

The intended instrument variables are economics at school which is the same variable chosen by Rooij, Alessie and Lusardi (2011a) and a variable which measures the ease with which individuals dealt with the currency change from the Deutsche Mark to the Euro.[64] The questions concerning economics at school and the currency change in the FNA-Data are the following:

**Table 16: Questions about Economic Education at School**

| 1 | During your schooldays, did you have economics education at school? (Yes) (No) (No Reply) |
|---|---|
| 2 | How much time was spent on this topic during your schooldays? (a lot) (quite a lot) (little) (very little) (Don't know) (No Reply) |
| 3 | In 2002 the Euro has been introduced, which replaced the Deutsch Mark. How difficult was it for you to go shopping, to check the account balance and to manage your money matters in general? (very difficult) (little difficult) (not very difficult) (not difficult at all) |

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[64] Binswanger and Carman (2012) use four instrument variables, being a dummy if an individual took economics courses, the number of courses, self-assessed math confidence and if they are doing some research when they have to make a decision about health-care.

The ease with which individuals dealt with the currency conversion has been chosen as an instrument for financial literacy because of the findings of Cattell (1941, 1987) and Horn (1988) who did not only find evidence that numeracy and general knowledge entails financial literacy but also more general cognitive abilities. How easy it was to deal with the currency conversion is assumed to be dependent on individual cognitive abilities. Furthermore, this variable is thought to be a viable instrument because it should not directly influence if someone saves for retirement or not, while on the other hand it should be positively related to financial and pension knowledge.

The first of the three questions has been answered by 1,012 out of 1,016 respondents. Half of the respondents stated that they had economics at school. About 31% stated that they had quite a lot or a lot of economics education and 64% stated that they had little or very little economics education. The remaining five percent could not remember how much education they had at school. From these two variables one variable has been generated which describes the amount of economics education an individual received during their time at school. This variable has five categories, the 0 "no economics education", the 1 "very little", the 2 "little", the 3 "quite a lot" and the 4 "a lot" economics education.

**Table 17: Instrument Variables**

| Economics education at school | % |
|---|---|
| no economics education | 52 |
| very little | 15 |
| little | 18 |
| quite a lot | 7 |
| a lot | 9 |
| **Difficulties with currency conversion?** | |
| very difficult | 3 |
| little difficult | 13 |
| not very difficult | 23 |
| not difficult at all | 61 |
| **Actual pension knowledge** | |
| **Questions answered correctly** | |
| 0 | 9 |
| 1 | 32 |
| 2 | 35 |
| 3 | 16 |
| 4 | 5 |
| 5 | 2 |
| 6 | 0 |

| Correlation Matrix | 1 | 2 | 3 |
|---|---|---|---|
| actual knowledge (1) | 1.000 | | |
| currency conversion (2) | 0.016 | 1.000 | |
| economics at school (3) | 0.025 | 0.000 | 1.000 |

Source: 1. FNA-Telephone Interview. Data is neither weighted nor imputed.

Table 17 shows the percentages which fall into each of the categories of the instrument variables and of the variable which has to be instrumented. The correlation matrix in the same table reveals only a low correlation between the instruments and the variable actual pension knowledge. It might be that the problem of weak instruments emerges in the empirical analysis of chapter 6.

When the excluded instruments are only weakly correlated with the endogenous variables, IV estimates are biased and may not be consistent (Chao and Swanson 2005, Nichols 2006). This would entail significance tests with incorrect size and wrong confidence intervals. In chapter 6.1, in which the probability if someone has thought about an appropriate retirement income is estimated we will have a look at the potential problem of weak instruments again.

All of the empirical analysis in this work will be conducted with Stata 12.1. One emerging problem is that Stata has not yet implemented an official estimation procedure which supports IV-estimation within imputed data sets. The Stata manual (StataCorp LP 2011) states: "Certain concepts, e.g., likelihood and deviance, do not have clear interpretation within the MI framework. As such, various statistical (postestimation) procedures based on these concepts (e.g., likelihood-ratio tests, goodness-of-fit tests) are not directly applicable to MI results." In order to circumvent this problem, sometimes, especially, in chapter 6.1, the original data has been used to compare results and to obtain test statistics which cannot be obtained otherwise.

There is the potential problem that the instruments are weak, this problem will further be analysed in chapter 6.1. For this reason and also as a robustness check with another model specification will be estimated for most of the models from chapter 6.1 onwards. It might be possible to mitigate the endogneiety of pension knowledge by adding appropriate control variable to the regression. Two variables are suited to reduce the extent of which pension knowledge could have been influenced by the experience from investing money in pension plans or other financial products. The first of these variables is the number of different assets an individual holds.

Table 19, describing the main variables to be used, shows that the number of different assets an individual holds ranges from 0 assets to 13 different assets with a mean of 5 different assets. It will be assumed that individuals who hold many different kinds of assets have a greater financial and pension knowledge than individuals who only hold a few or no financial assets. Hence the number of assets can be interpreted as a measure of experience with financial product. This kind of reasoning has also been applied in the research of Leinert (2005) who similarly investigated theoretically and empirically private retirement savings in Germany.

The second variable to reduce a potential endogeneiety of pension knowledge (both subjective and objective) is the total amount of wealth an individual has acquired up to the present. The assumption would again be that the more wealth someone has acquired the greater is his or her experience with financial products. Acquiring, taking care of and investing a large amount of wealth should generally increase financial knowledge by a larger amount than acquiring and managing a small stock of wealth.

## 4.5 Model and Variables

This chapter is comprised of an explanation of the derivation of the empirical models which will be estimated and a description of the variables used. Figure 4 has been developed in chapter 2.1 and is presented here again in order to relate each of the empirical models to be calculated to the theoretical model.

The headlines in Table 18 describe the variables available in the dataset which reflect different stages in the path towards private retirement provision. These variables will be taken as dependent variables. Each of these variables will be analysed in one of the following chapters, while firstly a description is provided as to what all five models have in common.

**Figure 4: The Path Towards Private Retirment (chapter 2.1)**
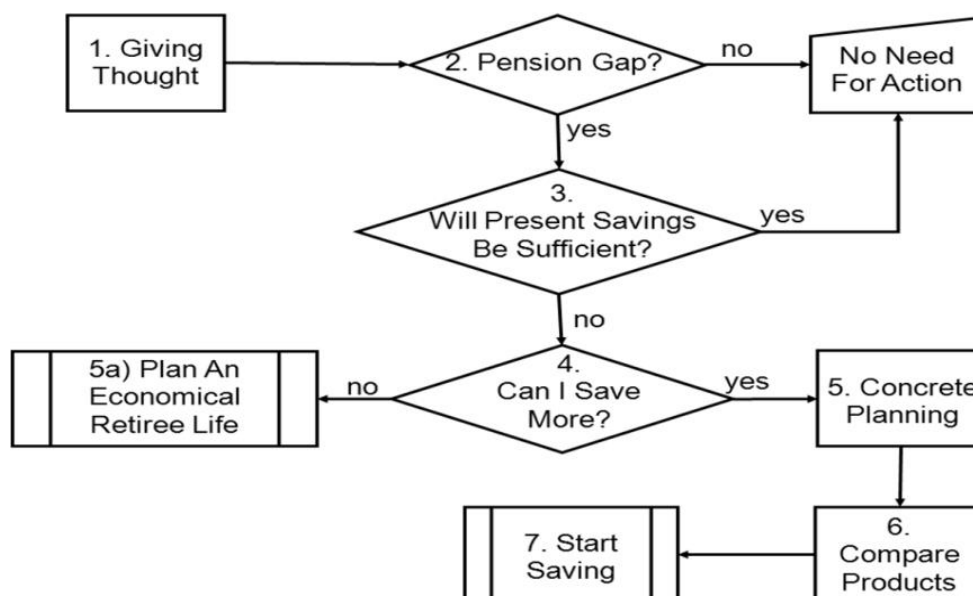


There is a basic stock of explanatory variables which will be part of each model. Among those variables are demographics, the variables necessary to test the three hypothesis and other variables theoretically relevant in determining retirement planning and savings behavior. Among the demographics are the variables gender, age, marital status, children, education, income and wealth. The tests of hypothesis 1 to 3 require a variable measuring objective pension

knowledge, a variable measuring time preferences and a variable measuring procrastination (interpreted as sophistication). Additionally, interaction terms have been created for hypothesis testing.

**Table 18: The Path Towards Private Retirement Provision (dependent variables)**

| Ch. | Dependent Variable | Stage |
|-----|--------------------|-------|
| 6.1 | Thinking about an appropriate retirement income | 1-2 |
| 6.2 | Planning concrete changes in retirement savings behaviour | 3+5 |
| 6.3 | Translating plans into action | 6-7 |
| 6.4 | Saving for retirement | 7 |
| 6.5 | Joining a retirement seminar | 1-7 |
| 6.6 | Effectiveness of retirement seminars | 1-7 |

In order to test hypothesis 2 an additional interaction term between time preferences and objective knowledge is needed and testing the strict formulation of hypothesis 3 requires the inclusion of an interaction term between time preferences and procrastination (proxy for sophistication). A further variable which has been implemented into each of the models is subjective knowledge which has been transformed in such a way that it measures if someone correctly, over- or under- estimates his/her pension knowledge.

Furthermore occupation dummies are important in this analysis because the pension system and entitlements differ between occupational groups. The pension for public servants for example is still more generous than the pension for white- and blue-collar workers and self-employed generally have the sole responsibility for their old-age provision. It can therefore be expected that white- and blue-collar workers as well as self-employed are more likely to save for retirement than public servants.

Besides the base model also variations of the model will be estimated including some further variables. The aim of these estimations which are generally deferred to the Appendix is to prove previous results or to analyse which effect a single variable may has as compared to the effect it has as part of a factor variable. One of these additional variables is the number of different assets an individual holds which serves as a proxy for financial experience. The reason why the number of assets had been added to the regression is to mitigate the potential endogeneiety problem of objective pension knowledge.

A further variable which are part of some models is a factor variable approximating potential procrastination behavior. The variables which are part of this factor are a variable measuring if the individual likes dealing with financial matters, if the individual admits that he/she sometimes procrastinates on financial matters

and lastly the variable which states if the individual has sufficient time to deal with financial matters.

All models in chapter 6 have in common the fact that the dependent variable is binary. The probit model will be chosen to estimate these models. A probit model can be derived form an underlying latent variable model.

$$y^* = \beta_0 + x'\beta + e, \ y = 1[y^* > 0] \tag{7}$$

$y^*$ is an unobserved variable. In the case that $y^* > 0$, $y$ is one and in the case that $y^* < 0$, $y$ is zero. It is assumed that the error term $e$ is independent from the explanatory variables $x$ and furthermore that $e$ has a standard normal distribution and symmetrically distributed about zero. The response probability of $y$ can be derived in the following way:

$$P(y = 1|x) = P(y^* > 0|x) = P[e > -(\beta_0 + x'\beta)|x] =$$

$$1 - G[-(\beta_0 + x'\beta)] = G(\beta_0 + x'\beta) \tag{8}$$

In order to make sure that the probabilities are between zero and one, the standard normal cumulative distribution function (cdf) will be chosen for $G$.

$$G(\beta_0 + x'\beta) = \ \Phi(\beta_0 + x'\beta) = \int_{-\infty}^{\beta_0 + x'\beta} \phi(v) dv \tag{9}$$

One of the assumptions underlying the probit model, however, is likely not to be met, since the variable actual pension knowledge is likely to be endogen. In order to counteract this problem an instrument variable estimation will be employed. Cameron and Trivedi (2010) describe the model as follows:

$$y_{1i}^* = \beta y_{2i} + x_{1i}'\gamma + u_i \tag{5}$$

$$y_{2i} = x_{1i}'\pi_1 + x_{2i}'\pi_2 + v_i \tag{6}$$

Here $i = 1, \dots, N, y_{2i}$ is a *1xp* vector endogenous variables $x_{1i}$, is a $1 \times k_1$ vector of exogneous variables and the instrument variables are presented by a $1 \times k_2$ vector, $x_{2i}$. It will be assumed that $(u_i, v_i) \sim N(0, \Sigma)$, where $\sigma_{11}$ is normalized to one to identify the model. The parameters of the structural are the vectors $\beta$ and $\gamma$, and the matrices of the reduced-form parameters are $\pi_1$ and $\pi_2$. $y_{1i}^*$ cannot be observed instead the following can be observed:

$$y_{1i} = 0 \ if \ y_{1i}^* < 0 \ \text{and}$$

$$y_{1i} = 1 \ if \ y_{1i}^* \geq 0 \tag{10}$$

It is required that $k_2 \geq p$ because of the order conditions for identification of the structural parameters. If $\Sigma$ is not a block diagonal between $u_i$ and $v_i$, $y_{2i}$ would be endogenous (StataCorp LP 2013).

**Table 19: Variable Description**

| Demographic Variables: | Mean | Min | Max | % of Respondents* |
|---|---|---|---|---|
| Male | 0.388 | 0 | 1 | 39 |
| Age | 44.792 | 20 | 60 | |
| Married/cohabiting | 0.601 | 0 | 1 | 60 |
| Children | 1.374 | 0 | 4 | |
| (0 no kids - 4 four or more kids) | | | | |
| Education dummies: | | | | |
| Low (no degree, Hauptschule) | | 0 | 1 | 13 |
| Middle (Realschule) | | 0 | 1 | 33 |
| High ((Fach-) Abitur) | | 0 | 1 | 55 |
| Individual net income dummies: | | | | |
| Low = 0-<1,500 € | | 0 | 1 | 34 |
| Middle = 1,500-<3,000 € | | 0 | 1 | 33 |
| High = >3,000 | | 0 | 1 | 33 |
| Wealth dummies: | | | | |
| Low =  0-<20,000 € | | 0 | 1 | 40 |
| Middle =   20,000-<150,000 € | | 0 | 1 | 27 |
| High =   150,000-… € | | 0 | 1 | 33 |
| **Explanatory Variables:** | | | | |
| Kind of employment dummies | | | | |
| Unemployed | | 0 | 1 | 19 |
| Blue- or white collar | | 0 | 1 | 56 |
| Self employed | | 0 | 1 | 18 |
| Civil servant | | 0 | 1 | 7 |
| Actual pension knowledge | | 0 | 6 | |
| (0 zero - 6 six questions correct) | 1.836 | | | |
| Future orientation (factor1 variable)** | 5 | 1.95 | 6.18 | |
| Procrastinate on financial matters (1 agree - 4 not agree) | 2.812 | 1 | 4 | |
| Correct estimation of knowledge | | 0 | 1 | 39 |
| Overestimation of knowledge | | 0 | 1 | 36 |
| Underestimation of knowledge | | 0 | 1 | 25 |
| Housing equity (household level) | | 0 | 1 | 65 |
| Number of different assets | 5.325 | 0 | 13 | |
| **Dependent Variables:** | | | | |
| Thought about adequate retirement income | | 0 | 1 | 67 |
| Planning concrete measures concering retirement provision | | 0 | 1 | 21 |
| Saves more in existing product since last year | | 1 | 2 | 28 |
| Filed a new retirement savings contract since last year | | 1 | 2 | 11 |
| Owning "Riester-Pension" | | 0 | 1 | 35 |
| Owning other private penison | | 0 | 1 | 34 |
| Owning capital life insurance | | 0 | 1 | 53 |
| Owning company pension | | 0 | 1 | 41 |

| Dependent Variables: | Mean | Min | Max | % of Respondents* |
|---|---|---|---|---|
| Homeownership (household level) | | 0 | 1 | 65 |
| Taking part in long retirement seminar (1 yes - 3 no) | 2.517 | 1 | 3 | |
| Taking part in short retirement seminar (1 yes - 3 no) | 2.240 | 1 | 3 | |
| **Other Variables:** | | | | |
| Sufficient time to deal with financial matters  (1 no - 4 yes) | 1.728 | 1 | 4 | |
| Care only about urgent matters (0 not true - 10 true) | 4.076 | 0 | 10 | |
| I fear that I fall into disuse when retired | 3.309 | 1 | 4 | |
| ( 1 agree - 4 do not agree at all) | | | | |
| I associate aging with illness and care dependency | 2.637 | 1 | 4 | |
| ( 1 agree - 4 do not agree at all) | | | | |
| Savings suffice for adequate retirement live | | 0 | 1 | 58 |
| Like dealing with financial matters | 2.626 | 1 | 4 | |
| (1  do not like it - 4 like it very much) | | | | |
| Importance of saving for retirement | 7.911 | 0 | 10 | |
| (0 not important - 10 very important) | | | | |
| Importance of saving for care dependency when old | 6.759 | 0 | 10 | |
| (0 not important - 10 very important) | | | | |

Source: 1. Telephone interview, FNA-data, original data which has neither been imputed nor weigthed. *percentage of respondents are given only for dummy variables. ** Factor variable has been transformed by adding 5 in order to avoid negative values in this descriptive statistics.

# 5 Pension Knowledge in Germany

The empirical analysis begins with an overview of the state of pension knowledge among the participants in the telephone interview. Results are based on the first telephone interview used as part of the FNA-Data. After discussing objective and subjective knowledge in this chapter, the main analysis, concentrating on the obstacles on the way of private retirement provision, follows in chapter 6.

## 5.1 Objective Knowledge

This chapter will investigate how pension literacy is distributed among demographics. Figure 20 shows that more men were able to give a correct answer to most of the knowledge questions than women. An exception is the knowledge of the statutory right for deferred contributions. This difference between male and female is, however, not significant.[65] Additionally, the knowledge of the contribution rate is not significantly different between women and men.

**Figure 20: Pension Knowledge by Gender, in Per cent**
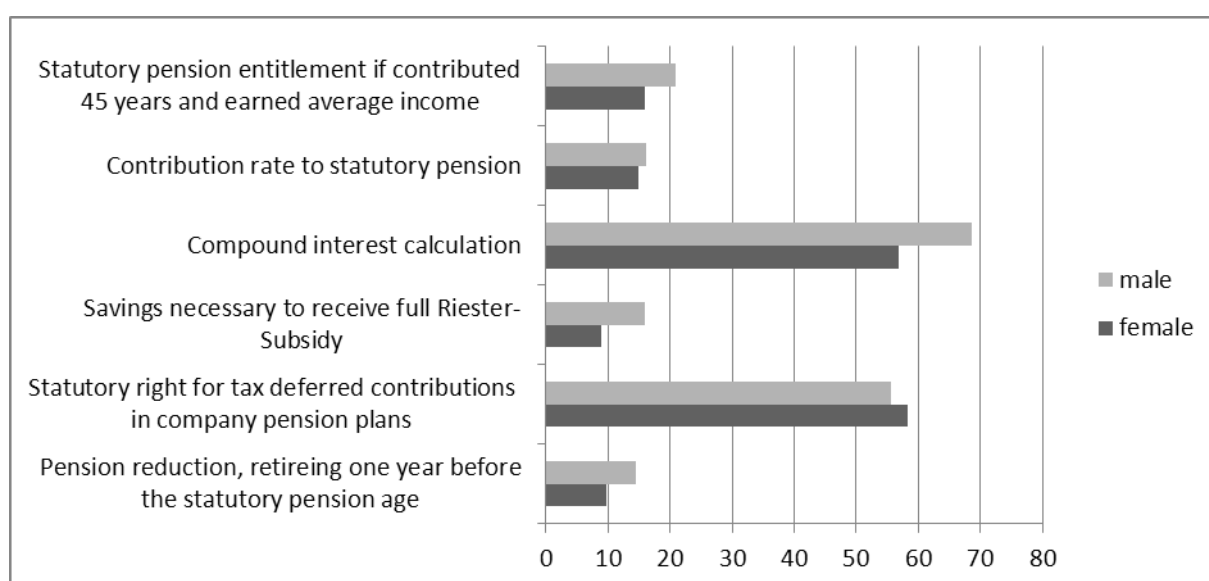


Source: FNA-Data, first telephone interview, weighted. Number of observations range from 951 to 1,010, depending on the question.

Objective pension knowledge also varies with age. Figure 21 shows that individuals who are 40 years and older are significantly more likely to know the amount of pension someone receives who meets the requirements outlined in question 6 than younger individuals. A related question, the question about the pension reduction if one retires one year before the statutory pension age was answered

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[65] The test statistic which has been used is the chi square test.

correctly significantly more often by individuals who were 50 years and above. Older respondents seem to be much more interested in their retirement income which could be explained by the proximity of retirement. Hence they search for the relevant information necessary to calculate retirement income, which in turn makes them more knowledgeable about these two questions.

**Figure 21: Pension Knowledge by Age, in Percentage**
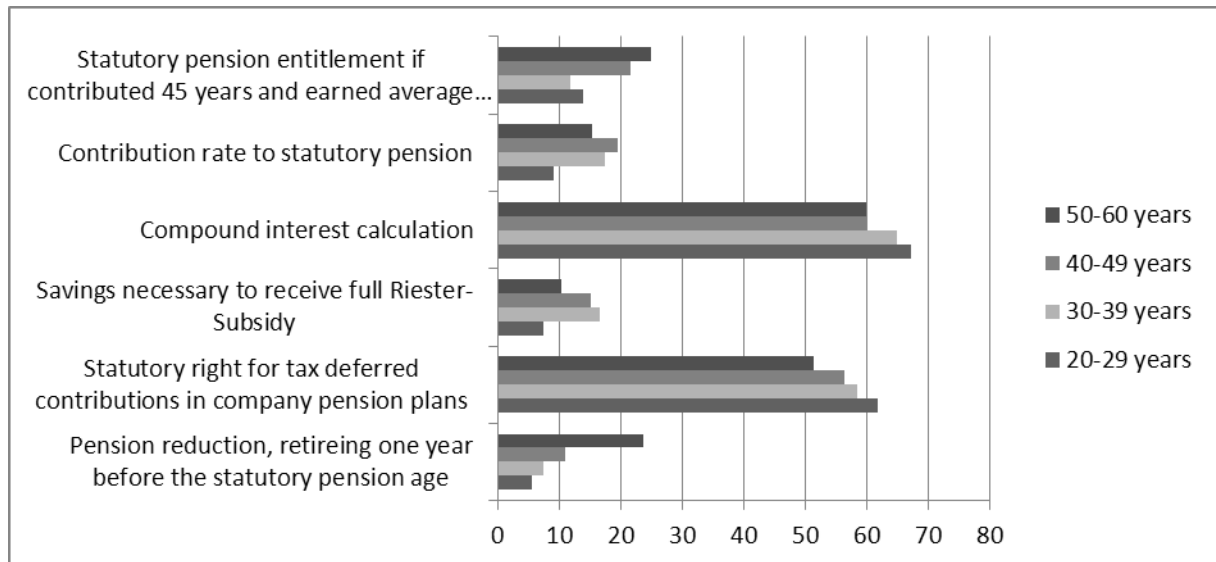


Source: FNA-Data, first telephone interview, weighted. Number of observations range from 951 to 1,010, depending on the question.

Since 2002 individuals have the statutory right to take advantage of deferred contributions when filing for a company pension plan. The number of individuals who know the correct answer to this question decreases with age. An explanation could be that older individuals were less likely to notice that the law had changed. Younger individuals do not even know that there was a time when they had no statutory right for deferred contributions. Another question which receives more correct answers among the young is compound interest calculation. This question can be subsumed under basic financial literacy as there seems to be no other explanation as to why younger individuals score better than older individuals. For the question about the "Riester-Subsidy" and the question about the contribution rate, no clear pattern can be detected. Generally, the middle-aged have slightly less problems in answering these questions correctly than older or younger individuals.

Figure 22 shows that generally knowledge increases with education. There is, however, one exception: individuals with low education are better informed about their right to tax deferred contributions than individuals with higher education. An explanation for why the lower educated are better informed could be that they are more open to new information provided by the employer or trade

union about the company pension plan. The more educated may already have gathered information elsewhere.

**Figure 22: Pension Knowledge by Education, in Percentage**
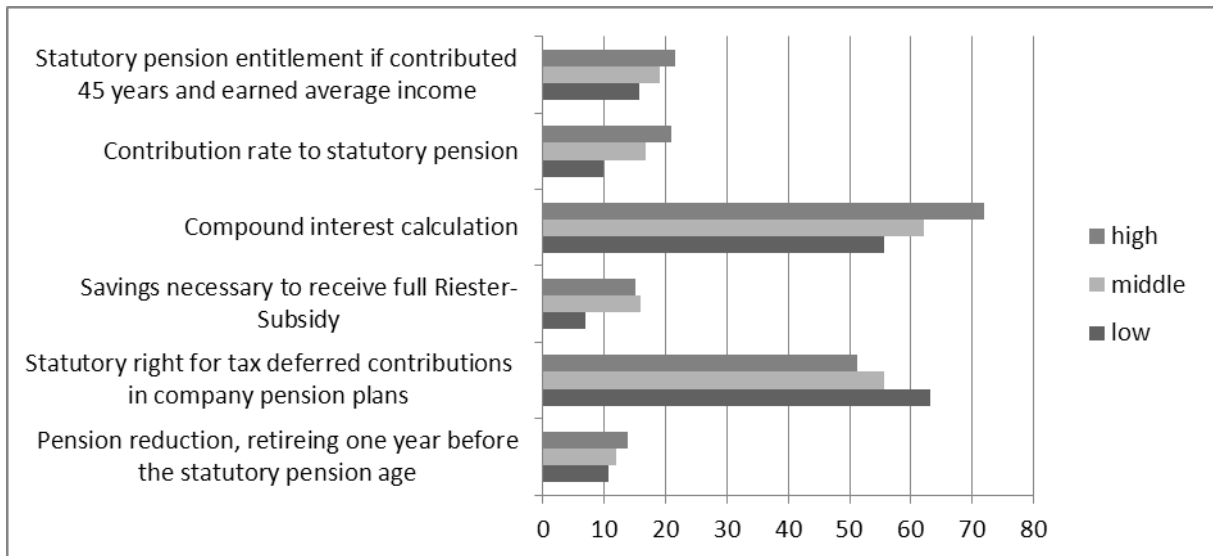


Source: FNA-Data, first telephone interview, weighted. Number of observations range from 951 to 1,010, depending on the question. Low education: no degree, Hauptschulabschluss or equal, middle: Realschulabschluss or equal, Abitur or equal.

According to the McNemar test statistic east-Germans are significantly better informed about the right to tax deferred contributions and are more often correct in their responses to the compound interest calculation task (Figure 23). They are also more knowledgeable about the pension entitlement of the representative individual and they are significantly better informed about the savings necessary to receive the "Riester-Subsidy". West-Germans on the contrary score better on the question about the contribution rate and pension reduction.

**Figure 23: Pension Knowledge by Region, in Percentage**
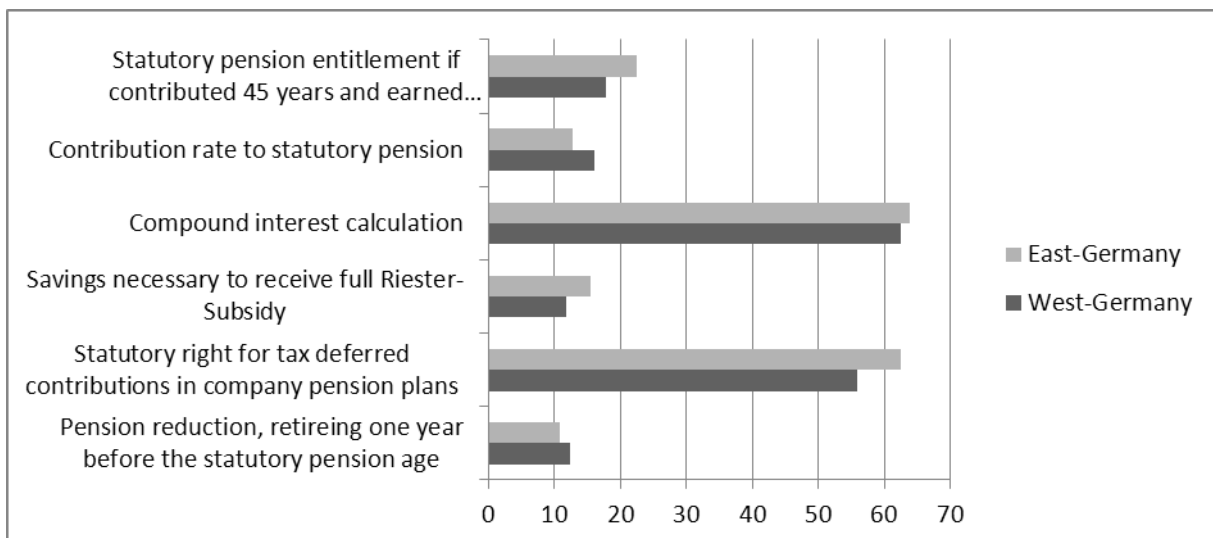


Source: FNA-Data, first telephone interview, weighted. Number of observations range from 951 to 1010, depending on the question.

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Even though all knowledge questions are very interesting, it might be worth looking at the question concerning pension entitlements in more detail first. There is the possibility that individuals who overestimate the statutory pension entitlement of a representative individual also overestimate their own pension entitlements. The result would be that they do not engage in sufficient retirement saving and therefore reach retirement with less wealth and retirement income than they expected.

The data reveals that 54% underestimate the pension entitlement of the representative individual, 28% overestimate it and the remaining 18% is about right. On average individuals living in the new federal states overestimate the pension entitlement by 320€ and individuals living in the old federal states overestimate by 380€. A multivariate logit estimation to find out which individual characteristics influence the likelihood of estimating the pension right or wrong has been conducted. There are two models for the likelihood of giving a correct estimation, two models for having overestimated the entitlement and two models for having underestimated the entitlement. The first model in each case uses the raw data, dropping all observations which have at least one missing value on one of the model variables. The other model uses the multiply imputed data. In each case the index for objective knowledge has been generated by adding the number of correct answers in all the knowledge questions, leaving out the question concerning the pension entitlement, which is the dependent variable.

Table 20 shows that over all models age has a significant effect. Age increases the likelihood of giving a correct answer but also the likelihood of overestimating the pension entitlement. Underestimating the pension level is less likely as individual's age. An explanation for this observation could be the same as the one stated in connection with the descriptive analysis. Which is that older individuals are more interested in their retirement income for the statutory pension system. Men are significantly more likely to know the pension entitlement and also more likely to underestimate the pension compared to women. This supports findings from other studies which find that men are more knowledgeable concerning financial matters (e.g. Rooij van et al. 2011a, Lusardi and Mitchell 2008). Education has also a significant influence in most models. With education, on the one hand, the probability of knowing the correct answer increases but, on the other hand, the probability of overestimating the pension entitlement also increases. Since research has shown that the better educated are more likely to plan for retirement and to accumulate wealth, one does not have to be concerned about this finding. It would have been more problematic if fewer educated people overestimated the pension, but instead they are more likely to underestimate the pension entitlement of the representative individual.

Neither subjective nor objective knowledge seem to have a significant influence. Only in the models based on the raw data does subjective knowledge decrease the probability of overestimating the pension and increases the probability of underestimating it. However, these results are not supported by the analysis with imputed data, which makes the results less robust compared to the results presented earlier.

**Table 20: Determinants of Estimating the Pension of a Representative Individual**

|  | (1) Correct imputed | (2) Overes-timation imputed | (3) Underes-timation imputed | (4) Correct | (5) Overes-timation | (6) Underes-timation |
|---|---|---|---|---|---|---|
| Male | 0.44** | 0.09 | 0.09 | 0.44** | 0.13 | -0.47** |
|  | (0.18) | (0.16) | (0.16) | (0.21) | (0.19) | (0.19) |
| Age | 0.02** | 0.03*** | 0.03*** | 0.02** | 0.03*** | -0.05*** |
|  | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married or living together | 0.22 | 0.06 | 0.06 | 0.35* | 0.00 | -0.23 |
|  | (0.17) | (0.15) | (0.15) | (0.21) | (0.19) | (0.18) |
| Education (low, middle, high) | 0.16 | 0.30*** | 0.30*** | 0.37** | 0.35*** | -0.57*** |
|  | (0.12) | (0.11) | (0.11) | (0.15) | (0.14) | (0.13) |
| Individual net income (low, middle, high) | 0.10 | 0.11 | 0.11 | 0.03 | 0.14 | -0.14 |
|  | (0.14) | (0.13) | (0.13) | (0.15) | (0.13) | (0.13) |
| Objective knowledge | 0.08 | 0.00 | 0.00 | 0.06 | -0.04 | 0.00 |
|  | (0.08) | (0.07) | (0.07) | (0.09) | (0.09) | (0.08) |
| Subjective knowledge | 0.00 | -0.07 | -0.07 | 0.02 | -0.17** | 0.14** |
|  | (0.07) | (0.06) | (0.06) | (0.08) | (0.07) | (0.07) |
| Blue- or white collar | -0.22 | -0.04 | -0.04 | -0.31 | 0.13 | 0.13 |
|  | (0.23) | (0.21) | (0.21) | (0.27) | (0.25) | (0.23) |
| Self-employed | -0.30 | 0.17 | 0.17 | -0.65* | 0.41 | 0.07 |
|  | (0.29) | (0.25) | (0.25) | (0.35) | (0.32) | (0.31) |
| Public servant | -0.44 | 0.16 | 0.16 | -0.46 | -0.04 | 0.38 |
|  | (0.41) | (0.35) | (0.35) | (0.46) | (0.42) | (0.41) |
| Living in East Germany | 0.03 | -0.02 | -0.02 | 0.25 | 0.02 | -0.12 |
|  | (0.22) | (0.20) | (0.20) | (0.25) | (0.24) | (0.23) |
| _cons | -2.90*** | -2.55*** | -2.55*** | -3.15*** | -2.33*** | 2.52*** |
|  | (0.53) | (0.48) | (0.48) | (0.64) | (0.57) | (0.54) |
| N | 990 | 993 | 990 | 668 | 671 | 668 |
| Prob>F | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Source: FNA-Data, first telephone interview, imputed data: coefficients are the mean of ten imputed datasets

Note: Logit Model. The first three models have been estimated with imputed data and the last three with the non-imputed raw data. According to a likelihood-ratio test, treating education as an interval variable does not lead to a loss of information. The LR-test compared a model with only education to a model that included education and all but two of the indicator (dummy) variables (Long and Freese 2006).

The dependent variables are the knowledge of financial matters, the statutory pension, company pension, capital life insurance and the "Riester-Pension". The "Basis-/Rürup-Pension" and the pension for public servants will not be investigated in more detail because this knowledge is not relevant for individuals subject to social insurance contributions. This group of people is most affected by the pension reforms and the following decline of the replacement rate of the statutory pension system. Individual responsibility concerning old-age provision is rising and therefore, the main interest in this work is to analyse the savings behavior of people who are subject to social insurance contributions. Since all the dependent variables can take on values between 1 and 7 and ordered logit model will be estimated. Explanatory variables for the analysis of subjective knowledge are the same as the ones employed in the analysis of objective knowledge in the previous chapter. The aim of this analysis is to grasp which individuals are most likely to rate their pension knowledge as good.

**Table 21: Determinants of Actual Pension Knowledge for six Knowledge Questions**

| | (1) Riester | (2) Interest | (3) Contribu-tion rate | (4) Pension reduct. | (5) Company Pension | (6) Statutory Pension |
|---|---|---|---|---|---|---|
| Male | 0.77*** | 0.66*** | 0.03 | 0.56*** | -0.07 | 0.47*** |
| | (0.23) | (0.16) | (0.19) | (0.21) | (0.14) | (0.17) |
| Age | -0.01 | -0.01** | 0.01 | 0.04*** | -0.02*** | 0.02** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married or | 0.15 | 0.18 | -0.20 | 0.02 | 0.10 | 0.22 |
| living together | (0.22) | (0.15) | (0.18) | (0.20) | (0.14) | (0.17) |
| Education | 0.29* | 0.29*** | 0.33** | -0.05 | -0.27*** | 0.17 |
| (low, middle, high) | (0.16) | (0.10) | (0.13) | (0.14) | (0.10) | (0.12) |
| Individual net income | -0.13 | 0.10 | 0.09 | 0.11 | -0.05 | 0.11 |
| (low, middle, high) | (0.18) | (0.15) | (0.14) | (0.17) | (0.11) | (0.14) |
| Subjective knowledge | 0.62*** | 0.09 | 0.33*** | 0.25*** | 0.11** | 0.02 |
| | (0.09) | (0.06) | (0.07) | (0.08) | (0.05) | (0.07) |
| Blue- or white collar | 1.03*** | -0.11 | 0.28 | 0.33 | -0.17 | -0.22 |
| | (0.37) | (0.21) | (0.26) | (0.31) | (0.19) | (0.23) |
| Self-employed | 0.80* | -0.18 | 0.32 | 0.31 | -0.09 | -0.29 |
| | (0.43) | (0.27) | (0.31) | (0.37) | (0.23) | (0.29) |
| Public servant | 0.59 | -0.55 | -0.21 | 0.86* | -0.32 | -0.46 |
| | (0.60) | (0.37) | (0.46) | (0.45) | (0.33) | (0.41) |
| Living in East | 0.36 | -0.24 | -0.15 | 0.06 | 0.12 | 0.03 |
| Germany | (0.27) | (0.18) | (0.24) | (0.25) | (0.18) | (0.22) |
| Cons | -5.80*** | 0.14 | -4.02*** | -5.45*** | 0.92** | -2.83*** |
| | (0.75) | (0.44) | (0.58) | (0.70) | (0.41) | (0.53) |
| $N$ | 948 | 1001 | 986 | 990 | 1007 | 990 |
| Prob>F | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 |

Source: FNA-Data, first telephone interview, imputed data, coefficients are the mean of ten imputed datasets

Note: Logit Model. According to a likelihood-ratio test, treating education as an interval variable does not lead to a loss of information. The LR-test compared a model with only education to a model that included education and all but two of the indicator (dummy) variables (Long and Freese 2006).

The next step is to expand the analysis to the other knowledge questions. From now on only the results based on imputed data will be shown and discussed. In Table 21 outcomes from logit regressions on the six objective pension knowledge questions are presented. Unlike the models in Table 20, this time the actual knowledge questions have not been included as explanatory variables this time. The analysis of the pension entitlement above has shown that actual knowledge was never significant.

Table 21 shows that male are significantly more likely to know the correct answers to the "Riester", the "Interest compounding", the "Pension reduction" and the "Statutory pension entitlement" Questions. This again supports findings from related research (e.g. Rooij van et al. 2011a; Lusardi and Mitchell 2008). Existing research has also proposed a positive relationship between education and financial knowledge (eg. Lusardi and Mitchell 2010, 2011, Monticone 2010, Rooij van et al. 2007). The analysis of this work also found that individuals' actual knowledge of the "Riester-Pension", interest compounding and the contribution rate, increased with education. Individuals with a low educational degree, however, were better informed about the statutory right for deferred contributions in the form of a company pension plan than high educated. An explanation for why lower educated people are better informed could be that they are more open to information from their employer or the trade union concerning the company pension plan. In this case they do not have to exert any effort to gather information themselves, instead the employer provides them with the relevant information. High educated may already provide for retirement privately and have turned for advice to the internet, journals, or advisors at banks or insurance companies.

Coppola and Gasche (2011) find that many individuals do not even know that they are eligible to join a "Riester-Pension" plan or that a certain amount of savings is necessary to receive the full "Riester-Subsidy". This lack of knowledge is especially high among those most in need, which are individuals with low income. The result of this research, however, does not find income to be a significant predictor of "Riester-Pension" knowledge. The reason could be that the questions about the "Riester-Pension" were different in both surveys. While the question in Coppola and Gasche (2011) was about the eligibility criteria and the subsidy, the question in the FNA-survey was about the percentage which has to be saved in order to receive the full "Riester-Subsidy".

Older individuals have a higher perceived and actual knowledge concerning the statutory pension and they also feel more confident in dealing with capital life insurance than younger respondents. The proximity to retirement could be a reason why they know more about the statutory pension. As retirement approaches, the perceived utility of an appropriate income increases which makes

an investments in future orientated capital more likely (Becker and Mulligan 1997). Furthermore, older individuals will be confronted with retirement issues more often. Friends may retire, the employer provides information about partial retirement and from the age of 54 the statutory pension insurance starts to send out pension information letters which contains much more information than the pension information an individual receives before this age (Drechsler 2006). As retirement approaches, the perceived utility of an appropriate income increases which makes an investment in future orientated capital more likely. From the age of 27 each individual receives brief pension information which also states how much pension an individual could expect if he retires at the statutory pension age. Drechsler (2006) found that 31% of the respondents of a survey conducted among individuals who received pension information found that the information is a very valuable source of information and 58% found that it is at least of some use. It is therefore likely that the pension information is not effective in encouraging individuals to think about retirement.

This finding has been previously discussed whereby the young are less likely to know how much pension an individual receives when old and also less likely to know by how much pension will be reduced for early retirement. At least the amount of pension to be expected is an important determinant of retirement income. Wrong information about the statutory pension system could therefore lead to suboptimal savings decisions. Older individuals also seem to be more familiar with the capital life insurance than younger respondents. The capital life insurance is a product which has been on the market for a long time and which has widely been used as an instrument to provide for retirement. Young individuals on the other hand are better informed about the "Riester-Penison" than old respondents. In contrary to the older generations, the young have grown up with the "Riester-Pension".

The probability of knowing the pension reduction when retiring one year early, and the pension of a representative individual, increases with age. This supports the descriptive findings which have already been discussed above. Being a blue- or white-collar worker or even being self-employed or a freelancer compared to someone who is unemployed or not employed, increases the knowledge about the "Riester-Subsidy". Financial resources of individuals who are not unemployed or receiving a need orientated basic income support are a restraint. Some may even have taken on a credit such that private retirement provision is a topic with a very low priority for these individuals. This lack of financial resources is likely to be the reason why the unemployed and not yet employed are significantly less knowledgeable than the occupational groups with which they were compared.

Individuals who rate their subjective pension knowledge as high do indeed know more about pensions than individuals who rate their subjective knowledge as lower. To be more exact, the knowledge of the "Riester-Subsidy", the contribution rate, the pension reduction and the right for deferred contribution in a company pension plan increases with higher assessments of subjective pension knowledge. The correlation coefficient of indexes for objective and subjective knowledge, which have been created in this work, is 0.23. Hung, Parker and Yoong (2009) reviewed literature measuring financial literacy and found that actual and perceived knowledge regularly correlate but the correlation is often moderate at best (0.10 to 0.78).

## 5.2 Subjective Knowledge

The FNA-Data contains several questions to assess subjective knowledge, the exact wording of the question can be found in Table 7. In this chapter the aim is to provide more information about how subjective knowledge concerning different areas of retirement provision is distributed among the respondents. For this reason a multivariate analysis will be conducted which is similar to the one which has been conducted for objective knowledge. The first item of the battery to be analysed is the "knowledge regarding financial matters" which is a measure of financial literacy in general. The other five questions are more concerned with old-age provision and therefore measure pension literacy.

**Figure 24: Subjective Knowledge by Type of Employment**
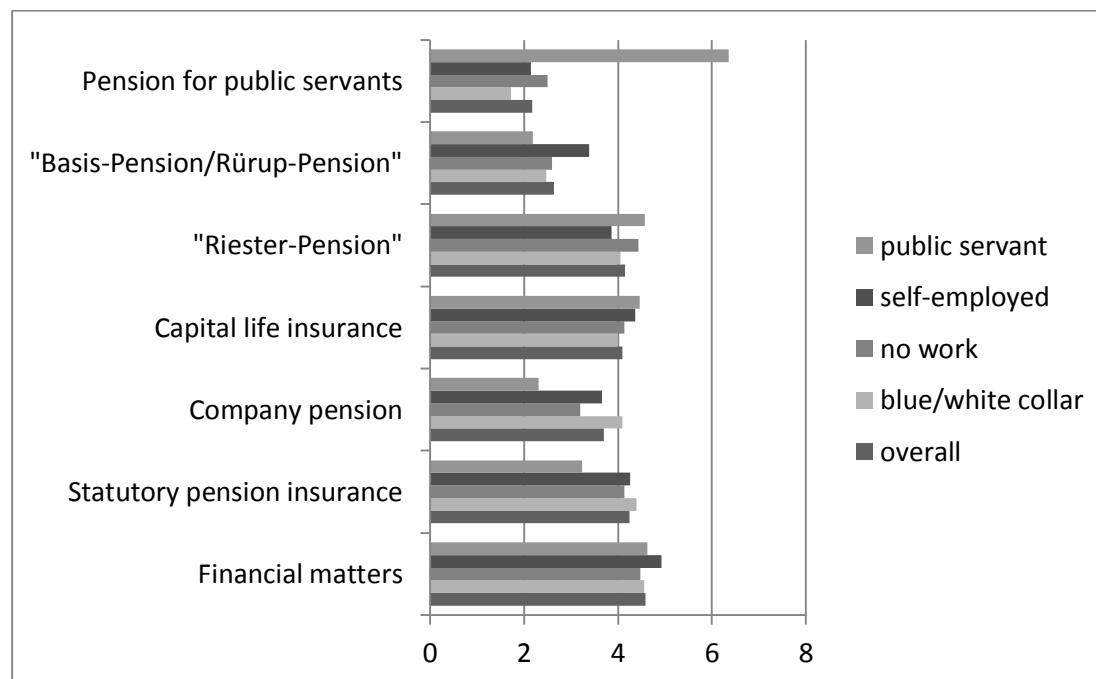


Source: FNA-Data, first telephone interview, weighted. The number of individuals who answered the item battery range from 981 to 1013, depending on the item. Don't know answers has been counted as (1) very low. Answers ranged from (1) very low knowledge regarding the product to (7) very good knowledge regarding the product.

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While the statutory pension insurance, company pension, capital life insurance and "Riester-Pension" all affect individuals subject to social insurance contribution, the "Basis-Pension/Rürup-Pension" is designed for private retirement provision for the self-employed and the Pension for public servants is paid as retirement income by the government to his public servants.

About 15% of the respondents are self-employed or freelancers, 4% are public servants, 25% are not employed or unemployed and the remaining individuals, 56% are blue or white collar worker who are subject to social insurance contributions. Analysing subjective knowledge differentiating between these groups reveals that public servants know significantly more about the Pension for public servants than the others do.[66] On the contrary public servants know significantly less about the statutory pension insurance and company pensions. This is to be expected since public servants are the only occupation group that receives retirement income from the pension for public servants.[67] They do not receive income from the statutory pension and it is also very unlikely that public servants own company pensions, consequently the knowledge of these kinds of retirement income is low as compared to the other employees. This picture is exactly the other way round for blue- and white-collar workers who know significantly more about company pension and statutory pension but less about the pension for public servants.

Looking at self-employed and freelancers, the test statistic reveals that they assess their knowledge concerning financial matters, capital life insurance and the "Basis-/Rürup-Rente" as significantly higher than the other respondents. This underlines the high responsibility with respect to retirement provision the government conferred to the self-employed. This responsibility forces the self-employed to engage in personal financial matters and to collect information on suitable vehicles for retirement provision. Individuals who are self-employed, freelancer, unemployed or not employed know significantly less about company pensions than the other respondents. The explanation for this finding would be that these individuals generally have no opportunity to save in the form of company pensions. Further determinants influencing subjective knowledge have been investigated in Table 22.

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[66] The test used to analyse if there is a significant difference between two groups, is the two-sample Wilcoxon rank-sum (Mann-Whitney) test.

[67] Each individual could, however, start working as public servant and then he would be entitled for the Pension for public servants.

**Table 22: Determinants of Subjective Knowledge (separate for each question)**

| | (1) Financial Matters | (2) Statutory Pension | (3) Company Pension | (4) Capital Life Ins. | (5) "Riester-Pension" |
|---|---|---|---|---|---|
| Male | 0.10 | -0.07 | 0.03 | 0.02 | -0.34** |
| | (0.10) | (0.11) | (0.14) | (0.14) | (0.14) |
| Age | 0.01 | 0.03*** | 0.01 | 0.01* | -0.04*** |
| | (0.00) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married or living | 0.16 | -0.19 | 0.18 | 0.09 | -0.09 |
| together | (0.10) | (0.12) | (0.15) | (0.14) | (0.14) |
| Number of children | -0.06 | 0.04 | -0.02 | 0.06 | 0.17*** |
| (max. 3 or more) | (0.04) | (0.05) | (0.06) | (0.06) | (0.06) |
| Education low | . | . | . | . | . |
| | . | . | . | . | . |
| Education middle | 0.22 | 0.34* | 0.05 | 0.43** | 0.27 |
| | (0.14) | (0.17) | (0.21) | (0.20) | (0.20) |
| Education high | -0.07 | -0.00 | -0.25 | 0.29 | 0.07 |
| | (0.14) | (0.17) | (0.20) | (0.20) | (0.20) |
| Individual net income | 0.33*** | 0.23*** | 0.56*** | 0.54*** | 0.22** |
| (low, middle, high) | (0.07) | (0.08) | (0.11) | (0.11) | (0.11) |
| Objective knowledge | 0.14*** | 0.18*** | 0.31*** | 0.14** | 0.32*** |
| | (0.04) | (0.05) | (0.06) | (0.06) | (0.06) |
| Unemployed | . | . | . | . | . |
| | . | . | . | . | . |
| Blue- or white collar | -0.14 | 0.11 | 0.51*** | -0.34* | -0.17 |
| | (0.12) | (0.15) | (0.18) | (0.18) | (0.18) |
| Self-employed | -0.07 | -0.26 | -0.59** | -0.20 | -0.35 |
| | (0.16) | (0.18) | (0.23) | (0.22) | (0.23) |
| Public servant | -0.45** | -1.46*** | -1.61*** | -0.54* | 0.09 |
| | (0.21) | (0.25) | (0.31) | (0.31) | (0.30) |
| Living in east Germany | 0.06 | 0.11 | -0.29* | -0.04 | 0.22 |
| | (0.12) | (0.14) | (0.17) | (0.17) | (0.17) |
| _cons | 3.77*** | 2.63*** | 2.20*** | 2.72*** | 4.87*** |
| | (0.25) | (0.30) | (0.37) | (0.36) | (0.36) |
| *N* | 1012 | 1012 | 1012 | 1012 | 1012 |
| Adjusted R^2 | 0.06 | 0.11 | 0.16 | 0.06 | 0.07 |

Source: FNA-Data, first telephone interview, imputed data, coefficients are the mean of ten imputed datasets

Note: OLS-Regression. Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The dependent variables can take on values between 1 "very low" and 7 "very high" and will be treated as continuous. There is no reason to believe that that a movement from 1 to 2 is different from a movement from 3 to 4. This reasoning is also confirmed by running an ordinal logit model which yields similar results (Appendix 9). According to a likelihood-ratio test, treating education as an interval variable would lead to a loss of information, therefore dummy variables for education have been used. The LR-test compared a model with only education to a model that included education and all but two of the indicator (dummy) variables (Long and Freese 2006).

The adjusted R^2 has been calculated via the user written command "mibeta" in STATA 12. "mibeta" calculates the adjusted R^2 as suggested by Harel (2009). The model has been estimated and the adjusted R^2 calculated in each of the imputed datasets. Then the square-root of each adjusted R^2 has been taken in order to transform it into a correlation (r). Then each of the r values has been transformed into a z value via Fisher's z transformation. Lastly, the average z across all imputations has been calculated and transformed back into an adjusted R^2.

The dependent variables are the knowledge of financial matters, the statutory pension, company pension, capital life insurance and the "Riester-Pension". The "Basis-/Rürup-Pension" and the pension for public servants will not be investigated in more detail because this knowledge is not relevant for individuals subject to social insurance contributions. This group of people is most affected by the pension reforms and the following decline of the replacement rate of the statutory pension system. Individual responsibility concerning old-age provision is rising and therefore, the main interest in this work is to analyse the savings behavior of people who are subject to social insurance contributions. Since all the dependent variables can take on values between 1 and 7 and ordered logit model will be estimated. Explanatory variables for the analysis of subjective knowledge are the same as the ones employed in the analysis of objective knowledge in the previous chapter. The aim of this analysis is to grasp which individuals are most likely to rate their pension knowledge as good.

Older individuals are significantly more likely to judge their knowledge of the statutory pension and the capital life insurance as very good, compared to their younger counterparts. They, however, judge their knowledge of the "Riester-Pension" worse than young individuals do. An explanation would be that the older an individual is, the nearer retirement, and the more likely it is that the individual is concerned with his retirement income. Therefore these individuals are better informed concerning the statutory pension which makes up the lion share of retirement income. The capital life insurance is a product which has been on the market for a long time, since many older people know this product or even use it as a savings vehicle. Younger individuals on the other hand are grown up with the "Riester-Pension". It could be that young individual's prefer to save in a "Riester-Pension" which could lead to a substitution of savings away from capital life insurances.

An interesting result is that men do not judge their knowledge significantly better than women. On the contrary, women are significantly more likely to judge their knowledge of the "Riester-Pension" as very good compared to men. One consideration would be that men are objectively more knowledgeable than women and by including objective knowledge in the analysis takes away the positive effect of being male. To trace this thought the same model had been estimated but by leaving out objective knowledge as the explanatory variable. In this case the p-value from being male changed from 0.005 to 0.076 but it is still significant and negative. Hence women are still more confident about their knowledge of the "Riester-Pension" than men. Another positive effect on the subjective knowledge of the "Riester-Pension" is the number of children. As the number of children increases so the likelihood of judging subjective knowledge as very good increases. These are two positive results since the "Riester-

Pension" is among others targeted at women and families with children. Nevertheless as an individual's income increases also the likelihood of having a good subjective Riester-Pension" knowledge increases. The "Riester-Pension" itself has, however, been designed especially for individuals with low incomes to the extent that these individuals are entitled to the full "Riester-Subsidy" if they contribute 60€ per year themselves.

A higher individual net income and a higher objective knowledge index are associated with a higher subjective knowledge over all questions.[68] Above income and objective knowledge, having a middle education compared to low education, increases the probability of judging the knowledge of capital life insurance and the statutory pension system as very good. The kind of occupation has also significant effects on judging own knowledge with respect to several areas. The reference group are individuals who are unemployed or not employed. Public servants declare that they know significantly less than this group with respect to financial matters, statutory pension and company pension. But they know more about capital life insurance. While the lack of knowledge about the statutory pension and company pension is understandable it is less clear why they rate their knowledge about financial matters worse than the reference group. It could be that public servants are more conservative, rely more on the state and have more trust in their pension, which makes them less likely to engage in financial transactions. Hence they feel less confident in dealing with financial matters. Against this reasoning is the fact that they feel more confident in dealing with capital life insurance than the reference group and the blue- or white collar workers. As expected, blue and white collar workers feel more confident about matters concerning company pensions than the other occupational groups.

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[68] The objective knowledge index represents the number of correct answers to the six objective knowledge questions (Chapter 4.2.1).

# 6 The Path towards Private Retirement Provision

In chapter 2.1 a decision model describing the path towards private retirement provision has been developed based on theoretical considerations. This model will be the background for the following empirical analysis (Figure 4). Dealing with financial matters is costly in terms of time and effort required to think about retirement, to collect information and to make a retirement plan. Perceived effort costs are especially high for individuals who dislike dealing with financial matters. External factors like too much information or too many products could also increase effort costs. Everything that helps individuals to imagine the future, like reports in the media or retirement seminars, decreases effort costs. Some individuals may also have a high preference for the present and do not care about the future. If these individuals do not realize that they excessively discount the future, they are likely to find themselves at retirement age having an insufficient retirement income. Such individuals who do not realize that they have present biased preferences have a self-control problem and continuously procrastinate retirement savings decisions (O'Donoghue and Rabin 1998).

At each point in the path towards retirement individuals have to overcome their potential self-control problems (Laibson et al. 1998, Thaler 1994, Thaler and Shefrin 1981). Many individuals may not be able to follow through and leave the path towards private retirement provision before actual saving starts. In this analysis each step towards private retirement provision will be analysed in order to find out, which factors there are, preventing individuals saving for retirement.

## 6.1 Thinking about an appropriate retirement income

Taking time to think about old-age provision and the desired life during retirement is the first step towards private retirement provision (Figure 4). Somewhere between the first and the second step, the respondent has to think about his/her desired retirement income. This is an activity which requires some effort which many individuals are not willing to make. About 38% of the respondents completing the first telephone interview had not yet thought about the income they would need to live an adequate life during retirement.

Starting to think about retirement is for many individuals the first obstacle to private retirement savings. As discussed in connection with the theoretical model "Towards Private Retirement Provision" at the end of chapter 2.1, thinking about retirement is costly, especially in terms of time since time is a scarce resource for many individuals. If individuals dislike dealing with financial matters or old-age in general, the effort costs are especially high.

**Table 23: Thinking about Retirement Income (Question)**

| 1 | Have you ever thought about how much money you would need to live an adequate life during retirement? |
|---|---|
|   | (yes) (no) (refuse) |

The question of interest would then be: who has thought about retirement and who did not. The dependent variable is therefore the one depicted in Table 23 and the explanatory variables are the ones already described in the previous chapter. This first step, thinking about an appropriate retirement income, is the first analysis on the path towards private retirement provision. Within this analysis the estimation results of the imputed data and the original data will be contrasted with each other to show how imputation may effect coefficients and hence significance levels. All of the following analysis will generally be based only on the imputed data.

Table 24 presents eight models which have been estimated. The data underlying model 6.1(1) to 6.1(4) is the original data and for model 6.1(5) to 6.1(8) the imputed data has been used for the estimations. All models have been estimated via the instrumental variable approach and conventional as a probit regression model. A further variation between the models is that half of the models have been estimated without the interaction terms and the other models consider the interaction terms.[69]

The first thing evident in Table 24 is that the standard errors for pension knowledge and being overconfident about that knowledge increases considerably from 0.05 to 0.49 and 0.11 to 0.44 respectively, when IV estimation has been conducted (model 6.1(5) compared to model 6.1(6)). This implies a huge efficiency loss compared to the ordinary probit estimation.

The Wald test for exogeneity, testing $H_0: \rho = 0$, implying that $u$ and $v$ are not correlated, results in p-values above 0.7 for all models estimated by IV, so that $H_0$ is not rejected at conventional levels.

$$y_{1i}^* = \beta y_{2i} + x_{1i}'\gamma + u_i \tag{5}$$

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[69] The interactions terms are the interaction between future orientation and procrastination and the interaction between future orientation and pension knowledge. Both of these interactions have been included in order to test the hypotheses outlined in chapter 4.3.

**Table 24: Determinants of Having Thought About an Appropriate Retirement Income**

| | 6.1(1) Probit | 6.1(2) IV-Prob | 6.1(3) Probit int. | 6.1(4) IV-Prob int. | 6.1(5) Imput-ed Probit | 6.1(6) Imput-ed IV-Prob | 6.1(7) Imput-ed Probit int. | 6.1(8) Imput-ed IV-Prob int |
|---|---|---|---|---|---|---|---|---|
| Male | -0.11 | -0.16 | -0.11 | -0.15 | -0.04 | -0.09 | -0.04 | -0.09 |
| | (0.14) | (0.26) | (0.15) | (0.26) | (0.10) | (0.16) | (0.10) | (0.16) |
| Age | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.00) | (0.01) | (0.00) | (0.01) |
| Married/Cohabiting | -0.03 | -0.02 | -0.03 | -0.02 | -0.13 | -0.14 | -0.14 | -0.14 |
| | (0.16) | (0.16) | (0.16) | (0.16) | (0.11) | (0.11) | (0.11) | (0.11) |
| Children | -0.04 | -0.03 | -0.04 | -0.03 | 0.03 | 0.04 | 0.03 | 0.04 |
| (0 no – 4 four or more kids) | (0.07) | (0.07) | (0.07) | (0.07) | (0.05) | (0.05) | (0.05) | (0.05) |
| Middle Education[a] | -0.35 | -0.40 | -0.34 | -0.38 | -0.11 | -0.14 | -0.11 | -0.14 |
| | (0.22) | (0.25) | (0.22) | (0.25) | (0.15) | (0.16) | (0.15) | (0.16) |
| High Education[a] | -0.17 | -0.20 | -0.17 | -0.19 | 0.11 | 0.09 | 0.11 | 0.08 |
| | (0.22) | (0.29) | (0.22) | (0.29) | (0.15) | (0.16) | (0.15) | (0.16) |
| Middle Individual net Income[b] | 0.39** | 0.40** | 0.39** | 0.41** | 0.36*** | 0.34** | 0.37*** | 0.35** |
| | (0.17) | (0.18) | (0.17) | (0.18) | (0.13) | (0.14) | (0.13) | (0.14) |
| High Individual net Income[b] | 0.47** | 0.49** | 0.48** | 0.50** | 0.22 | 0.18 | 0.22 | 0.19 |
| | (0.20) | (0.22) | (0.20) | (0.23) | (0.15) | (0.17) | (0.15) | (0.17) |
| Middle Wealth[c] | 0.15 | 0.13 | 0.14 | 0.13 | 0.17 | 0.12 | 0.16 | 0.12 |
| | (0.17) | (0.25) | (0.17) | (0.26) | (0.14) | (0.18) | (0.14) | (0.18) |
| High Wealth[c] | -0.03 | -0.05 | -0.03 | -0.06 | 0.05 | -0.00 | 0.05 | -0.01 |
| | (0.17) | (0.27) | (0.17) | (0.29) | (0.13) | (0.19) | (0.13) | (0.19) |
| Blue- or White Collar Worker[d] | -0.10 | -0.14 | -0.10 | -0.14 | 0.06 | 0.05 | 0.06 | 0.05 |
| | (0.18) | (0.23) | (0.18) | (0.24) | (0.12) | (0.13) | (0.12) | (0.13) |
| Self-employed[d] | -0.02 | -0.05 | -0.02 | -0.07 | 0.28* | 0.29* | 0.28* | 0.29* |
| | (0.24) | (0.24) | (0.24) | (0.24) | (0.16) | (0.16) | (0.16) | (0.16) |
| Civil Servant[d] | -0.39 | -0.37 | -0.40 | -0.39 | -0.35* | -0.27 | -0.35* | -0.27 |
| | (0.31) | (0.39) | (0.31) | (0.39) | (0.21) | (0.28) | (0.21) | (0.28) |
| Actual Pension Knowledge | 0.23*** | 0.37 | 0.23*** | 0.36 | 0.21*** | 0.39 | 0.22*** | 0.39 |
| (0 = zero – 6 = six question correct) | (0.08) | (0.82) | (0.08) | (0.87) | (0.05) | (0.42) | (0.05) | (0.42) |
| Future Orientation | 0.30*** | 0.28** | 0.15 | 0.00 | 0.16*** | 0.15** | 0.02 | -0.01 |
| (factor1, Table 5) | (0.08) | (0.13) | (0.28) | (0.37) | (0.06) | (0.07) | (0.18) | (0.19) |
| **Procrastinate on Financial Matters** | 0.08 | 0.06 | 0.09 | 0.06 | 0.07 | 0.06 | 0.07* | 0.06 |
| (1 agree – 4 not agree) | (0.07) | (0.07) | (0.07) | (0.07) | (0.04) | (0.06) | (0.04) | (0.06) |
| Underestimate Knowledge[e] | -0.13 | -0.25 | -0.12 | -0.23 | -0.15 | -0.29 | -0.13 | -0.27 |
| | (0.17) | (0.64) | (0.17) | (0.65) | (0.13) | (0.35) | (0.13) | (0.35) |
| Overestimate Knowledge[e] | 0.46*** | 0.60 | 0.46*** | 0.60 | 0.34*** | 0.49 | 0.35*** | 0.51 |
| | (0.16) | (0.75) | (0.17) | (0.83) | (0.11) | (0.37) | (0.11) | (0.37) |
| Procrastinate*Future Orient. | | | 0.04 | 0.06 | | | 0.03 | 0.03 |
| (interaction term) | | | (0.08) | (0.08) | | | (0.05) | (0.05) |
| A.P.Knowledge*Future Orie. | | | 0.02 | 0.05 | | | 0.04 | 0.04 |
| (interaction term) | | | (0.07) | (0.11) | | | (0.05) | (0.05) |
| Constant | -1.06** | -1.17 | -1.08** | -1.21 | -1.53*** | -1.74*** | -1.54*** | -1.76*** |
| | (0.42) | (1.17) | (0.42) | (1.29) | (0.30) | (0.55) | (0.30) | (0.56) |
| Wald test[f] | | -0.12 | | -0.11 | | -0.16 | | -0.17 |
| | | (0.72) | | (0.76) | | (0.40) | | (0.40) |
| N | 512.00 | 512.00 | 512.00 | 512.00 | 984 | 984 | 984 | 984 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. )Wald test of exogeneity, testing the null hypothesis $H_0: \rho = 0$.

$$y_{2i} = x'_{1i}\pi_1 + x'_{2i}\pi_2 + v_i \qquad\qquad (6)^{70}$$

In this specific case, where the aim is to measure the influence of pension knowledge on thinking about an appropriate retirement income, endogeneity might not be a huge problem and probit estimation results should not be differ much compared to IV estimation results.

A test for the strength of the instruments has been conducted. Regressing the endogenous variable "pension knowledge" on all exogenous variables from model 6.1(6) and the instruments (first stage regression Table 25) reveals that the variable measuring the problems Germans might have had by the change of their currency from the "Deutsche Mark" to the "Euro" is not significant. The variable measuring the extent of economics education at school, however, is significant at the 1% level. One of the chosen instruments can be classified as a weak instrument for "pension knowledge". Instead of using both instruments to estimate the probability of thinking about an appropriate retirement income (over-identified model), model 6.1(5) has also been estimated with "economics education at school" as sole instrument (just identified model). Comparing both models does not show any differences in coefficients or standard errors.[71]

In each of the following chapters analysing a specific step on the way towards private retirement savings, the first results which will be outlined, are those concerning the variables which make it possible to test the first three hypotheses. The fourth hypothesis will be tested later in chapter 6.6. In a simplified way, hypothesis one states that individuals who have a sound pension knowledge are more likely to think about an appropriate retirement income than individuals with a lack of pension knowledge. In order to prove this hypothesis, the variable approximating actual pension knowledge needs to be significant and positive. The results in Table 24 indicate that the coefficient of actual pension knowledge is positive but the significance of this variable disappears as soon as potential endogeneity of actual pension knowledge is controlled for via IV-estimation. Hence there is, if at all, only weak evidence supporting hypothesis 1.

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[70] Here $i = 1, \dots, N$, $y_{2i}$ is a *1xp* vector endogenous variables $x_{1i}$, is a $1 \times k_1$ vector of exogneous variables and the instrument variables are presented by a $1 \times k_2$ vector, $x_{2i}$. It will be assumed that $(u_i, v_i) \sim N(0, \Sigma)$, where $\sigma_{11}$ is normalized to one to identify the model. The parameters of the structural are the vectors $\beta$ and $\gamma$, and the matrices of the reduced-form parameters are $\pi_1$ and $\pi_2$. $y_{1i}^*$ cannot be observed instead the following can be observed:

$y_{1i} = 0 \; if \; y_{1i}^* < 0 \;$ and $\; y_{1i} = 1 \; if \; y_{1i}^* \geq 0 \qquad (10)$

It is required that $k_2 \geq p$ because of the order conditions for identification of the structural parameters. If $\Sigma$ is not a block diagonal between $u_i$ and $v_i$, $y_{2i}$ would be endogenous (StataCorp LP 2013).

[71] Regression results see Appendix 9.4, Table 50.

**Table 25: First Stage Regression for Model 6.1(6)**

| First stage regression    Model 6.1(6) | Pension Knowledge |
|---|---|
| Male | 0.27*** |
| | (0.07) |
| Age | 0.00 |
| | (0.00) |
| Married/Cohabiting | 0.03 |
| | (0.07) |
| Children | -0.05 |
| (0 no – 4 four or more kids) | (0.03) |
| Middle Education[a] | 0.15 |
| | (0.11) |
| High Education[a] | 0.16 |
| | (0.11) |
| Middle Individual net Income[b] | 0.06 |
| | (0.09) |
| High Individual net Income[b] | 0.15* |
| | (0.09) |
| Middle Wealth[c] | 0.22*** |
| | (0.08) |
| High Wealth[c] | 0.29*** |
| | (0.09) |
| Blue- or White Collar Worker[d] | 0.09 |
| | (0.08) |
| Self-employed[d] | -0.05 |
| | (0.10) |
| Civil Servant[d] | -0.35** |
| | (0.15) |
| Future Orientation | 0.06 |
| (factor1, Table 5) | (0.04) |
| **Procrastinate on Financial Matters** | 0.20*** |
| (1 agree – 4 not agree) | (0.04) |
| Underestimate Knowledge[e] | 0.81*** |
| | (0.08) |
| Overestimate Knowledge[e] | -0.90*** |
| | (0.07) |
| Econ. Education at School | 0.07*** |
| (0=no – 4 a lot of) | (0.02) |
| Euro Conversion | -0.00 |
| (1=difficult – 4 not difficult) | (0.04) |
| Constant | 1.40*** |
| | (0.24) |
| N | 984.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

Hypothesis 2 states that an additional amount of future orientated capital (actual pension knowledge) affects individuals with different rates of future orientation differently. More specifically, if an individual with a high initial preference for the present acquires an additional amount of pension knowledge, than this additional pension knowledge increases his/her probability of thinking about an appropriate retirement income by a greater amount that it would increase the probability for someone who is already highly future orientated. In order to verify this hypothesis, the variables approximating future orientation, actual pension knowledge and the interaction term between these variables should be significant and the predicted probabilities should resemble Figure 13 from chapter 4.3. As can be seen in model 6.1(8), none of these variables is significant. Hence hypothesis 2 cannot be verified.

Hypothesis 3 is split into a strict and a relaxed version. The strict version implies that present biased preferences do not necessarily result in procrastination of thinking about an appropriate retirement income. If individuals are aware about their tendency to procrastinate, they can take measures to overcome procrastination. As a result these individuals may not be less likely to think about an appropriate retirement income than individuals who are future orientated. Empirically this would mean that the coefficients of future orientation, procrastination and the interaction of those variables should be significant and the predicted probabilities should look like the ones in Figure 16 from chapter 4.3. The relaxed version of the hypothesis would only require the variable approximating if someone is aware of his/her potential procrastination behavior to be negative and significant. Having a look at model 6.1(8) none of these variables significantly influences the probability to think about an appropriate retirement income. Hence hypothesis 3 cannot be verified.

The interaction terms are neither on their own nor jointly significant. When compared to the model without interaction terms, they, nevertheless, often change the size and significance of the coefficients from which they are constructed considerably. In order to avoid this distortion, the following results are taken from IV-estimation in model 6.1(6) which does not consider the interaction terms.

The variable which now becomes significant is future orientation. The positive and significant sign implies that future orientated individuals are more likely to think about an appropriate retirement income than individuals who are present orientated. In the Appendix a model variation has been estimated, replacing the variable which measures if someone procrastinates on financial matters with a factor variable consisting of several variables which are thought to influence procrastination behavior (Appendix 9.4, Table 48). The factor variable is signifi-

cant and positive in all probit models but not in the IV estimations. Hence there is weak evidence that individuals who do not procrastinate are more likely to think about an appropriate retirement income. Variables which are part of the factor variable are: not procrastinating on financial matters, having sufficient time to deal with financial matters and if the individual likes dealing with financial matters. Investigating these variables further by including each of them separately into the estimation model, it turns out that the variable with the greatest predictive power is if the individual likes dealing with financial matters.[72]

The probability of thinking about the required retirement income to live an adequate life during retirement also increases with age. This result is as expected since retirement inevitably approaches as one gets older. As the day of retirement comes closer it becomes easier to imagine future retirement life. Friends or relatives file private pension savings contracts, become homeowner or partially or fully retire. Talking about retirement with friends and relatives may become more important than it was before. Another significant predictor of thinking about retirement over all model specifications is income. Individuals with a low income are less likely to think about retirement income than individuals with a medium income. Earning a high income significantly increases the probability of thinking about retirement income in the models based on the original data but not in the models with imputed data. Self-employed individuals are significantly more likely to have thought about an appropriate retirement income than not employed individuals in all models based on the imputed data.

In the case that endogeneity of pension knowledge has been controlled for via instrumental variables, the significance of the variable indicating if someone overestimates his/her pension level disappears. This is a similar result to the one with the variable approximating actual pension knowledge, which has already been noted before. Since sometimes the significance of the coefficients varies between probit and IV estimation, even though the results should be similar because of the not rejected exogeneity test another attempt will be made in order to account for the potential endogeneity of actual pension knowledge. For that reason a robustness check will be conducted examining how the significance of the coefficients may change when a variable measuring the experience with financial products will be included as explanatory variable. In the absence of appropriate instruments this method has been chosen by Leinert (2005) in order to encounter endogeneity.

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[72] Estimation results can be found in the Appendix 9.4. Table 48.

**Table 26: Probit Estimation Controlling for Experience (Thinking About Retirement Income)**

|  | 6.1(9) Probit | 6.1(10) Probit | 6.1(11) Imputed Probit | 6.1(12) Imputed Probit |
|---|---|---|---|---|
| Male | -0.11 | -0.10 | -0.04 | -0.04 |
|  | (0.14) | (0.15) | (0.10) | (0.10) |
| Age | 0.02*** | 0.02*** | 0.02*** | 0.02*** |
|  | (0.01) | (0.01) | (0.00) | (0.00) |
| Married/Cohabiting | -0.04 | -0.06 | -0.14 | -0.16 |
|  | (0.16) | (0.16) | (0.11) | (0.11) |
| Children | -0.03 | -0.03 | 0.04 | 0.04 |
| (0 no – 4 four or more kids) | (0.07) | (0.07) | (0.05) | (0.05) |
| Middle Education[a] | -0.34 | -0.34 | -0.11 | -0.12 |
|  | (0.22) | (0.22) | (0.15) | (0.15) |
| High Education[a] | -0.13 | -0.13 | 0.14 | 0.13 |
|  | (0.22) | (0.22) | (0.15) | (0.15) |
| Middle Individual net Income[b] | 0.38** | 0.35** | 0.36** | 0.32** |
|  | (0.17) | (0.17) | (0.14) | (0.14) |
| High Individual net Income[b] | 0.46** | 0.42** | 0.21 | 0.16 |
|  | (0.20) | (0.21) | (0.15) | (0.15) |
| Middle Wealth[c] | 0.13 | 0.08 | 0.14 | 0.09 |
|  | (0.17) | (0.18) | (0.13) | (0.14) |
| High Wealth[c] | -0.04 | -0.11 | 0.03 | -0.05 |
|  | (0.17) | (0.18) | (0.13) | (0.14) |
| Blue- or White Collar Worker[d] | -0.08 | -0.10 | 0.05 | 0.03 |
|  | (0.19) | (0.19) | (0.13) | (0.13) |
| Self-employed[d] | -0.00 | -0.05 | 0.27* | 0.23 |
|  | (0.24) | (0.24) | (0.16) | (0.16) |
| Civil Servant[d] | -0.39 | -0.40 | -0.33 | -0.35* |
|  | (0.31) | (0.31) | (0.21) | (0.21) |
| Actual Pension Knowledge | 0.21*** | 0.20*** | 0.20*** | 0.19*** |
| (0 = zero – 6 = six question correct) | (0.08) | (0.08) | (0.05) | (0.05) |
| Future Orientation | 0.30*** | 0.28*** | 0.16*** | 0.15*** |
| (factor1, Table 5) | (0.08) | (0.08) | (0.06) | (0.06) |
| **Procrastinate on Financial Matters** | 0.20** | 0.19** | 0.18*** | 0.17*** |
| (1 agree – 4 not agree) | (0.09) | (0.09) | (0.06) | (0.06) |
| Underestimate Knowledge[e] | -0.11 | -0.09 | -0.14 | -0.12 |
|  | (0.17) | (0.17) | (0.12) | (0.12) |
| Overestimate Knowledge[e] | 0.45*** | 0.43*** | 0.32*** | 0.30*** |
|  | (0.17) | (0.17) | (0.12) | (0.12) |
| Experience Fin. Matters |  | 0.03 |  | 0.04* |
| (no. of different assets) |  | (0.03) |  | (0.02) |
| _cons | -0.82** | -0.92** | -1.26*** | -1.39*** |
|  | (0.39) | (0.40) | (0.28) | (0.29) |
| N | 512.00 | 512.00 | 984.00 | 984.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

The variable measuring experience with financial products has been created by summing up the number of different assets an individual holds. This would mean that only someone who owns a checking account is coded as one and someone else, who for example holds a checking account, a "Riester-Pension" and stocks, is coded as three.

For that reason a robustness check will be conducted examining how the significance of the coefficients may change when a variable measuring the experience with financial products will be included as explanatory variable. In the absence of appropriate instruments this method has been chosen by Leinert (2005) in order to encounter endogeneity. The variable measuring experience with financial products has been created by summing up the number of different assets an individual holds. This would mean that only someone who owns a checking account is coded as one and someone else, who for example holds a checking account, a "Riester-Pension" and stocks, is coded as three.

The results of these estimations are shown in Table 26. Even though the variable approximating experience with financial products has been added to the model, pension knowledge remains a positive and significant predictor. In the model with imputed data, experience with financial products has a positive and significant influence on the probability of thinking about an appropriate retirement income above and beyond the effect of pension literacy.

### 6.1.1 Discussion

Lusardi and Mitchel (2007c) investigated the effect of financial literacy on a variable measuring if someone is a planner. The underlying question in Lusardi and Mitchel (2007c) survey is: "Did you try to figure out how much to save for retirement". This question had been interpreted so that individuals who agreed to this question were seen as being planners. They found that the financial literacy index which has been derived after principal component analysis positively influenced the probability to plan. Lusardi and Mitchel (2011) also affirm these results. They found that the knowledge of risk diversification concerning stock risk increased the likelihood of developing a plan.

The question investigarted by Lusardi and Mitchel (2007c) is similar to the one examined in this chapter. Here it was found that pension literacy though a positive coefficient can be observed, ceases to be significant as soon as one controls for the potential endogeneity of pension knowledge. It has to be noted that the definition of planning can vary and depends on the underlying question. In the FNA-Data also a question about planning had been asked but this question does not asked individuals if they have planned for retirement, rather it asked, if individuals plan concrete changes in retirement behavior. The results retrieved from analysing this question can therefore not be compared to the results discussed

here. The individual characteristics which influence whether someone plans concrete changes in retirement savings behavior will be analyzed in the next chapter (6.2).

Individuals are also more likely to think about retirement income when they like to deal with financial matters compared to individuals who do not like dealing with financial matters.[73] For individuals who like dealing with financial matters, the psychological costs of thinking about and appropriate retirement income are lower than for individuals who do not like to deal with financial matters (Leinert 2005). This makes individuals less likely to procrastinate. Self-employed have always been solely responsible to provide for their retirement while the responsibility for, for example, blue and white collar workers started as recently as 2001 when the "Riester" pension reform was coming into effect. This responsibility is also reflected in the estimation results which suggests that self-employed are significantly more likely to think about an appropriate retirement income than not employed individuals.

The estimations have also shown that dealing with desired retirement income is among others a matter of age. As individuals get older, they are more likely to deal with this problem. This finding is consistent with theoretical findings. As retirement approaches individuals are confronted with a lot of information provided by the statutory pension insurance, the employer or just retired friends. This information directly increases future orientated capital, which in turn reduces the discount rate (Becker and Mulligan 1997). Furthermore, the proximity of retirement is likely to increase the perceived utility of retirement income, which makes it more likely that individuals invest resources on thinking about an appropriate retirement income. A discussion about why older individuals are better informed about issues concerning the statutory pension can be found in chapter 5.1, where financial and pension knowledge have been investigated.

According to the theory of Becker and Mulligan (1997) investment in future orientated capital and henceforth future orientation increases as future utility increases. On the one hand individuals with medium and high incomes can invest more for retirement than individuals with a low income and they are likely to invest in more complex products which taken together might lead to a greater return on investment than saving in a savings account. It might be rational if individuals, who do not have much money left to save, do not invest time learning about complex and potentially risky savings products. On the other hand,

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[73] The variable measuring if someone likes dealing with financial matters had been added to the model in the Appendix 9.4, Table 48. This variable is positive significant at the one per cent level in the probit estimation but not in the IV estimation.

the costs of investment in future orientated capital also increases with income. The higher the hourly income the higher the opportunity costs of thinking about how much retirement income is needed to live an adequate life during retirement.

The empirical results have shown that for individuals with medium income compared to low income, thinking about retirement needs is still costly in terms of effort and time to be invested, but the utility gained from investing the money wisely outweighs the cost. For individuals with a high income, on the other hand, the potential utility gained form an investment in thinking about an appropriate retirement income does not outweigh the cost. Besides the high opportunity costs it could also be that the additional future utility gained for this investment is low due to the assumption of a diminishing marginal utility of consumption. High income earners may prefer to hire a professional financial planner and/or already save sufficient money in stocks, housing equity or other types of investment such that additional savings are not necessary. Furthermore, they will receive a higher pension from the statutory pension insurance because pensions among others depend on life-time earnings up to a ceiling.

There is also an argument for why individuals with low income are significantly less likely to think about an appropriate retirement income than medium income earners. Individuals with a low income often also expect a low statutory pension entitlement hence they regard retirement with a much more negative feeling than someone with a high income. Henceforth, thinking about future retirement income for individuals with high income is more pleasant than for individuals with a low income. Reports in the media that private pensions like the "Riester-Pension" will be offset by the need-orientated basic income support, additionally reduces the utility from retirement savings for this group of people (Welt Online 2008).[74]

## 6.2 Planning Concrete Changes in Retirement Savings Behavior

Planning concrete changes in retirement savings behavior are especially important if someone thinks that present saving efforts will not be sufficient to live an adequate life during retirement. Of course individuals, who are already saving enough, to the extent that sufficient wealth would be accumulated before reaching retirement, could also plan concrete changes in retirement saving behavior. New information concerning profitable investments or new retirement

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[74] Individuals who are not able to acquire sufficient pension claims from the statutory pension insurance, such that their pension would be below a certain threshold, receive the need-orientated basic income support.

savings rules passed by the government may lead to individuals shifting wealth from one savings vehicle to another in order to maximize returns on investment. It is important to note, that the resulting variable does not measure if someone is a planner or not but only if someone plans any changes at the time the telephone interview took place.

The FNA-Data offers three variables related to this context which are depicted in Table 27. Question 3 has been directly asked after question 2 and question 1 has been asked several questions before the other two. From question 1 a dummy variable has been generated, being 1 if someone should provide more for retirement and zero otherwise. Comparing this variable with the answers to question 2 which also asks if someone should save more, shows that 72% of the respondents' answers are consistent which means that they state they should provide/save more for retirement in both questions. From the remaining respondents, 18% say that actual savings are not sufficient for an adequate life during retirement (question 2) but at the same time they think that they should not save more for retirement (question 1). The remaining 10% say that they should save more (question 1), contradicting their statement that actual savings are sufficient (question 2).

**Table 27: Questions - Saving Sufficient and Planning for Retirement**

| 1 | Actually I should provide more for retirement than I do at present. |
|---|---|
| | (totally agree) (agree) (not agree) (absolutely not agree) (refused) |
| 2 | What do you think, will the amount you save to date, plus retirement income from other sources, like for example the statutory pension, suffice for an adequate life during retirement? |
| | (yes) (no, I should save more) (don't know) (refuse) |
| 3 | Do you plan (further) concrete measures to provide for old-age? |
| | (yes) (no) (refuse) |

This comparison shows that several respondents interpreted these two similar questions differently. From 887 respondents who answered both questions, 375 said that their savings to date would not be sufficient for an adequate life during retirement in question 2, but only 303 respondents thought that they should save more for retirement according to question 1. Question 2 in contrast asks more specifically if retirement savings plus income from other sources would suffice for an adequate retirement life. It might be that the surrounding context of Question 2 made the respondents think more thoroughly about their actual retirement savings and as a result they realized that their current savings would not be sufficient if they did not change their savings behavior. Questions direct-

ly preceding question 2 asked for the savings vehicles an individual owns and for the amount of money put aside each month for retirement provision. The conclusion would be that some individuals are at first glance optimistic concerning their retirement income, but when they are forced to think more precisely about their retirement savings they realize that their current savings would not suffice. The conclusion to this discussion is that question 2 is more accurate and therefore more reliable than question 1. Hence question 2 will be the variable of choice in successive analyses.

The next step is to investigate if individuals who say that they should save more also plan concrete (further) measures concerning their old-age provision. In question 2 about 42% (N=899) said that their retirement savings they regularly put aside would not suffice to live an adequate retirement life. From these individuals only 30% plan concrete changes in their retirement savings behavior, even though question 2 was directly followed by question 3 (Table 28). For question 1 the picture is similar although there were several questions in between question 1 and question 3. "I should save more" was stated by 36% (N=996) of the respondents but only 29% of these individuals plan to change their retirement savings behavior.

**Table 28: Cross Tabulation - Saving Sufficiency and Planning for Retirement**

| Q3: does plan | Q2: savings suffice | | | Q3: does plan | Q1: should save more | | |
|---|---|---|---|---|---|---|---|
| | No | Yes | Total | | No | Yes | Total |
| No | 266 | 446 | 712 | No | 532 | 247 | 779 |
| | 70.18 | 86.77 | 79.73 | | 84.04 | 70.11 | 79.33 |
| Yes | 113 | 68 | 181 | Yes | 101 | 102 | 203 |
| | 29.82 | 13.23 | 20.27 | | 15.96 | 29.23 | 20.67 |
| Total | 379 | 514 | 893 | Total | 633 | 349 | 982 |
| | 100 | 100 | 100 | | 100 | 100 | 100 |

Table 28 also shows that several respondents who think that they already save sufficient still plan concrete measures concerning their retirement savings. The aim of the following analysis is to investigate who plans concrete changes in retirement savings behavior. The model of most interest, namely the model investigating individuals who indicated they should save more, is based on only 368 observations instead of 1,016 (total sample size).

Table 29 analyzes the probability of planning concrete changes in retirement savings behavior for individuals who already save sufficient and Table 30 estimates the same model for individuals who think that their present savings would not suffice. The data underlying all models is the imputed data. All models have been estimated via the instrumental variable approach and conventional as a probit regression model.

**Table 29: Planning Concrete Changes if Savings Suffice[75]**

| Planning concrete changes if savings suffice | 6.2(1) Probit | 6.2(2) IV-Probit | 6.2 (3) Probit Interaction | 6.2(4) IV-Probit Interaction | 6.2(2a) IV-Probit Original Data |
|---|---|---|---|---|---|
| Male | 0.18 | 0.12 | 0.19 | 0.14 | 0.09 |
| | (0.18) | (0.23) | (0.18) | (0.23) | (0.26) |
| Age | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.02 | -0.02 | -0.00 | -0.00 | -0.04 |
| | (0.20) | (0.20) | (0.20) | (0.20) | (0.27) |
| Children | -0.00 | 0.01 | -0.00 | 0.01 | -0.06 |
| (0 no – 4 four or more kids) | (0.08) | (0.09) | (0.08) | (0.09) | (0.11) |
| Middle Education[a] | 0.56 | 0.52 | 0.56 | 0.52 | 0.27 |
| | (0.37) | (0.38) | (0.37) | (0.38) | (0.43) |
| High Education[a] | 0.80** | 0.73* | 0.81** | 0.73* | 0.77* |
| | (0.36) | (0.42) | (0.36) | (0.42) | (0.43) |
| Middle Individual net Income[b] | -0.42* | -0.42* | -0.42 | -0.42* | -0.21 |
| | (0.25) | (0.25) | (0.25) | (0.25) | (0.33) |
| High Individual net Income[b] | -0.24 | -0.26 | -0.26 | -0.27 | -0.39 |
| | (0.24) | (0.24) | (0.24) | (0.24) | (0.35) |
| Middle Wealth[c] | -0.24 | -0.32 | -0.23 | -0.31 | 0.09 |
| | (0.22) | (0.28) | (0.22) | (0.27) | (0.37) |
| High Wealth[c] | -0.34 | -0.41 | -0.34 | -0.40 | -0.22 |
| | (0.23) | (0.26) | (0.23) | (0.26) | (0.37) |
| Blue- or White Collar Worker[d] | -0.06 | -0.08 | -0.06 | -0.08 | 0.02 |
| | (0.25) | (0.25) | (0.25) | (0.25) | (0.36) |
| Self-employed[d] | 0.48* | 0.52* | 0.49* | 0.53* | 0.53 |
| | (0.28) | (0.29) | (0.28) | (0.30) | (0.51) |
| Civil Servant[d] | -0.29 | -0.14 | -0.29 | -0.15 | -0.11 |
| | (0.36) | (0.52) | (0.36) | (0.51) | (0.59) |
| Actual Pension Knowledge | -0.05 | 0.36 | -0.06 | 0.34 | -0.65 |
| (0 = zero – 6 = six question correct) | (0.14) | (1.01) | (0.14) | (0.99) | (1.10) |

[75] Besides theoretical considerations the AIC and BIC have been employed in order to decide which time preferences, procrastination and actual knowledge variable should go into the mode (see Appendix)

| Planning concrete changes if savings suffice | 6.2(1) Probit | 6.2(2) IV-Probit | 6.2 (3) Probit Interaction | 6.2(4) IV-Probit Interaction | 6.2(2a) IV-Probit Original Data |
|---|---|---|---|---|---|
| Future Orientation | 0.16 | 0.14 | 0.40 | 0.50 | 0.24 |
| (factor1, Table 5) | (0.11) | (0.13) | (0.45) | (0.50) | (0.18) |
| **Procrastinate on Financial Matters** | 0.01 | -0.03 | 0.03 | 0.00 | 0.09 |
| (1 agree – 4 not agree) | (0.08) | (0.12) | (0.09) | (0.11) | (0.13) |
| Underestimate Knowledge[e] | -0.06 | -0.31 | -0.05 | -0.31 | 0.59 |
|  | (0.23) | (0.64) | (0.23) | (0.64) | (0.75) |
| Overestimate Knowledge[e] | -0.09 | 0.24 | -0.09 | 0.22 | -0.65 |
|  | (0.21) | (0.83) | (0.21) | (0.80) | (0.93) |
| Procrastinate*Future Orient. |  |  | -0.11 | -0.12 |  |
| (interaction term) |  |  | (0.11) | (0.12) |  |
| A.P.Knowledge*Future Orie. |  |  | 0.04 | 0.01 |  |
| (interaction term) |  |  | (0.14) | (0.16) |  |
| Constant | 0.18 | -0.48 | 0.13 | -0.52 | 1.03 |
|  | (0.62) | (1.74) | (0.63) | (1.73) | (2.01) |
| Wald test[f] |  | -0.24 |  | -0.23 | 0.29 |
|  |  | (0.61) |  | (0.59) | (0.69) |
| N | 511.00 | 511.00 | 511.00 | 511.00 | 269 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. a) Reference group is low education, b) reference group is low income, c) reference group is low wealth, d) reference group is not employed/unemployed and e) reference group is correct estimation of pension knowledge. f) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

**Table 30: Planning Concrete Changes if Savings do not Suffice**

| Planning concrete changes if savings do not suffice | 6.2(5) Probit | 6.2(6) IV-Probit | 6.2(7) Probit Interaction | 6.2(8) IV-Probit Interaction | 6.2(6a) IV-Probit Original Data |
|---|---|---|---|---|---|
| Male | 0.40** | 0.20 | 0.40** | 0.21 | 0.34* |
|  | (0.17) | (0.35) | (0.17) | (0.36) | (0.20) |
| Age | -0.03*** | -0.02 | -0.03*** | -0.02 | -0.03* |
|  | (0.01) | (0.02) | (0.01) | (0.02) | (0.01) |
| Married/Cohabiting | -0.46** | -0.37 | -0.48** | -0.39 | -0.18 |
|  | (0.19) | (0.28) | (0.19) | (0.29) | (0.29) |
| Children | 0.22*** | 0.19 | 0.23*** | 0.19 | 0.14 |
| (0 no – 4 four or more kids) | (0.09) | (0.13) | (0.09) | (0.13) | (0.14) |
| Middle Education[a] | 0.43 | 0.28 | 0.44 | 0.28 | 0.20 |
|  | (0.28) | (0.38) | (0.28) | (0.39) | (0.34) |
| High Education[a] | 0.70*** | 0.55 | 0.69** | 0.54 | 0.50 |
|  | (0.27) | (0.41) | (0.27) | (0.42) | (0.47) |

| Planning concrete changes if savings do not suffice | 6.2(5) Probit | 6.2(6) IV-Probit | 6.2(7) Probit Interaction | 6.2(8) IV-Probit Interaction | 6.2(6a) IV-Probit Original Data |
|---|---|---|---|---|---|
| Middle Individual net Income[b] | -0.09 | -0.12 | -0.12 | -0.13 | 0.11 |
|  | (0.21) | (0.20) | (0.22) | (0.21) | (0.21) |
| High Individual net Income[b] | -0.27 | -0.33 | -0.28 | -0.33 | -0.14 |
|  | (0.28) | (0.27) | (0.28) | (0.27) | (0.40) |
| Middle Wealth[c] | 0.17 | 0.01 | 0.14 | -0.01 | 0.23 |
|  | (0.23) | (0.30) | (0.23) | (0.30) | (0.24) |
| High Wealth[c] | 0.45* | 0.12 | 0.43* | 0.10 | 0.71*** |
|  | (0.25) | (0.53) | (0.25) | (0.53) |  |
| Blue- or White Collar Worker[d] | -0.04 | -0.15 | -0.02 | -0.14 | (1) |
|  | (0.20) | (0.22) | (0.20) | (0.23) |  |
| Self-employed[d] | 0.02 | -0.04 | 0.04 | -0.03 | (1) |
|  | (0.24) | (0.24) | (0.25) | (0.25) |  |
| Civil Servant[d] | -0.09 | 0.11 | 0.02 | 0.20 | (1) |
|  | (0.53) | (0.57) | (0.53) | (0.55) |  |
| Actual Pension Knowledge (0 = zero – 6 = six question correct) | -0.05 | 0.95 | -0.04 | 0.96 | -1.30* |
|  | (0.14) | (1.13) | (0.14) | (1.15) | (0.73) |
| Future Orientation (factor1, Table 5) | 0.22** | 0.10 | -0.11 | -0.31 | 0.35** |
|  | (0.10) | (0.21) | (0.37) | (0.39) | (0.14) |
| **Procrastinate on Financial Matters** (1 agree – 4 not agree) | -0.10 | -0.11 | -0.11 | -0.11 | -0.07 |
|  | (0.08) | (0.07) | (0.08) | (0.08) | (0.10) |
| Underestimate Knowledge[e] | -0.15 | -0.91 | -0.14 | -0.89 | 0.84 |
|  | (0.24) | (0.85) | (0.24) | (0.85) | (0.64) |
| Overestimate Knowledge[e] | 0.13 | 0.59 | 0.13 | 0.61 | -0.41 |
|  | (0.20) | (0.51) | (0.21) | (0.54) | (0.61) |
| Procrastinate*Future Orient. (interaction term) |  |  | 0.15 | 0.14 |  |
|  |  |  | (0.10) | (0.10) |  |
| A.P.Knowledge*Future Orie. (interaction term) |  |  | -0.03 | 0.04 |  |
|  |  |  | (0.14) | (0.15) |  |
| Constant | 0.27 | -1.26 | 0.33 | -1.25 | 2.34* |
|  | (0.50) | (1.85) | (0.51) | (1.92) | (1.29) |
| Wald test[f] |  |  | -0.66 | -0.66 | 0.83 |
|  |  |  | (1.00) | (1.02) | (0.80) |
| N |  | 368.00 | 368.00 | 368.00 | 368.00 · 206 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, testing the null hypothesis $H_0: \rho = 0$.

(1) These variables have been omitted in the estimation based on the original data because some of them predict planning behavior perfectly. This is owing to the small sample size.

A further variation between the models is that half of the models have been estimated without the interaction terms and the other models consider the interaction terms. Looking at Table 30 it stands out that all variables which are significant predictors of planning concrete changes in retirement savings behavior in the probit model, cease to be significant, when the model is estimated via IV. The size and sign of the coefficients rarely changes but the standard errors in-

crease sharply as the model switches from probit to instrumental variable estimation. This implies a huge efficiency loss compared to the ordinary probit estimation. Because of the extensive difference between model 6.2(5) and 6.2(6), the latter model has also been estimated with the original data instead of the imputation. The results can be found in the same table, model 6.2(6a). Even though the sample size decreases from 368 to 206 it can be seen that the results are much closer to model 6.2(5) estimated with an ordinary probit regression than to the corresponding IV results. The reason could be that Stata encounters problems when conducting IV estimation for a binary choice model on imputed data when the sample size is small.[76] Interestingly, pension knowledge becomes significant in model 6.2(6a) and school education is not significant anymore. The reason might be that the IV is "time spent on economics at school" which influences the variable measuring school attainment.

The Wald test for exogeneity, testing $H_0: \rho = 0$ results in p-values above 0.5 for all models estimated by IV, so that $H_0$ is not rejected at conventional levels. In this specific case, where the aim is to measure the probability of planning concrete changes in savings, endogeneity might not be a huge problem and the size and coefficients of the explanatory variables should not vary between probit and IV-estimation.

The idea that the results of the IV estimation in Table 29 varies from the probit results because of the small sample size is supported by the finding that this variation was not observed in Table 29, where the models only included individuals who said they would already save sufficient. The reason for this observation could be the variation in the sample size, 368 in the case that individuals think that savings suffice and 511 in the case that individuals think that their savings do not suffice. Therefore it is likely that the sample size matters for an IV estimation with imputed data. The observation shows that the greater the sample size, the closer are the results from probit and IV. This makes an interpretation of Table 30, based on a small sample size, difficult. According to the IV estimation based on the imputed data none of the coefficients has a significant influence on planning concrete changes for retirement for individuals whose savings do not suffice this is different when the estimation is based on the original data. For that reason the same robustness check will be conducted as in Chapter 6.1. It will be examined to see how the significance of the coefficients may change when a variable measuring the experience with financial products is included as an explanatory variable.

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[76] For potential problems of IV estimation with imputed data see chapter 4.4, Estimation Techniques and Potential Problems.

Table 31 shows that experience with financial products does not significantly influence planning behavior. However, in the models based on individuals who think that they should save more (model 6.2(9) and 6.2(10)), a high amount of wealth is not significant anymore when experience is an additional right hand sight variable. The reason is that someone with a lot of different financial products is also likely to be wealthier than someone with say only one product. For individuals who already save sufficiently the variable of self-employed loses its significance which might be explained by the number of different assets (model 6.2(11) and model 6.2(12)). The self-employed are likely to hold a greater number of different assets than other employees because they need to hold some financial products, on the one hand, to finance their business and, on the other hand, to provide for retirement. The remaining variables do not change due to the inclusion of the number of different assets.

In order to compare the results between individuals who think they should save more (Table 30) and individuals who think they do not need to save more (Table 29), the coefficients of most importance are those that are significant in the probit as well as in the IV model based on the imputed data. However, because of potential problems IV estimation may have in small samples in an imputed data set, I consider the IV results based on the original data 6.2(6a) for the sample which is based on the individuals who think they should save more.

The results will now be examined in order to test hypothesis one to three. In a simplified way, hypothesis one states that individuals who have a sound pension knowledge are more likely to think about an appropriate retirement income than individuals with a lack of pension knowledge. In order to prove this hypothesis, the variable approximating actual pension knowledge needs to be significant and positive.

The results in Table 29 indicates that the coefficient of actual pension knowledge is not significant. Hence actual pension knowledge does not influence the probability of making concrete plans to change retirement savings for individuals who already save sufficient. Table 30 investigates the influence of actual pension knowledge for individuals who should save more. In some of the models the coefficient is negative and in others it is positive. The variable is significant, however, only in the model in which the IV-estimation is based on the original data 6.2(6a). The negative and significant coefficient contradicts the hypothesis because it would imply that individuals with less pension knowledge are more likely to plan concrete changes in their retirement behavior.

Hypothesis 2 states that an additional amount of future orientated capital (actual pension knowledge) affects individuals with different rates of future orientation differently.

**Table 31: Probit Estimation Controlling for Experience (Planning Concrete Changes)**

| | 6.2(9) Savings do not suffice | 6.2(10) Savings do not suffice | 6.2(11) Savings suffice | 6.2(12) Savings suffice |
|---|---|---|---|---|
| Male | 0.40** | 0.40** | 0.18 | 0.19 |
| | (0.17) | (0.17) | (0.18) | (0.18) |
| Age | -0.03*** | -0.03*** | -0.03*** | -0.03*** |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.46** | -0.48** | -0.02 | -0.03 |
| | (0.19) | (0.19) | (0.20) | (0.20) |
| Children | 0.22*** | 0.22*** | -0.00 | -0.01 |
| (0 no – 4 four or more kids) | (0.09) | (0.09) | (0.08) | (0.08) |
| Middle Education[a] | 0.43 | 0.44 | 0.56 | 0.55 |
| | (0.28) | (0.28) | (0.37) | (0.37) |
| High Education[a] | 0.70*** | 0.70*** | 0.80** | 0.78** |
| | (0.27) | (0.27) | (0.36) | (0.36) |
| Middle Individual net Income[b] | -0.09 | -0.11 | -0.42* | -0.44* |
| | (0.21) | (0.21) | (0.25) | (0.26) |
| High Individual net Income[b] | -0.27 | -0.30 | -0.24 | -0.29 |
| | (0.28) | (0.28) | (0.24) | (0.25) |
| Middle Wealth[c] | 0.17 | 0.14 | -0.24 | -0.27 |
| | (0.23) | (0.24) | (0.22) | (0.23) |
| High Wealth[c] | 0.45* | 0.39 | -0.34 | -0.40* |
| | (0.25) | (0.27) | (0.23) | (0.24) |
| Blue- or White Collar Worker[d] | -0.04 | -0.05 | -0.06 | -0.09 |
| | (0.20) | (0.20) | (0.25) | (0.25) |
| Self-employed[d] | 0.02 | 0.00 | 0.48* | 0.44 |
| | (0.24) | (0.25) | (0.28) | (0.29) |
| Civil Servant[d] | -0.09 | -0.10 | -0.29 | -0.30 |
| | (0.53) | (0.53) | (0.36) | (0.36) |
| Actual Pension Knowledge | -0.05 | -0.06 | -0.05 | -0.08 |
| (0 = zero – 6 = six question correct) | (0.14) | (0.14) | (0.14) | (0.14) |
| Future Orientation | 0.22** | 0.21** | 0.16 | 0.16 |
| (factor1, Table 5) | (0.10) | (0.10) | (0.11) | (0.11) |
| **Procrastinate on Financial Matters** | -0.10 | -0.10 | 0.01 | 0.00 |
| (1 agree – 4 not agree) | (0.08) | (0.08) | (0.08) | (0.08) |
| Underestimate Knowledge[e] | -0.15 | -0.12 | -0.06 | -0.04 |
| | (0.24) | (0.24) | (0.23) | (0.23) |
| Overestimate Knowledge[e] | 0.13 | 0.11 | -0.09 | -0.11 |
| | (0.20) | (0.20) | (0.21) | (0.21) |
| Experience Fin. Matters | | 0.03 | | 0.04 |
| (no. of different assets) | | (0.04) | | (0.04) |
| Constant | 0.27 | 0.20 | 0.18 | 0.08 |
| | (0.50) | (0.52) | (0.62) | (0.63) |
| N | 368.00 | 368.00 | 511.00 | 511.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

More specifically, if an individual with a high initial preference for the present acquires an additional amount of pension knowledge, than this additional pension knowledge increases his/her probability of thinking about an appropriate retirement income by a greater amount that it would increase the probability for someone who is already highly future orientated. In order to verify this hypothesis, the variables approximating future orientation, actual pension knowledge and the interaction term between these variables should be significant and the predicted probabilities should resemble Figure 13 from chapter 4.3. As can be seen in Table 29 and Table 30 in the models in which the interaction term has been added, none of the relevant variable is significant. Hence hypothesis 2 cannot be verified.

Hypothesis 3 is split into a strict and a relaxed version. The strict version implies that present biased preferences do not necessarily result in procrastination of thinking about an appropriate retirement income. If individuals are aware about their tendency to procrastinate, they can take measures to overcome procrastination. As a result these individuals may not be less likely to plan concrete changes than individuals who are future orientated. Empirically this would mean that the coefficients of future orientation, procrastination and the interaction of those variables should be significant and the predicted probabilities should look like the ones in Figure 16 from chapter 4.3. The relaxed version of the hypothesis would only require the variable approximating if someone is aware of his/her potential procrastination behavior is negative and significant. Having a look at Table 29 and Table 30 none of these variables significantly influences the probability to plan concrete changes. Hence hypothesis 3 cannot be verified.

The interaction terms are neither on their own nor jointly significant. They nevertheless often change the size and significance of the coefficients from which they are constructed considerably. In order to avoid this distortion, the following results are taken from the models that do not consider the interaction terms. There are several differences in the results of the model making use of sample comprising only of individuals who already save sufficiently, and the model which analyses only those individuals who stated that they should save more for retirement. The first one is the variable future orientation which has a positive and significant coefficient if interaction terms are not included into the model based on individuals who should save more. This would imply that individuals who are future orientated are more likely to plan concrete changes than individuals who are present orientated. The second difference can be observed when looking at the variable measuring an individual's net income. The amount of income someone earns does not influence the probability to plan for individuals who should save more for retirement. In other words this implies that there is no significant difference between the planning behavior of individuals with low

and high income. This is different when looking at the sample containing only individuals who stated that they already save sufficient. Earning a middle income compared to low income is negatively associated with planning for retirement. The third difference is the amount of wealth someone possesses. The variable has a significant effect on retirement planning only for individuals who should save more for retirement. The positive and significant coefficient implies that individuals who already acquired some stock of wealth are more likely to make concrete plans to increase retirement savings, if they think that present savings do not suffice.

From all individuals who think that savings already suffice, self-employed individuals are significantly more likely to plan concrete changes in their savings behavior compared to not employed individuals. This might be explained by the high responsibility the self-employed have to take concerning their retirement provision and henceforth the need to optimize retirement savings. Being male is significantly positively associated with concrete retirement planning if savings do not suffice. This implies that men are more likely to start planning concrete changes, if they think that their savings up to date will not suffice for an adequate retirement life. Theoretically planning costs are lower for individuals who are highly educated and for individuals who possess a good knowledge of pensions. The degree of school education significantly influences the likelihood of planning concrete changes in retirement savings behavior for individuals who think that their savings suffice. The higher the education of the individual the less effort someone has to put into processing information and converting it into concrete plans. Age is also significant in both models. The effect is negative, which implies that with age the probability of planning concrete changes declines.

### 6.2.1 Discussion

Neither actual pension knowledge nor confidence in ones knowledge seems to be relevant in increasing the probability of engaging in retirement planning when individuals know that they should save more. In the case of individuals who know that they should save more but do nothing about it, it can be assumed that they procrastinate in their plans because the perceived costs of planning exceed its expected utility (e.g. Laibson et al. 1998).[77] Considering this assumption in the light of the empirical results, it could be that providing finan-

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[77] Costs can be psychological costs like engaging in the search for information and processing it. Furthermore costs could be the opportunity costs. Each hour spend on retirement planning cannot be spend for leisure activities or work.

cial and retirement knowledge alone is not sufficient to inducing these individuals to plan for retirement.

Women who are one of the groups most at risk emerging retirement with low pension claims from the statutory pension insurance are less likely to plan changes even though they do not save sufficient. A reason could be that women are more cautious when they have to make concrete retirement plans or they rely on their partner to make plans. Here retirement seminars or counseling sessions at consumer advice centers could be designed to motivate women to participate. These institutions would assist women in coming up with a concrete retirement savings plan.

Income has not been found to be a significant predictor of planning if individuals think that they should save more. In the event that individuals think their savings suffice, however, individuals with low income are more likely to plan concrete changes than individuals with a medium or high income. The theoretical implication of this result would be that for medium and high income earners it is more likely that the opportunity cost of forgone income due to the time spent on planning changes is higher than the corresponding increases of utility from changing savings behavior. Since the considered respondents already save sufficient for retirement it is likely that there is no or only a low additional utility to be gained from making concrete plans to change retirement savings behavior. For Individuals with low income there might be a greater need for optimizing the savings strategy while high income individuals already have optimized their savings strategy.

According to the theory of Becker and Mulligan (1997) an investment in the time spent to make concrete plans for retirement it is likely to result in higher utility for someone with a high amount of wealth than for someone with a low amount of wealth. Individuals with a high amount of wealth can invest more for retirement than individuals with a low income and they are likely to invest in more complex products which taken together might lead to a greater return on investment than saving a small amount in a savings account. Hence future utility increases although with diminishing marginal utility. This additional utility, however, does not outweigh the planning costs for individuals who already save sufficiently for retirement hence the wealth coefficient is not significant.

The likelihood of planning concrete changes decreases with age. As individuals age changes in retirement savings would have less effect on the outcome than changes which have been made when young. Hence the potential utility gained from planning concrete changes declines with age. Most individuals have already completed their planning of the necessary savings required for an adequate retirement life and think it is too late to make any changes to those plans.

## 6.3 Translating Plans into Action

The FNA-telephone interview had been conducted as a short panel. In the first interview respondents were asked if their savings for retirement suffice and if they plan changes concerning their retirement savings behavior. Previous research has shown that many individuals who make a plan do not translate their plan into action (Frommert 2008). For that reason a second telephone interview was conducted one year after the first interview. From 1,016 individuals who took part in the first telephone interview, 565 individuals also completed the second telephone interview. This chapter initially discusses some descriptive findings from the first telephone interview and then relates these results to the descriptive findings based on the second telephone interview. All of the following descriptive findings will be weighted. Following the descriptive statistics, a multivariate regression will be carried out analysing who actually changed his or her retirement behavior and who did not.

**Figure 25: Intention to Start with (Additional) Retirement Savings**
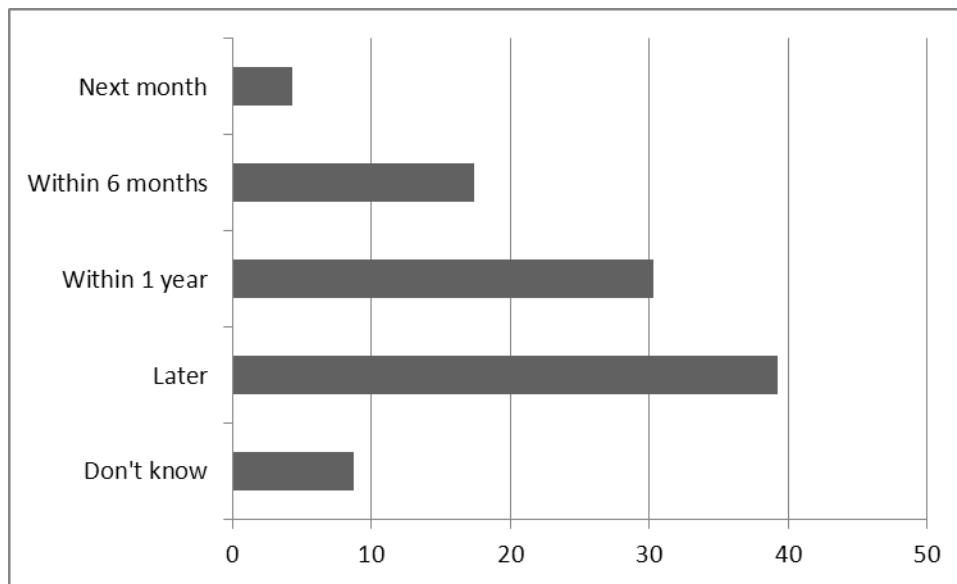


Source: 1. Telephone interview, FNA-Data, N=183, weighted.

In the first telephone interview about 48% of the respondents said that their savings would not suffice for an adequate retirement life. Of these individuals a mere 13% planned to change their retirement savings behavior within a year. Looking at the results for individuals who already save sufficiently reveals that 8% plan to change their savings behavior within a year. Of those individuals who plan to start or to increase their retirement savings only 22% plan to do so during the following six months (Figure 25). Most individuals plan to start retirement savings later, which carries the potential hazard that during this long time span things could happen which deter the respondents from starting savings as intended. They might therefore be more likely to procrastinate in their decision to save than individuals who plan to start savings very soon.

A year later respondents were asked if they had filed an additional contract to save for retirement or if they saved more in an existing contract since the last interview (Table 32). Overall 8% had filed a contract during the past year and 27% said that they save more through an existing contract. In Figure 26 individuals who either save more in an existing contract or filed a contract are described as having changed their savings behavior. Looking at this variable reveals that there are no significant differences between individuals who claimed that they should save more and individuals who stated that savings suffice. Individuals who intended to start saving in the following year also not significantly more often changed their savings behavior than individuals who did not plan to do so.

**Table 32: Questions about Translating Plans into Action**

|   | Since the last interview in June, do you have... |
|---|---|
| 1 | ... acquired an additional product to provide for old age? <br> (yes) (no) (refuse) |
| 2 | ... saved more in an existing contract? <br> (yes) (no) (refuse) |

While these observations are based on the combined changes: saving more and filing a new contract, the results are slightly different when investigating who filed a new contract. In this case individuals who planned to change their savings behavior during the next year significantly more often file a new contract than individuals who did not state that they would change their savings behavior during the following year. These findings confirm previous findings which revealed that there are large discrepancies between planning to change savings behavior and actual behavior (e.g. Clark et al. 2006). There is no easy explanation of why individuals do not translate their plans into action. The following paragraphs will focus on shedding some light on the reasons for the large gap between plans and actions.

All individuals, regardless of having planned to change their savings behavior or not, were asked why their savings behavior did not change. The main reason which 35% of the individuals stated was that they already provide for retirement adequately and a further 27% of the respondents said that they do not have sufficient money to increase retirement savings. Looking only at individuals who intended to start (additional) retirement saving during the next year, 32% said that they do not have sufficient money and 16% said that their actual savings suffice. This last reason would mean that individuals adjusted their assessment of their retirement savings from being insufficient to being sufficient. Concentrating on the whole sample again, not having sufficient time and not finding an

appropriate product was the reason not to save more or not to file a contract during the past year for 5% and 4% of the individuals respectively. Only 2% of the respondents indicated that they did not change their savings behavior because the savings decision was too complicated. Another 2% did not change their savings behavior because they were too old or had only a few years before they retired.

**Figure 26: Planned vs Actual Behavior**
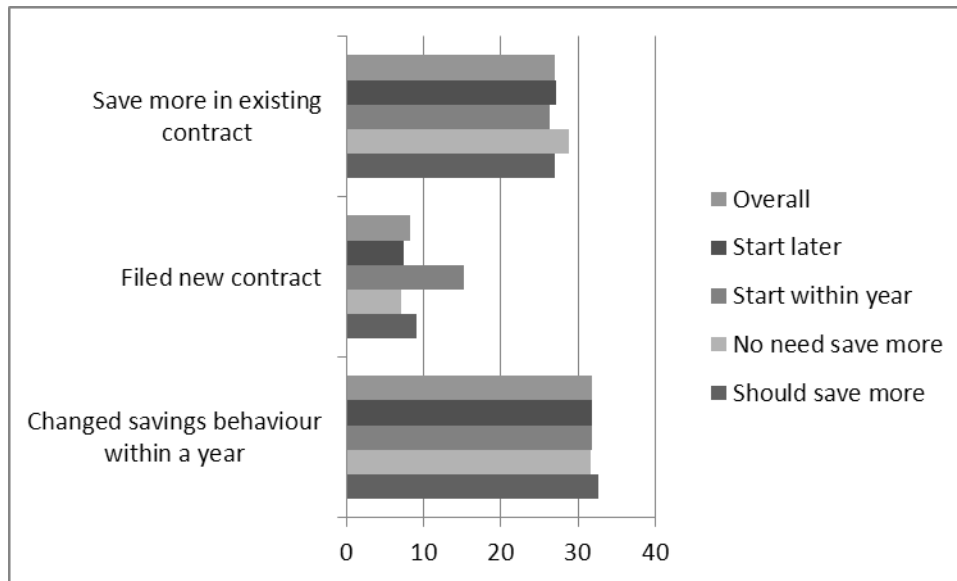


Source: 1. and 2. Telephone interview FNA-Data. N: 513-560

In order to get a clearer picture of who saved more and who does not, a probit and an IV estimation will be conducted. On the one hand the underlying sample will be everyone who took part in the second telephone interview (Table 33) and on the other hand only individuals who said they should save more (Table 34) in the first telephone interview. The dependent variable is binary stating if someone obtained a new product or increased savings during the last year or not. The Wald test for exogeneity, testing $H_0: \rho = 0$ results in p-values above 0.3 for all models estimated by IV, so that $H_0$ is not rejected at conventional levels. In this specific case, where the aim is to measure changes in retirement savings behavior, endogeneity might not be a huge problem and results between probit and IV estimates should be similar. In this chapter the same small sample size problem occurs as with the model in the previous chapter. Estimation results from Table 34 are based on only 191 observations. For that reason model 6.3(6a) of this table presents the IV estimation results which are based on the original in addition to the results based on the imputed data.

The first step is again to look at the three hypotheses. In a simplified way, hypothesis one states that individuals who have a sound pension knowledge are more likely to think about an appropriate retirement income than individuals with a lack of pension knowledge. In order to prove this hypothesis, the variable

approximating actual pension knowledge needs to be significant and positive. The results in Table 33 and Table 34 indicate that the coefficient of actual pension knowledge is not significant. Hence there is no evidence in support of hypothesis one.

Hypothesis two states that an additional amount of future orientated capital (actual pension knowledge) affects individuals with different rates of future orientation differently. More specifically, if an individual with a high initial preference for the present acquires an additional amount of pension knowledge, than this additional pension knowledge increases his/her probability of thinking about an appropriate retirement income by a greater amount that it would increase the probability for someone who is already highly future orientated. In order to verify this hypothesis, the variables approximating future orientation, actual pension knowledge and the interaction term between these variables should be significant and the predicted probabilities should resemble Figure 13 from chapter 4.3. As can be seen in all models considering the interaction effect, none of these variables is significant (Table 33, Table 34). Hence hypothesis 2 cannot be verified.

Hypothesis 3 is split into a strict and a relaxed version. The strict version implies that present biased preferences do not necessarily result in procrastination of thinking about an appropriate retirement income. If individuals are aware about their tendency to procrastinate, they can take measures to overcome procrastination. As a result these individuals may not be less likely to think about an appropriate retirement income than individuals who are future orientated. Empirically this would mean that the coefficients of future orientation, procrastination and the interaction of those variables should be significant and the predicted probabilities should look like the ones in Figure 16 from chapter 4.3. The relaxed version of the hypothesis would only require the variable approximating if someone is aware of his/her potential procrastination behavior is negative and significant. Looking at Table 33 and Table 34, none of these variables significantly influence the probability of thinking about an appropriate retirement income. Hence hypothesis 3 cannot be verified.

The interaction terms are neither on their own nor jointly significant. They nevertheless often change the size and significance of the coefficients from which they are constructed considerably. In order to avoid this distortion, the following results are taken from probit and IV-estimation which do not consider the interaction terms.

**Table 33: Determinants of Translating Intentions into Action (Complete Sample)**

| | 6.3(1) Probit | 6.3(2) IV-Probit | 6.3(3) Probit Interaction | 6.3(4) IV-Probit Interaction |
|---|---|---|---|---|
| Male | 0.10 | 0.16 | 0.10 | 0.16 |
| | (0.14) | (0.14) | (0.14) | (0.14) |
| Age | -0.00 | -0.01 | -0.01 | -0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.12 | -0.10 | -0.13 | -0.11 |
| | (0.15) | (0.15) | (0.15) | (0.15) |
| Children | -0.03 | -0.05 | -0.02 | -0.05 |
| (0 no – 4 four or more kids) | (0.06) | (0.06) | (0.06) | (0.06) |
| Middle Education[a] | 0.31 | 0.35* | 0.31 | 0.35* |
| | (0.21) | (0.21) | (0.21) | (0.21) |
| High Education[a] | 0.27 | 0.32 | 0.26 | 0.33 |
| | (0.21) | (0.21) | (0.21) | (0.21) |
| Middle Individual net Income[b] | 0.27 | 0.30* | 0.27 | 0.30* |
| | (0.17) | (0.18) | (0.17) | (0.18) |
| High Individual net Income[b] | 0.50** | 0.56*** | 0.51** | 0.57*** |
| | (0.21) | (0.20) | (0.21) | (0.20) |
| Middle Wealth[c] | 0.05 | 0.15 | 0.05 | 0.16 |
| | (0.19) | (0.21) | (0.19) | (0.20) |
| High Wealth[c] | 0.22 | 0.35 | 0.23 | 0.37* |
| | (0.21) | (0.23) | (0.21) | (0.22) |
| Actual Savings Suffice | -0.14 | -0.08 | -0.13 | -0.08 |
| | (0.14) | (0.16) | (0.14) | (0.16) |
| Blue- or White Collar Worker[d] | 0.09 | 0.14 | 0.10 | 0.15 |
| | (0.17) | (0.17) | (0.17) | (0.17) |
| Self-employed[d] | -0.05 | -0.07 | -0.05 | -0.07 |
| | (0.21) | (0.20) | (0.21) | (0.20) |
| Civil Servant[d] | -0.02 | -0.23 | 0.00 | -0.23 |
| | (0.27) | (0.34) | (0.27) | (0.33) |
| Actual Pension Knowledge | 0.04 | -0.42 | 0.04 | -0.46 |
| (0 = zero – 6 = six question correct) | (0.07) | (0.49) | (0.07) | (0.47) |
| Timepreference Results | 0.11 | 0.14* | 0.06 | 0.22 |
| (Table 5) | (0.07) | (0.08) | (0.26) | (0.28) |
| **Procrastinate on Financial Matters** | 0.06 | 0.08 | 0.05 | 0.08 |
| (1 agree – 4 not agree) | (0.06) | (0.06) | (0.06) | (0.06) |
| Underestimate Knowledge[e] | -0.17 | 0.21 | -0.17 | 0.23 |
| | (0.17) | (0.44) | (0.17) | (0.41) |
| Overestimate Knowledge[e] | 0.10 | -0.40 | 0.09 | -0.45 |
| | (0.15) | (0.54) | (0.15) | (0.52) |
| Procrastinate*Future Orient. | | | 0.06 | 0.02 |
| (interaction term) | | | (0.07) | (0.08) |
| A.P.Knowledge*Future Orie. | | | -0.07 | -0.08 |
| (interaction term) | | | (0.07) | (0.07) |
| Constant | -0.89** | -0.12 | -0.87** | -0.03 |
| | (0.43) | (0.97) | (0.43) | (0.94) |
| Wald test[f] | | 0.43 | | 0.47 |
| | | (0.51) | | (0.49) |
| N | 533.00 | 533.00 | 533.00 | 533.00 |

Source: FNA-Data, 1. and 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, testing the null hypothesis $H_0 : \rho = 0$.

**Table 34: Determinants of Translating Intentions into Action (Should Save More)**

| | 6.3(5) Probit | 6.3(6) IV-Probit | 6.3(7) Probit | 6.3(8) IV-Probit | 6.3(6a) IV-Probit Original Data |
|---|---|---|---|---|---|
| Male | 0.06 | -0.04 | 0.06 | -0.05 | -0.26 |
| | (0.25) | (0.26) | (0.25) | (0.26) | (0.34) |
| Age | 0.00 | -0.01 | 0.00 | -0.01 | 0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) |
| Married/Cohabiting | -0.22 | 0.01 | -0.24 | 0.02 | 0.21 |
| | (0.27) | (0.38) | (0.27) | (0.39) | (0.36) |
| Children | -0.19 | -0.20 | -0.18 | -0.21* | -0.25 |
| (0 no – 4 four or more kids) | (0.12) | (0.14) | (0.12) | (0.12) | (0.25) |
| Middle Education[a] | 0.22 | 0.18 | 0.21 | 0.17 | 0.27 |
| | (0.36) | (0.34) | (0.37) | (0.34) | (0.50) |
| High Education[a] | 0.18 | -0.04 | 0.16 | -0.03 | -0.25 |
| | (0.35) | (0.40) | (0.35) | (0.38) | (0.45) |
| Middle Individual net Income[b] | 0.29 | 0.20 | 0.30 | 0.20 | 1.02** |
| | (0.27) | (0.31) | (0.27) | (0.30) | (0.44) |
| High Individual net Income[b] | 0.92** | 0.78 | 0.94** | 0.78 | 1.63 |
| | (0.39) | (0.63) | (0.39) | (0.61) | (1.09) |
| Middle Wealth[c] | -0.22 | -0.05 | -0.23 | -0.01 | -0.28 |
| | (0.33) | (0.35) | (0.33) | (0.36) | (0.43) |
| High Wealth[c] | 0.46 | 0.60 | 0.45 | 0.64 | 0.21 |
| | (0.37) | (0.43) | (0.37) | (0.40) | (0.72) |
| Blue- or White Collar Worker[d] | 0.22 | 0.34 | 0.22 | 0.33 | -0.89 |
| | (0.29) | (0.27) | (0.29) | (0.27) | (0.58) |
| Self-employed[d] | 0.02 | 0.21 | 0.04 | 0.18 | -0.54 |
| | (0.35) | (0.35) | (0.36) | (0.34) | (0.51) |
| Civil Servant[d] | 0.54 | 0.19 | 0.57 | 0.15 | 0.04 |
| | (0.60) | (0.77) | (0.61) | (0.79) | (0.75) |
| Actual Pension Knowledge | 0.09 | -0.91 | 0.10 | -0.91 | 1.25 |
| (0 = zero – 6 = six question correct) | (0.13) | (0.91) | (0.14) | (0.86) | (1.02) |
| Timepreference Results | 0.14 | 0.20 | -0.06 | 0.62 | -0.58 |
| (Table 5) | (0.13) | (0.13) | (0.44) | (0.70) | (0.90) |
| **Procrastinate on Financial Matters** | 0.03 | 0.13 | 0.04 | 0.11 | -0.06 |
| (1 agree – 4 not agree) | (0.10) | (0.12) | (0.11) | (0.11) | (0.25) |
| Underestimate Knowledge[e] | 0.11 | 0.81 | 0.12 | 0.75 | -0.64 |
| | (0.30) | (0.62) | (0.31) | (0.53) | (1.04) |
| Overestimate Knowledge[e] | 0.41 | -0.74 | 0.44 | -0.77 | 1.71* |
| | (0.32) | (1.16) | (0.32) | (1.16) | (0.90) |
| Procrastinate*Future Orient. | | | 0.06 | -0.10 | |
| (interaction term) | | | (0.13) | (0.19) | |
| A.P.Knowledge*Future Orie. | | | 0.01 | -0.10 | |
| (interaction term) | | | (0.14) | (0.16) | |
| Constant | -1.23* | 1.03 | -1.23* | 1.05 | -2.97** |
| | (0.71) | (2.46) | (0.73) | (2.35) | (1.21) |
| Wald test[f] | | 1.16 | | 1.11 | -0.61 |
| | | (1.94) | | (1.70) | (1.19) |
| N | 191.00 | 191.00 | 191.00 | 191.00 | 119.00 |

Source: FNA-Data, 1. and 2. Telephone Interview. Sample consits only of individuals who stated that they should save more in the first telephone interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. Wald test of exogeneity, testing the null hypothesis $H_0: \rho = 0$.

Considering the complete sample, Table 33 reveals that individuals with a high net income (>=2,000€) are significantly more likely to have adjusted their savings behavior in the direction of increased retirement provision compared to individuals with a low net income (<1,000€). This result is also true for the models estimated only with individuals who stated that they should save more in the previous year (Table 34). There is also weak evidence that individuals with medium education are more likely to have changed their savings behavior than respondents with a low degree and also future orientation might be important (Table 33). Model 6.3(4) confirms a positive and significant effect of future orientation on translating plans into action.

### 6.3.1 Discussion

In the first telephone survey individuals were asked if they plan concrete changes in retirement savings behavior and during which period they plan these changes. One year later individuals were asked if they followed their plan through. Weak evidence has been found that individuals who are overconfident concerning their knowledge of financial and pension matters are more likely to start saving when they previously acknowledged that they should save more. While the confidence in one's own knowledge did not have an influence on the likelihood to plan, it has a weak positive effect on translating plans into action. For individuals who feel very confident in dealing with pension issues the effort costs incurred by inviting offers for pension plans from different providers in counselling sessions will be much lower than for someone who believes that he is not well informed. The results suggest that the confidence in one's own knowledge is more important than actual knowledge when translating retirement plans into action.

One year after the individuals indicated that they planned to change their savings behavior within the upcoming year, they were also asked directly about why they did not follow their plan through. 16% argued that their savings would already suffice for an adequate retirement life. This would imply that during the year after the first interview these individuals received new information.[78] Considering this new information they recalculated their optimization problem and reasoned that it was not necessary to change their savings strategy (Clark et al. 2006). Further 32% argued that they did not change their behavior as intended because they do not have sufficient financial resources. In this case it could be that external circumstance led to a decrease of household income or wealth.

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[78] New information could for example be: increase in housing prices, increase in the return on investment, change in pension law, financial crises, inheritance, better understanding of the pension system, (private) pension statement about the expected pay-out/pension.

Such circumstances could for example be the loss of a job, an increase of the electricity rate or a divorce. Furthermore, it is possible that they had planned to change their savings behavior but within this year they discovered that there is not money left to save because they spend more on other goods. This reasoning also explains why a high individual income compared to a low income is positively associated with translating the plan into action. For individuals who have a high income, external shocks like an increase in fuel or electricity prices, can be absorbed more easily. This is also supported by the empirical analysis since income positively influences the likelihood of saving more for retirement. If someone translates his/her plans into action therefore depends on income while planning concrete changes (analysed in the previous chapter) for individuals who should save more not.

A retirement seminar or a counselling session at a consumer advice centre might increase the number of individuals who translate their plans into action if they show that already small monthly contributions can increase retirement income considerably. Information about the "Riester-Subsidy" or the reduction of taxable income by the contributions to a company pension plan (may be coupled with an employer match) could motivate low income individuals to start saving for retirement. These incentives may not only attract individuals with low income to start saving but may also be effective for individuals with medium or high income whereby the drawback of financial incentives are windfall gains. This means that individuals who apply for the subsidy would also have saved without this subsidy or now save less in other retirement savings vehicles.[79]

## 6.4 Saving for retirement

Ideally individuals who started to save for retirement in one of many different savings vehicles have passed through all stages within the path towards retirement. Individuals having not much time to deal with financial matters, who are boundedly rational or who discount the future at a high rate, may refrain from planning a great deal and just choose the product which the financial advisor offers (e.g. Leinert 2005, Thaler 1990, 1994). In the following analysis the focus is on individual characteristics which determine if someone saves for retirement and which savings product he or she has chosen. Furthermore, it will be investigated whether there is any evidence that individuals omit the planning process preceding retirement savings. The analysis does, however, not allow saying anything about the amount of savings, the adequacy of savings to provide for re-

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[79] Studies who examined potential windfall gains concerning the „Riester-Pension" are for example  Börsch-Supan et al. (2007), Börsch-Supan et al. (2008), Corneo et al. (2008) or Pfarr and Schneider Udo (2010).

tirement nor is it possible to assess if the product chosen is suited for the individual. While all these aspects are very interesting it is not possible to investigate their relevance in the scope of this research.

**Figure 27: Owning Different Kinds of Assets**
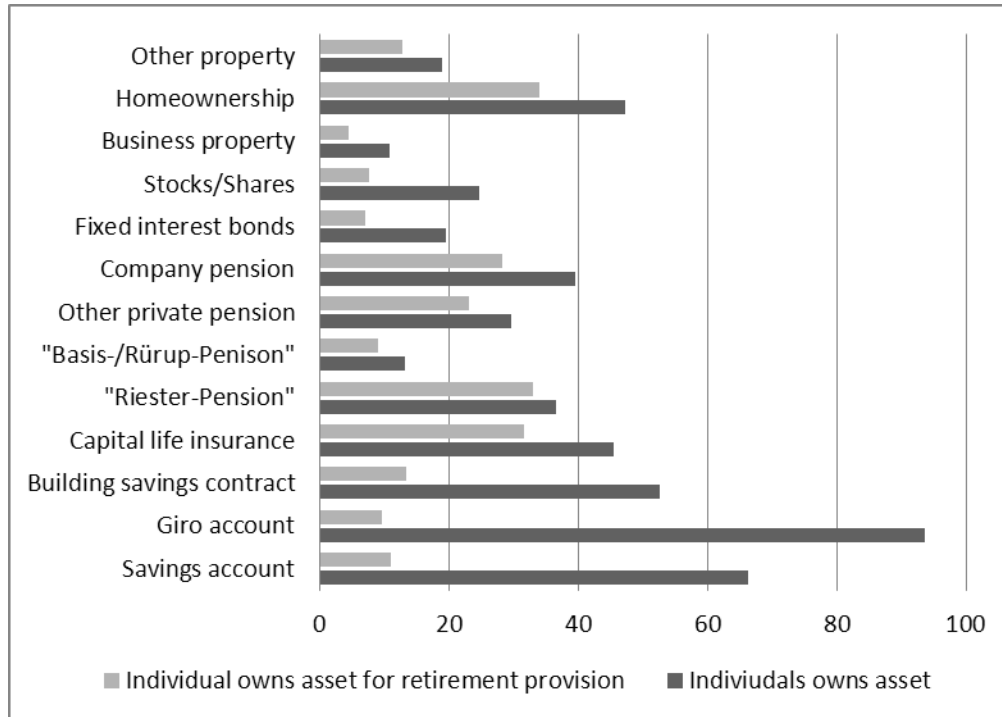
In order to analyse who provides for retirement and who does not, several in depth analyses will be conducted. The assets chosen to be analysed are the assets which were the most popular vehicles to provide for retirment. According to Figure 27 these assets are: the "Riester-Pension", other private pension, capital life insurance, company pension and Homeownership. Furthermore, it will be analysed who saves for retirement in one of the following contracts: "Riester-Pension", "Basis-/Rürup-Pension", other private pension, capital life insurance or company pension. This analysis will be conducted on the individual level. The generated variables will be called "private retirement provision individual". All remaining analyses, with an exeption of homeownership which will be investigated at the household level, will be investigated at the individual level. Homeownership has been chosen to be evaluated at the household level because housing equity is generally seen as a retirement provision for both spouses. In each case probit regressions and IV-estimations will be performed with a fixed set of variables which consist of the same variables used in the previous analysis. New variables which have been implemented into the models to predict if someone saves for retirement in one of the products are:

*Homeownership*

For many individuals housing equity is a form of retirement provision. Owning a house can lead to a rent free life during old-age and has therefore the same effect as a "Riester-Pension" from which retirees receive an annuity. Housing equity is generally financed on credit which requires monthly payments from the debtor. It is expected that individuals who own a house are less likely to own the other forms of retirement provision which would also require regular payments.

*Age squared*

Generally it could be expected that the number of savers in one of the private retirement provision vehicles increases with age. If individuals are young they care less about retirement, have many other priorities such as their career or family and also have less disposable income. However, since the pension level is only decreasing slightly, it might not be necessary for older individuals (e.g. 55 years and upwards) to acquire private pension wealth. This theoretical consideration, however, can only be applied to the cohort who is now 55 years and older. In future generations those who are 55 years and older should have some kind of private retirement savings. As a result the probability to save for retirement should increase up to a certain age, say 55, and then decrease. It is exactly this reasoning which would be represented by adding age squared to the regression.

The detailed estimation results can be found in the Appendix 9.7.[80] Here only the IV-estimation without considering the interaction effects will be presented for each savings vehicle. Endogneity of pension knowledge is one major problem in the empirical research examining the influence of financial literacy on planning or wealth. This problem has also been encountered in this analysis. It is not clear if the causality runs from pension knowledge to old-age provision or the other way round. In order to investigate the potential endogeneity problem further, a statistical test will be conducted, which has also been applied in the preceding chapters. The test for exogeneity tests the hypothesis $H_0$ that the correlation between u and v is zero. This hypothesis has only been rejected in one of the six models estimated. This means that endogeneity of pension knowledge is a major problem in the model estimating the likelihood of owning a house. In

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[80] In the Appendix 9.7 (Table 75 and the following tables) the results from the probit regression, the interaction terms, estimations based on the original data, estimations including a factor variable for procrastination and a regressions in which the factor variables are implemented separately.

all other models, like the probability of owning a "Riester Pension" or a capital life insurance, this hypothesis was not rejected at conventional levels.

**Table 35: Determinants of Owning Different Vehicles to Provide for Retirement**

| Owning a | 6.4(1) Riester Pension | 6.4(2) Capital Life Insurance | 6.4(3) Company Pension | 6.4(4) Other Private Pension | 6.4(5) Housing Equity | 6.4(6) Private Saving |
|---|---|---|---|---|---|---|
| Male | -0.16 | -0.22* | -0.08 | -0.28** | -0.13 | -0.06 |
| | (0.17) | (0.13) | (0.15) | (0.14) | (0.15) | (0.21) |
| Age | 0.10** | 0.04 | -0.02 | 0.01 | 0.01* | 0.07 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.01) | (0.05) |
| Age Squared | -0.00*** | -0.00 | 0.00 | -0.00 | | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | | (0.00) |
| Married/Cohabiting | 0.03 | 0.15 | 0.11 | 0.06 | 0.48** | 0.03 |
| | (0.12) | (0.11) | (0.12) | (0.11) | (0.21) | (0.14) |
| Children | 0.25*** | -0.02 | 0.01 | -0.07 | 0.17*** | 0.08 |
| (0 no – 4 four or more kids) | (0.07) | (0.05) | (0.06) | (0.07) | (0.06) | (0.07) |
| Middle Education[a] | 0.12 | -0.19 | -0.43*** | 0.16 | 0.13 | 0.04 |
| | (0.17) | (0.14) | (0.15) | (0.18) | (0.19) | (0.20) |
| High Education[a] | 0.11 | -0.07 | -0.27* | 0.05 | 0.13 | -0.03 |
| | (0.17) | (0.15) | (0.15) | (0.17) | (0.20) | (0.20) |
| Middle Individual net Income[b] | 0.09 | 0.05 | 0.47*** | 0.15 | -0.00 | 0.41** |
| | (0.14) | (0.13) | (0.17) | (0.15) | (0.14) | (0.20) |
| High Individual net Income[b] | -0.10 | 0.15 | 0.49** | 0.43* | -0.14 | 0.47* |
| | (0.18) | (0.19) | (0.23) | (0.24) | (0.16) | (0.26) |
| Middle Wealth[c] | 0.17 | 0.08 | 0.42* | 0.11 | 0.35 | 0.45* |
| | (0.18) | (0.16) | (0.22) | (0.20) | (0.25) | (0.26) |
| High Wealth[c] | -0.03 | 0.10 | 0.01 | 0.06 | 1.09** | 0.32 |
| | (0.19) | (0.19) | (0.21) | (0.23) | (0.51) | (0.31) |
| Housing Equity | -0.03 | 0.32** | 0.16 | 0.01 | | 0.26 |
| | (0.13) | (0.14) | (0.14) | (0.13) | | (0.17) |
| Blue- or White Collar Worker[d] | 0.11 | 0.20 | 0.62*** | 0.07 | 0.06 | 0.41** |
| | (0.14) | (0.14) | (0.18) | (0.14) | (0.15) | (0.18) |
| Self-employed[d] | -0.15 | 0.48*** | -0.29 | 0.46*** | 0.52** | 0.28 |
| | (0.18) | (0.16) | (0.21) | (0.17) | (0.21) | (0.20) |
| Civil Servant[d] | 0.11 | 0.33 | -0.59 | 0.07 | 1.01*** | 0.01 |
| | (0.30) | (0.25) | (0.36) | (0.31) | (0.27) | (0.38) |
| Actual Pension Knowledge | 0.11 | 0.55 | 0.67* | 0.52 | 0.80*** | 0.55 |
| (0 = zero – 6 = six question correct) | (0.45) | (0.35) | (0.37) | (0.48) | (0.28) | (0.55) |
| Future Orientation | 0.22*** | 0.14* | 0.00 | 0.08 | 0.01 | 0.16* |
| (factor1, Table 5) | (0.07) | (0.07) | (0.07) | (0.08) | (0.07) | (0.09) |
| **Procrastinate on Financial Matters** | 0.00 | -0.05 | -0.04 | -0.04 | 0.02 | -0.19*** |
| (1 agree – 4 not agree) | (0.05) | (0.05) | (0.05) | (0.05) | (0.06) | (0.06) |
| Underestimate Knowledge[e] | -0.21 | -0.48 | -0.74** | -0.53 | -0.81*** | -0.65 |
| | (0.39) | (0.30) | (0.31) | (0.40) | (0.23) | (0.47) |
| Overestimate Knowledge[e] | 0.11 | 0.69** | 0.72** | 0.47 | 0.55* | 0.81* |
| | (0.41) | (0.29) | (0.33) | (0.43) | (0.30) | (0.45) |
| Constant | -2.11** | -2.20*** | -1.81** | -1.78** | -2.80*** | -1.52 |
| | (0.85) | (0.73) | (0.81) | (0.77) | (0.38) | (0.95) |
| Wald test[f] | 0.08 | -0.42 | -0.36 | -0.41 | -0.86* | -0.27 |
| | (0.40) | (0.39) | (0.41) | (0.53) | (0.47) | (0.57) |
| N | 901.00 | 951.00 | 951.00 | 951.00 | 951.00 | 9515.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$. The coefficients which are highlighted in grey are significant when estimating the same specification via an ordinary probit model instead of IV.

Table 35 presents the IV-results for all six models. The coefficients which are highlighted in grey are significant when estimating the same specification via an ordinary probit model instead of IV. In the case that the coefficient which is earmarked by a star and highlighted in grey it can be concluded that the results are especially robust since they are significant regardless of estimating the model by probit or instrumental variables. Estimations based on original data have been conducted in order to robustify previous IV-results because IV estimation on imputed data is no official stata application and may result in wrong standard errors and test statistics.

Firstly the results will be evalutated concerning the three hypotheses. In a simplified way, hypothesis one states that individuals who have a sound pension knowledge are more likely to think about an appropriate retirement income than individuals with a lack of pension knowledge. In order to prove this hypothesis, the variable approximating actual pension knowledge needs to be significant and positive. The results in Table 35 indicate that the coefficient of actual pension knowledge is positive over all models but a significant predictor it is only for company pension and housing equity. Hence for these two savings vehicles, hypothesis 1 has been verified.

Hypothesis 2 states that an additional amount of future orientated capital (actual pension knowledge) affects individuals with different rates of future orientation differently. More specifically, if an individual with a high initial preference for the present acquires an additional amount of pension knowledge, than this additional pension knowledge increases his/her probability of thinking about an appropriate retirement income by a greater amount that it would increase the probability for someone who is already highly future orientated. In order to verify this hypothesis, the variables approximating future orientation, actual pension knowledge and the interaction term between these variables should be significant and the predicted probabilities should resemble Figure 13 from chapter 4.3.

It has been found that the interaction terms between future orientation and pension literacy and future orientation and procrastination are usually not significant.[81] One exception is the model estimating the probability of having housing equity. In this case the interaction between future orientation and pension literacy is significant, as well as the variable pension literacy itself. This result deserves some further investigation since the significance of the interaction term makes it possible to test hypothesis 2 which states that if the discount rate

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[81] Appendix 9.7,Table 76 and the following tables.

is high but still allows for at least some investment in future orientated capital, then, all other things being equal, an additional amount of future orientated capital would increase the likelihood of saving for retirement by a greater amount for an individual with an initially low future orientation than for an individual with an initially high future orientation.

**Figure 28: Probability of Having Housing Equity, Interactioneffect of Pension Knowledge and Future Orienation**
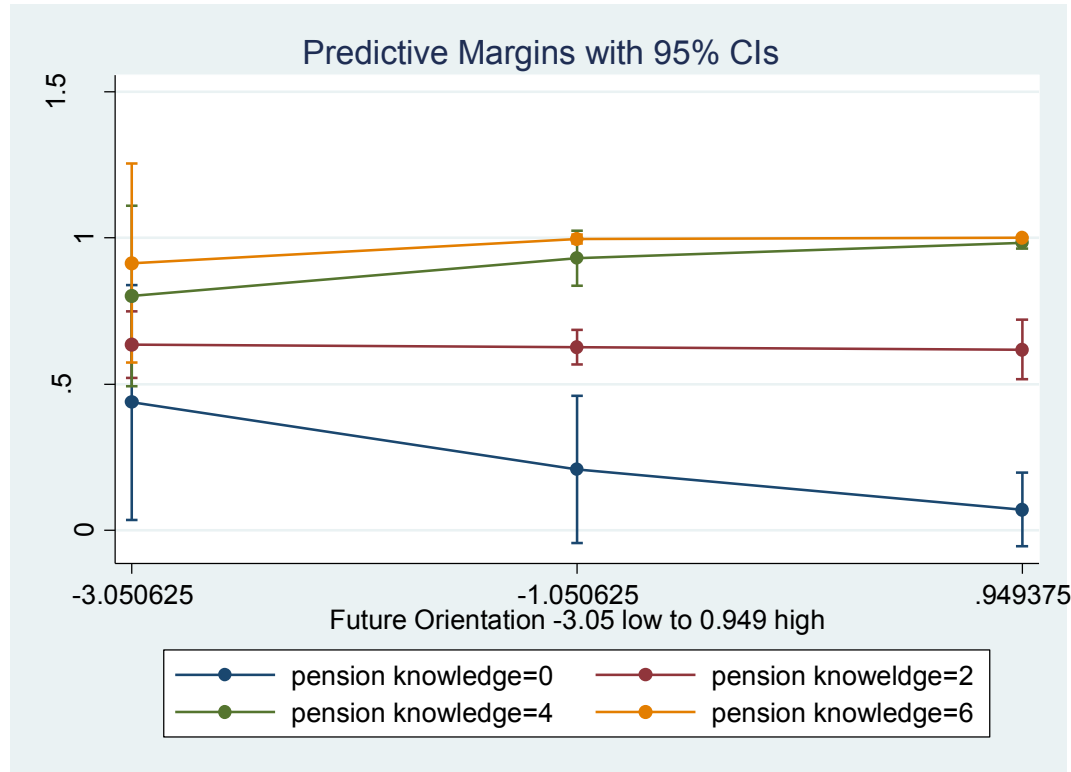


Note: 1. FNA-Telephone interview, orignial data, predicted probabilities after ivprobit.

Figure 28 shows the predicted probabilities for the variables which are part of the interaction term holding all other variables at their means. The underlying data is the original data because it was not possible to retrieve the predicted probabilities when the data was imputed. Comparing the result based on the imputed data and the results retrieved from the original data shows that the coefficient of actual pension knowledge is almost of the same size and significant at the one per cent level. The variable approximating future orientation is not significant in both models and the interaction term is significant at the 10 per cent level with the imputed data and at the 1 per cent level in the original data. The size of the coefficient is greater in the original data model. Besides these small differences I expect the predicted probabilities of the imputed model to be similar to the ones retrieved from the original model.

**Table 36: Delta-Method**

| _at | | | | _at | Margin | Std. Err | P>\|z\| | 95% Conf. Intervall | |
|---|---|---|---|---|---|---|---|---|---|
| 1._at | pension knowledge | = | 0 | 1 | 0.44 | 0.21 | 0.03 | 0.04 | 0.84 |
| | future orientation | = | -3.050625 | 2 | 0.21 | 0.13 | 0.11 | -0.04 | 0.46 |
| 2._at | pension knowledge | = | 0 | 3 | 0.07 | 0.06 | 0.28 | -0.06 | 0.20 |
| | future orientation | = | -1.050625 | 4 | 0.63 | 0.06 | 0.00 | 0.52 | 0.75 |
| 3._at | pension knowledge | = | 0 | 5 | 0.63 | 0.03 | 0.00 | 0.57 | 0.69 |
| | future orientation | = | 0.949375 | 6 | 0.62 | 0.05 | 0.00 | 0.52 | 0.72 |
| 4._at | pension knowledge | = | 2 | 7 | 0.80 | 0.16 | 0.00 | 0.49 | 1.11 |
| | future orientation | = | -3.050625 | 8 | 0.93 | 0.05 | 0.00 | 0.84 | 1.03 |
| 5._at | pension knowledge | = | 2 | 9 | 0.98 | 0.01 | 0.00 | 0.96 | 1.00 |
| | future orientation | = | -1.050625 | 10 | 0.91 | 0.17 | 0.00 | 0.57 | 1.26 |
| 6._at | pension knowledge | = | 2 | 11 | 1.00 | 0.01 | 0.00 | 0.98 | 1.01 |
| | future orientation | = | 0.949375 | 12 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| 7._at | pension knowledge | = | 4 | | | | | | |
| | future orientation | = | -3.050625 | | | | | | |
| 8._at | pension knowledge | = | 4 | | | | | | |
| | future orientation | = | -1.050625 | | | | | | |
| 9._at | pension knowledge | = | 4 | | | | | | |
| | future orientation | = | 0.949375 | | | | | | |
| 10._at | pension knowledge | = | 6 | | | | | | |
| | future orientation | = | -3.050625 | | | | | | |
| 11._at | pension knowledge | = | 6 | | | | | | |
| | future orientation | = | -1.050625 | | | | | | |
| 12._at | pension knowledge | = | 6 | | | | | | |
| | future orientation | = | 0.949375 | | | | | | |

Table 36 presents the standard errors, p-values and confidence intervals for each of the estimated probabilities based on the original data. What is evident from Figure 28 is that hypothesis two cannot be verified. In fact pension knowledge has a greater positive influence on owning housing equity for future orientated individuals than for present orientated individuals. Retirement seminars which increase pension knowledge would therefore be most effective in increasing homeownership if the participants exhibit at least some future orientation and have a low initial pension knowledge. For individuals who are already well informed about pension matters (being able to answer four questions correctly) an additional amount of pension knowledge does not significantly increase the probability of owning a house. The remaining models estimating the probability of owning other retirement savings vehicles do not show any positive or negative effects of the interaction terms. Hence hypothesis 2 can also not be verified in the other models.

Hypothesis 3 is split into a strict and a relaxed version. The strict version implies that present biased preferences do not necessarily result in procrastination of thinking about an appropriate retirement income. If individuals are aware about

their tendency to procrastinate, they can take measures to overcome procrastination. As a result these individuals may not be less likely to think about an appropriate retirement income than individuals who are future orientated. Empirically this would mean that the coefficients of future orientation, procrastination and the interaction of those variables should be significant and the predicted probabilities should look like the ones in Figure 16 from chapter 4.3. The relaxed version of the hypothesis would only require the variable approximating if someone is aware of his/her potential procrastination behavior is negative and significant. Looking at Table 35 reveals that the interaction term is not significant in any of the models. The variable procrastination is negative and significant in the model estimating if someone is engaged in any kind of private retirement saving. The light version of hypothesis 3 has therefore been veriefied for one of the six models.

The interaction terms are generally neither on their own nor jointly significant. They nevertheless often change the size and significance of the coefficients from which they are constructed considerably. In order to avoid this distortion, the overview of the results in Table 35 does not consider the interaction terms. Providing for retirement privately is often more important for women than for men because women's pension claims are generally lower than the pension claims of men. Table 35 reveals that women indeed are more likely to own other private retirement products. The savings vehicles "Riester-Pension" and capital life insurance are only significant in either the probit or the IV specification. Hence the positive effect of being a woman owning these products is less robust.

Age is a significant predictor of saving for retirement with the "Riester-Pension" and also, while less robust, for owning a capital life insurance. The assumption made previously that the probability would increase with age up to a certain age and then decrease again is supported by the data. The coefficient for age is positive and age squared negative. Owning a home might be differently motivated than filing a pension contract, and even a hundred years ago, before pension reforms took place, individuals built houses. Therefore, the assumption that the probability of homeownership decreases again after a certain age might not be appropriate. Indeed dropping age squared from the model leads to a positive and significant coefficient for homeownership. The marital status which in this analysis is 1 if someone is married or cohabiting has a significant effect on housing equity but not on the other variables. Often the idea to buy or build a house only arises in a strong partnership with the shared intention to have children in the future. Singles on the other hand may prefer to be flexible to focus on their career. With the number of children also the probability of owning a house or to have a "Riester-Pension" increases. The educational level itself has a

significant and robust influence only on the possession of company pension plans. The reference group are individuals with low education. Compared to the reference group middle educated and high educated are less likely to save for retirement via a company pension plan. Actual pension knowledge is closely related to education. Possessing pension knowledge decreases the effort costs of gathering and processing new information. Furthermore, pension knowledge facilitates imagining future retirement life. The coefficient of actual pension knowledge is positive in two of the models estimated by instrumental variables which are the models estimating the probability of having a company pension and housing equity. Estimating the model without instrumenting actual pension knowledge leads to significant coefficients for almost all models with one exception which is housing equity. A very robust result is therefore that individuals with a higher degree of actual pension knowledge are more likely to own a company pension.

Another set of variables analysed is subjective pension knowledge which entered the regression in a transformed way. A set of dummy variables measures if someone estimated his/her subjective knowledge approximately as good as his/her actual knowledge, better as his/her actual knowledge or worse. The model specifications analysed, generally display a significant positive coefficient for overestimating ones pension knowledge with an exception of the two savings vehicles "Riester-Pension" and "other private pension" were the coefficient is not significant. Underestimating or being under confident concerning ones pension knowledge reduces the probability of owing a company pension in both, the IV and the probit model. A negative influence of underestimating ones pension knowledge can also be observed for the savings vehicles "Riester-Pension" and private savings in general in the probit model and for housing equity in the IV estimation only. Here it is evident again that an individual's feeling about how well he is informed about retirement issues, even being more confident than the objective measure would suggest, is positively related to the probability of owning private retirement provision. Underestimating one's knowledge on the other hand would lead individuals to abstain from filing for a savings contract.

The amount of an individual's net income plays an important role in owning a company pension and other private pension. The more someone earns the more likely he/she is to own one of these savings vehicles. The data, however, reveals that a high income is not always positively related to retirement savings. An individual's net income for example has no significant influence on owning a "Riester-Pension", a house or a capital life insurance. Wealth has a positive and significant effect on possessing company pension and housing equity. The especially high association between wealth and housing equity could be due to

possible endogeneiety of wealth because housing equity is a component of wealth. Housing equity has been added to the stock of wealth and therefore directly influences the explanatory variable. The higher the stock of wealth, the more an individual can invest in his/her retirement plan and increase his/her return on investment. Another argument which might be much more important is that retirement is not the only motive why individuals save. Individuals generally also engage in precautionary savings such that they can afford to fix the washing machine or the car if it breaks. In the case where an individual has built a certain stock of wealth for precautionary reasons, additional money earned could be saved for retirement purposes. A high stock of wealth therefore frees money to be invested in retirement provision.

In all models with the exception of the model estimating the probability of owning a house, housing equity was added as explanatory variable in order to find out if individuals who own a house are less likely to other retirement savings vehicles. Homeownership is seen as a form of retirement provision for many people (Figure 27 see also Versicherungskammer Bayern 2009). Since most individuals have to repay the mortgage it is likely that these individuals have less money left to save for retirement in other savings devices. This presumption, however, has not been confirmed by the data. Instead house owners are more likely to also own a capital life insurance than individuals who do not own a house.

This positive relationship might be explained by risk aversion. Buying a house entails a great financial burden for many couples and families. In the case of the death of one partner it might not be possible to pay back the housing loan. A capital life insurance would then decrease the financial burden for the remaining partner and also reduce the pressure to sell the house. Another reason why many house owners also have a capital life insurance could be that this instrument was an attractive house financing tool 10 to 20 years ago because of high interest rates and an exemption from taxation for out-payments.

Theoretically, it is expected that individuals with a low future orientation are less likely to save for retirement. This effect, however, is significant only for owning "Riester-Pension" and capital life insurance. It has also been investigated if the kind of employment effects old age provision. The reference group are individuals who are unemployed or not employed for other reasons. The analysis shows that the self-employed are more likely to own a capital life insurance, other private pensions or a house. White- and blue collar-workers are more likely to own a company pension plan than not employed individuals and public servants are even more likely to own a house than self-employed. A company pension is connected with the work contract, hence individuals who are not employed may not have excess to a company pension plan, the same holds for self-employed.

Nevertheless, it could be that not employed and self-employed have some company pension entitlements because they have been employees in the past. While public authorities offer company pensions to their blue- and white-collar workers, civil servants generally are not offered a company pension, which explains the significant negative coefficient for public servants in the probit estimation.

Homeownership is more likely for public servants and for self-employed as compared to individuals who are not employed. Since public servants have a secure job generally for their whole life, they can take on credits without having to fear that they suddenly get unemployed and being unable to repay the credit. Their job also makes it easier to get a housing credit than for anyone else. An explanation of why self-employed are more likely to own a house could be inheritance. Often being self-employed, owning a company or the like has been passed on from generation to generation. In this respect it could also be that housing equity has been inherited.

### 6.4.1 Discussion

Individuals who do not like to deal with financial matters are less likely to think about an appropriate retirement income before they start to save for retirement but on the contrary are not less likely to save for retirement.[82] For these individuals the effort costs of dealing with retirement provision are especially high, to the extent that these costs are higher than the utility to be gained from retirement planning. For that reason they may prefer to skip the first stages of the path towards retirement and start saving immediately. Leinert (2005) suggests a similar behavior if heuristics are available which both propose saving a certain amount and the product to be chosen. Individuals might not be able to solve a dynamic optimization problem before starting to save for retirement, or individuals do not want to spend much time to think about retirement. Individuals with limited intellectual capabilities who may not be able to arrive at an optimal solution are also called boundedly rational (Thaler 1990, 1994).

If heuristics are available, they reduce the effort costs of planning for retirement and may induce people to save for retirement which would otherwise never have started. An example for a heuristic would be the "Riester-Subsidy". Everyone saving at least four per cent of is gross yearly income in a certified "Riester-Product" is entitled to the full subsidy. Four per cent could therefore be interpreted as optimal savings from individuals who decide to use the heuristic in-

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[82] For the results see Appendix 9.4, Table 48 for analysing the likelihood that an individual's thinks about an appropriate retirement income and Appendix 9.7 Table 76 and the following for estimating the probabilitiy that someone owns a retirement savings product.

stead of solving a dynamic maximisation problem. Heuristics are not the best initial solution for maximizing life time utility but they have the potential to improve the financial situation of individuals who would otherwise never start to save for retirement.[83] Individuals who apply a heuristic, which suggests how much to save and where to invest, decide not to think about an appropriate retirement income and investment. For them the effort costs outweigh the potential utility gained from dealing with retirement provision themselves.

**Figure 29: Percentage of Individuals Who Have Not Thought about Retirement Income but still Own a Retirement Savings Vehicle**
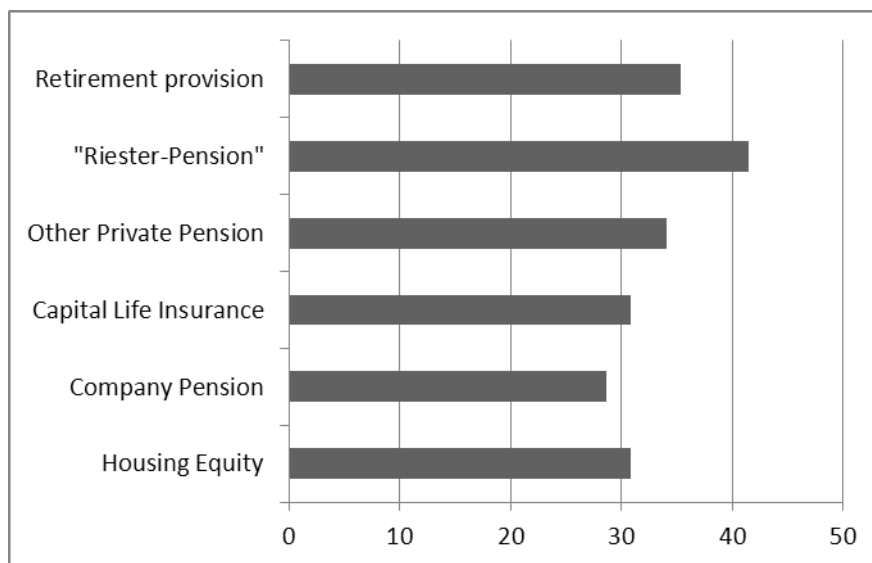


Source: FNA-Data, 1. Telephone-interview, weighted, in percentage

Figure 29 shows the percentage of individuals who own one of the depicted savings devices but have never thought about the amount of retirement income they would need to live an adequate life during retirement. While most of the respondents use these savings devices to save for retirement, generally about 30% of those individuals never thought about how much income is actually needed during retirement. These descriptive results suggest that many individuals have used heuristics which simplified their decision about how much to contribute. Individuals owning a company pension seem to be most engaged in thinking about retirement income while individuals owning a "Riester-Pension" are least likely to have thought about retirement income.

It is likely that the pension plan information provided by the employers through written material or seminars encourages people to think more thoroughly about retirement. In chapter 6.6 it will be shown that several respondents attended a company based retirement seminar and in chapter 5.1 it has been shown that

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[83] For more information about heuristics and their effect on retirement saving see chapter 2.1.

low educated are especially well informed about the company pension. It is likely that these low educated individuals not only know that they have the right to deferred contributions but that they are also better informed about the company pension in general. Evidence presented from Bayer et al. (2009) has shown that a better knowledge of the company pension plan is likely to increase participation rates in the pension plan especially for non-highly compensated workers.

The multivariate regression conducted in this chapter shows that education has a significant influence on the possession of company pension plans in the FNA-Data. The reference group are individuals with low education. Compared to the reference group, the middle and higher educated are less likely to save for retirement via a company pension plan. It could be that lower educated individuals are more open to pension plan information provided by trade unions or the staff association. For low educated individuals searching for information, processing it and consulting different pension plan provider bears higher effort costs than for highly educated individuals, hence, they are pleased if some trustworthy organization brings the information to them. This reasoning also provides a theoretical explanation, as to why low educated individuals are more likely to be informed about the company pension and more likely to file a company pension than middle and high educated individuals.

Besides education, income is also a significant predictor of the possession of a company pension plan. The higher an individual's net income the greater the probability of owning a company pension plan. This finding is in line with Leinert (2003) who also found that individuals with high incomes are more likely to have a company pension plan than individuals with low incomes. The "Riester-Pension" in contrast attracts individuals earning a low income. Coppola and Reil-Held (2009) calculated the "Riester-Subsidy" as a fraction of total contributions to the "Riester-Pension" plan. They state that the "Riester-Subsidy" often constitutes 50% of total contributions for individuals with low income or families with children. Hence the incentive for individuals who have a low income or many children to file a "Riester-Pension" is high. The results from the empirical estimations show that this monetary incentive indeed is effective. It can be observed that the likelihood of owning a "Riester-Pension" plan is significantly higher as the number of children increases.

Compared to the company pension and the other retirement savings vehicles, the "Riester-Pension" has the advantage that it attracts savings from the group of people for which private savings are most important. These are women, families with children and people with a low income. However, according to the data many "Riester-Savers" have not thought about an appropriate retirement income before starting to save (Figure 29). This number is larger than for the other savings vehicles. It is likely that the heuristics provided by the government

with respect to the "Riester-Pension" are attractive such that many decide to start saving right away, without any retirement planning. Problems which could arise due to the choice of a specific savings rate have been discussed in chapter 2.3.5. Saving 4% of gross income might not be an appropriate savings rate for everyone. Actually, a savings rate of 4% for someone who is expecting a high statutory pension, has housing equity and other savings contracts, might be too high. On the other hand for someone expecting a low statutory pension and having no other sources of wealth, a savings rate of 4% is likely to be too low.

Owning a "Riester-Pension", a house or a capital life insurance is not dependent on income. A reason could be that home equity is for many people in Germany the first choice of providing for retirement (Versicherungskammer Bayern 2009). Hence individuals start to save, for example in a building savings contract or a capital life-insurance, to build a house in the future regardless of their actual income. In this case, the building contract is due and they start building their house. Income is also not a significant predictor for owning a capital life insurance. In this case it could be that financial advisors from banks and insurance companies were able to convince consumer that a capital life insurance is either a good vehicle to finance home equity or a necessary insurance to protect the family from financial problems in the case of death. Furthermore, before the pension reforms in 2001 and 2004, capital life insurances were an attractive, tax exempt, savings vehicle to accumulate wealth for retirement which made it easier for financial advisors to convince consumers that having a capital life insurance would be beneficial, regardless of earnings.

In order to be able to judge if the product presented by an advisor from a bank or insurance company is suitable for an individual it is necessary that individuals have a basic knowledge about differnet savings products. Furthermore, if individuals feel confident in dealing with financial products the barrier to talk to financial advisors and choose a product is much lower than for someone who does not feel confident. It has been found that being overconfident is generally associated with a higher probability of saving for retirement while being under confident decreases the probability of owning one of the retirement savings products analysed in Table 35. A problem which overconfidence might entail is that individuals choose a product which might not be optimal for their personal circumstances. It will, however, be assumed that the mistake has less negative effects on future utility than abstaining from retirement savings completely. Choosing the wrong savings product is less likely when individuals are actually well informed about the available savings products. The influence of actual pension knowledge has also been found to be positively related to two of the retirement savings products when IV estimation had been conducted. It would therefore be likely that retirement seminars which increase actual pension knowledge

and the confidence in the participants own knowledge can foster actual retirement savings. Furthermore, retirement seminars may help individuals to choose the product and amount of saving which accords best with his/her individual needs.

An interesting result in this respect is that individuals who like to deal with financial matters are not significantly more likely to own one of the five retirement savings products (Appendix 9.7, Table 76 and the following). It might be that individuals feel obliged to save for retirement because they understand that there is a necessity to insure for retirement privately even though they do not like to deal with financial matters. Each day individuals are confronted with reports which argue that the statutory pension entitlements will not suffice to keep the standard of living high when old. These reports increase the psychological costs connected with doing nothing in terms of private old-age provision. Another explanation for the insignificance of the preference to deal with financial matters could be that individuals who do not like to deal with financial matters skip the planning stages and start saving for retirement without having thought a great deal. This is in line with the finding in chapter 6.1 that individuals who do not like to deal with financial matters are less likely to think about an appropriate retirement income.

In chapter 5.1 it has been found that older individuals seem to be more familiar with the capital life insurance than younger respondents. The capital life insurance is a product which has been on the market for a long time and which has widely been used as an instrument to provide for retirement. Young individuals on the other hand are better informed about the "Riester-Pension" than old respondents. In contrary to the older generations, the young have grown up with the "Riester-Pension".

Besides the reason that younger individuals have grown up with the "Riester-Pension" and are therefore more familiar with this concept there could also be another reason of why the capital life insurance is less attractive for younger cohorts. Figure 27 has shown that many individuals own a capital life insurance in order to provide for retirement. In 2001 the government introduced the "Riester-Pension" and provides lump sum subsidy for each individual owning a "Riester-Pension" and an additional subsidy for each child.[84] Furthermore, the government passed a law, the Alterseinkünftegesetz, which abolished the tax exemption for capital gains within capital life insurance for all new contracts filed after 31.12.2005. For new contracts, 50% of the capital gains will be taxed if individu-

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[84] A detailed description of the "Riester-Pension" can be found in chapter 2.2.

als hold the contract at least 12 years and choose not to pay-out the capital before the age of 60. Otherwise 100% of the capital gains would be subject to taxation. Hence the government has directed demand toward the "Riester-Pension".

**Figure 30: Capital Life Insurance and "Riester-Pension" According to Age**
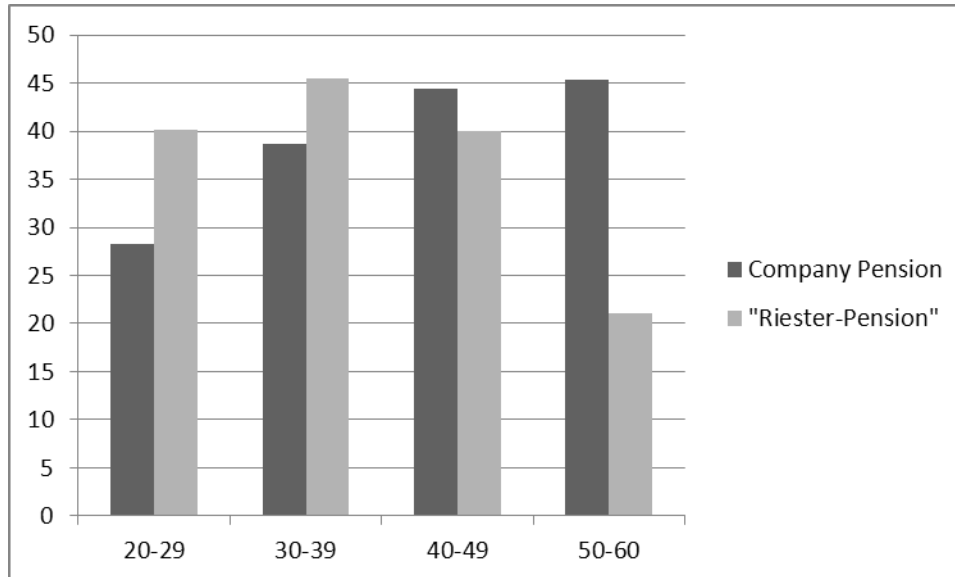


Compared to capital life insurance the "Riester-Pension" has many features which should according to the findings from behavioral economics increase the participation rate.[85] Firstly, fixing the amount to be eligible to receive the full "Riester-Subsidy" decreases effort costs. Individuals do not have to invest time and money to think about an appropriate savings rate. Secondly, the subsidy itself increases future utility of saving within a "Riester-Pension" plan. Thirdly, the certification of "Riester-Products" makes the impression that these kinds of products are trustworthy. The fourth and last point is that the "Riester-Pension" has been formulated by the government which could be interpreted as a signal of adequacy concerning the rate of savings and the product itself. As a result of the different incentive structure of the "Riester-Pension" and capital life insurance it could be that young individuals prefer to save in a "Riester-Pension" which could lead to a substitution of savings away from capital life insurances towards "Riester-Pension plans" in the future.

The FNA-Data provides evidence for this assumption. Figure 30 shows that for the cohort between 50 and 60 years, the capital life insurance is the savings vehicle of choice. However, the healthy margin of capital life insurances is fading away as cohorts become younger. In the cohort of 20-29 years old, the "Riester-Pension" even outperforms the capital life insurance. Age also remains a signif-

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[85] Theoretical discussion in chapter 2.1 and empirical evidence in chapter 2.3.4 and 2.3.5.

icant factor influencing the owning of a "Riester-Pension" if many other variables are taken into account. This is different to owning capital life insurance were age is not a significant predictor when other variables are added.

## 6.5 Joining a Retirement Seminar

Joining a retirement seminar like "Altersvorsorge macht Schule" could be beneficial at each stage on the path towards retirement. Theoretically, retirement seminars promise to improve and increase savings behavior. The extent to which seminars are effective depends on the individuals taking part in the seminar. If participants are generally interested in retirement issues and may already have a private pension plan than the effect of the course in terms of behavior change will be smaller than if the participants were not previously engaged in any form of retirement provision (e.g. Bernheim and Garrett 2003).

**Table 37: Questions about Participation in a Retirement Seminar**

| 1 | Would you participate in a 12-hour retirement seminar, which is extended over several weeks and provided at your place of work or adult education center that provides the information in cooperation with the German statutory pension insurance? |
|---|---|
| | (Of course) (Probably) (Rather not) |
| 2 | Would you participate in a 90-minute retirement seminar, provided at your place of work or adult education center that provides the information in cooperation with the German statutory pension insurance? |
| | (Of course) (Probably) (Rather not) |

The literature reviewing their effectiveness has shown that they can lead to adjustments in retirement behavior, like the amount of savings or the retirement age, which would increase individual utility (Bayer et al. 2009, Honekamp et al. 2012). Many individuals plan to change their aspired retirement age, retirement income or plan to save more or to start saving for retirement. The positive effects have often been mitigated by the low percentage of individuals who actually translate their plans into action (Clark et al. 2006, Duflo and Saez 2003). In the second telephone interview of the FNA-Data, respondents received the two questions depicted in Table 37.

In the cases where individuals answered that they would "rather not" participate in the seminar, the question about why they would not participate followed. The answers to all three questions are depicted in Figure 32 and Figure 31. Figure 31 shows that the willingness to participate in the seminar is greater for the 90-minutes seminar than for the 12-hours seminar. This difference can possibly be explained by a lack of time which many people stated as a reason for not partici-

pating in the seminar (Figure 32). Overall about 35% of respondents would "of course" or "probably" take part in the 12-hours course (intensive course). In the 90-minute course (introductory course) more than half of the respondents, 53%, would be likely to participate in the course.

**Figure 31: Potential Participation in Retirement Seminars**
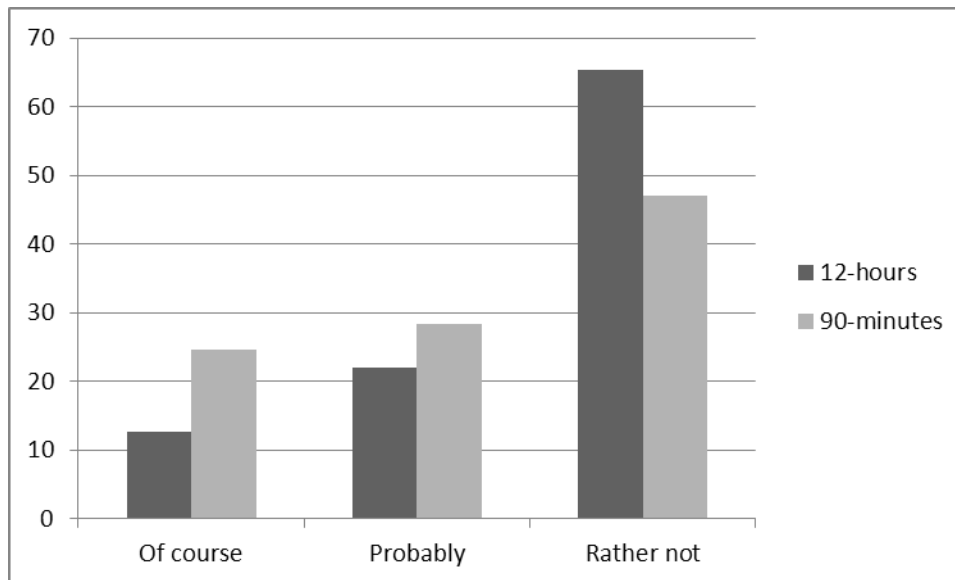


Source: Second telephone interview FNA-Data, N=560, weighted.

The main reason why individuals would "rather not" participate in the intensive-course was a lack of time. This reason for not participating was followed by the belief that such a course would not be of any assistance for the retirement planning of the individual, that the individual is already well informed or that they are already well prepared for retirement. Comparing the reasons for not participating between the intensive- and the introductory course it is evident that on the one hand the lack of time argument is a greater problem for the intensive than for the introductory course but on the other hand the introductory course is more often assessed as being of no assistance for the retirement planning of the individual.

A similar argument is also reflected in the open answers ("other reasons" Figure 32), in that some individuals rate the introductory course as too short. Furthermore, some individuals stated that they are already well informed about retirement issues, that the partner is responsible for financial issues, that there are plenty of other sources of information, that the respondent will soon retire, that the respondent does not believe that these seminars provide objective information, that they prefer an individual counselling and/or that they already receive individual counselling. Finding out more about why individuals are not willing to participate in retirement seminars is important for the design of those seminars. Knowing why individuals are reluctant to participate can help to in-

crease the number of participants by reshaping existing seminars or introducing new seminars which meet the requirements of individuals.

**Figure 32: Reasons for Not Participating in a Retirement Seminar**
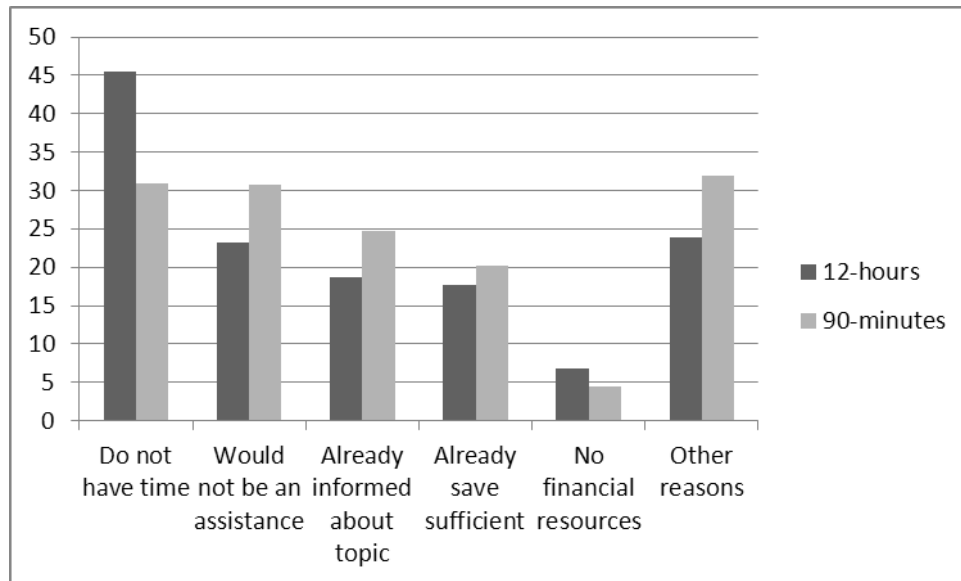


Source: Second telephone interview FNA-Data, N=560, weighted.

Table 38 and Table 39 provide information about further factors influencing the decision to participate in either the intensive or the introductory course. Generally, the explanatory variables constitute the base variables which have already been discussed and which also have been used in all previous analysis in connection with the path towards private retirement saving.

Additional model-specific explanatory variables are age squared and a variable measuring if regular savings up to date already suffice to live an adequate retirement live. It will be assumed that individuals' interest in retirement issues generally increases with age. Nevertheless, individuals who have only a few years until they approach retirement, may think that a retirement seminar would not pay of anymore, since there is not much time to save for retirement left. As individuals reach a certain age, the probability of participating in a seminar is going to decline again. To account for this age effect, the variable age squared has been implemented into the model.

The other model specific variable is if individuals think that their savings already suffice. It is expected that individuals who are already saving sufficient are less likely to attend a retirement seminar. Optimizing the savings strategy or just receiving the confirmation that the chosen savings strategy is correct could, however, also be an incentive for some individuals to participate, even though actual savings would already suffice. Nevertheless, the expected relationship between "savings suffice" and "participation" is expected to be negative because it is assumed that most individuals would not invest the time and effort for the

seminar if they already save adequately. Table 38 presents the results from four different model specifications estimating the probability of joining a 12 hour intensive retirement course. The specifications vary by the method of estimation which are probit or instrument variable estimation. Furthermore, the explanatory variables vary. Two of the models are estimated without the interaction terms and the other two models with interaction terms.[86] Table 39 is similarly structured but here the probability to join a 90 minutes introductory course has been investigated. The potential endogenous variable is again pension literacy. However, intuitively it does not seem likely that someone would be willing to join a seminar is more financially literate because of his/her willingness to join.

This assumption has also been supported by the Wald test for exogeneity, testing $H_0: \rho = 0$ results in p-values of about 0.6 for the intensive course and about 0.2 for the introductory course. Henceforth $H_0$ has not been rejected at conventional levels. As in the chapter before the variables objective knowledge, time preferences and procrastination are deemed theoretically relevant for the decision to join a retirement seminar. Therefore I will start by presenting the results concerning the three hypotheses. In a simplified way, hypothesis one states that individuals who have a sound pension knowledge are more likely to save for retirement than individuals with a lack of pension knowledge. The reasoning of this hypothesis however, cannot be applied when analysing the probability of joining an introductory or an intensive retirement course because in this case it is to be expected that individuals who already have a sound knowledge of pension matters are less likely to join these courses.

Indeed Table 38 and Table 39 indicate that individuals with a high degree of actual pension knowledge are significantly less likely to join an introductory retirement seminar but there is no significant effect for joining the intensive course. Hypothesis two states that an additional amount of future orientated capital (actual pension knowledge) affects individuals with different rates of future orientation differently. More specifically, if an individual with a high initial preference for the present acquires an additional amount of pension knowledge, than this additional pension knowledge increases his/her probability of owning a retirement product by a greater amount that it would increase the probability for someone who is already highly future orientated. Similarly to hypothesis one, this hypothesis cannot be applied to joining a retirement seminar.

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[86] Further variations for the model can be found in the Appendix 9.8. On the one hand a factor variable approximating procrastination on financial and retirement issues has been implemented and on the other hand the variables which were part of the factor variable have been implemented into the model. One of these variables is the variable procrastination which is also part of the analysis in this chapter.

**Table 38: Determinants of Potential Retirement Seminar Participation, Intensive Course**

| Would you join the Intensive Course (1:yes, 0:no) | 6.5(1) Probit | 6.5(2) IV-Probit | 6.5(3) Probit Interaction | 6.5(4) IV-Probit Interaction |
|---|---|---|---|---|
| Male | -0.03 | -0.08 | -0.03 | -0.07 |
| | (0.14) | (0.18) | (0.14) | (0.18) |
| Age | 0.11** | 0.11* | 0.11** | 0.10* |
| | (0.05) | (0.06) | (0.05) | (0.06) |
| Age Squared | -0.00** | -0.00* | -0.00** | -0.00* |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | -0.24* | -0.25* | -0.24* | -0.25* |
| | (0.15) | (0.15) | (0.15) | (0.15) |
| Children | 0.01 | 0.03 | 0.01 | 0.03 |
| (0 no – 4 four or more kids) | (0.06) | (0.08) | (0.06) | (0.08) |
| Middle Education[a] | -0.04 | -0.07 | -0.04 | -0.07 |
| | (0.20) | (0.22) | (0.20) | (0.22) |
| High Education[a] | 0.21 | 0.16 | 0.21 | 0.16 |
| | (0.20) | (0.25) | (0.20) | (0.25) |
| Middle Individual net Income[b] | 0.19 | 0.16 | 0.20 | 0.17 |
| | (0.17) | (0.20) | (0.17) | (0.20) |
| High Individual net Income[b] | -0.10 | -0.14 | -0.09 | -0.14 |
| | (0.21) | (0.26) | (0.21) | (0.26) |
| Middle Wealth[c] | -0.22 | -0.27 | -0.22 | -0.27 |
| | (0.20) | (0.23) | (0.20) | (0.23) |
| High Wealth[c] | -0.12 | -0.18 | -0.12 | -0.18 |
| | (0.21) | (0.25) | (0.21) | (0.25) |
| Blue- or White Collar Worker[d] | 0.23 | 0.20 | 0.23 | 0.20 |
| | (0.17) | (0.19) | (0.17) | (0.19) |
| Self-employed[d] | -0.55** | -0.51* | -0.55** | -0.51* |
| | (0.22) | (0.28) | (0.22) | (0.27) |
| Civil Servant[d] | 0.10 | 0.22 | 0.11 | 0.22 |
| | (0.27) | (0.44) | (0.27) | (0.43) |
| Actual Pension Knowledge | 0.05 | 0.29 | 0.05 | 0.29 |
| (0 = zero – 6 = six question correct) | (0.07) | (0.68) | (0.07) | (0.68) |
| Future Orientation | 0.14* | 0.11 | 0.07 | -0.01 |
| (factor1, Table 5) | (0.08) | (0.12) | (0.25) | (0.35) |
| **Procrastinate on Financial Matters** | -0.14** | -0.15** | -0.14** | -0.15** |
| (1 agree – 4 not agree) | (0.06) | (0.07) | (0.06) | (0.07) |
| Underestimate Knowledge[e] | -0.05 | -0.23 | -0.04 | -0.22 |
| | (0.16) | (0.54) | (0.16) | (0.53) |
| Overestimate Knowledge[e] | 0.14 | 0.39 | 0.15 | 0.39 |
| | (0.16) | (0.71) | (0.16) | (0.71) |
| Actual Savings Suffice | -0.19 | -0.20 | -0.19 | -0.20 |
| | (0.14) | (0.15) | (0.14) | (0.14) |
| Procrastinate*Future Orient. | | | 0.02 | 0.03 |
| (interaction term) | | | (0.07) | (0.08) |
| A.P.Knowledge*Future Orie. | | | 0.01 | 0.02 |
| (interaction term) | | | (0.07) | (0.08) |
| Constant | -2.29** | -2.49** | -2.27** | -2.46** |
| | (1.10) | (1.19) | (1.10) | (1.18) |
| Wald test[f] | | -0.22 | | -0.22 |
| | | (0.67) | | (0.66) |
| N | 542.00 | 542.00 | 542.00 | 542.00 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, testing the null hypothesis $H_0: \rho = 0$.

**Table 39: Determinants of Potential Retirement Seminar Participation, Introductory Course**

| Would you join the Introductory Course (1:yes, 0:no) | 6.5(5) Probit | 6.5(6) IV-Probit | 6.5(7) Probit Interaction | 6.5(8) IV-Probit Interaction |
|---|---|---|---|---|
| Male | -0.22 | -0.02 | -0.22 | -0.02 |
| | (0.14) | (0.19) | (0.14) | (0.18) |
| Age | -0.01 | 0.01 | -0.01 | 0.01 |
| | (0.05) | (0.05) | (0.05) | (0.05) |
| Age Squared | -0.00 | -0.00 | -0.00 | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | -0.13 | -0.05 | -0.14 | -0.05 |
| | (0.14) | (0.14) | (0.14) | (0.14) |
| Children | 0.06 | -0.02 | 0.07 | -0.02 |
| (0 no – 4 four or more kids) | (0.06) | (0.07) | (0.06) | (0.07) |
| Middle Education[a] | -0.02 | 0.09 | -0.02 | 0.09 |
| | (0.20) | (0.20) | (0.20) | (0.19) |
| High Education[a] | 0.27 | 0.31 | 0.27 | 0.31* |
| | (0.20) | (0.19) | (0.20) | (0.19) |
| Middle Individual net Income[b] | -0.13 | -0.02 | -0.13 | -0.02 |
| | (0.17) | (0.19) | (0.17) | (0.19) |
| High Individual net Income[b] | -0.30 | -0.04 | -0.30 | -0.04 |
| | (0.21) | (0.28) | (0.21) | (0.28) |
| Middle Wealth[c] | -0.08 | 0.09 | -0.08 | 0.10 |
| | (0.18) | (0.20) | (0.18) | (0.20) |
| High Wealth[c] | 0.04 | 0.22 | 0.04 | 0.22 |
| | (0.19) | (0.20) | (0.19) | (0.19) |
| Blue- or White Collar Worker[d] | 0.30* | 0.28* | 0.31* | 0.28* |
| | (0.17) | (0.17) | (0.17) | (0.17) |
| Self-employed[d] | -0.13 | -0.18 | -0.12 | -0.18 |
| | (0.20) | (0.20) | (0.20) | (0.20) |
| Civil Servant[d] | -0.04 | -0.43 | -0.03 | -0.43 |
| | (0.27) | (0.32) | (0.27) | (0.32) |
| Actual Pension Knowledge | -0.15** | -0.88*** | -0.15** | -0.90*** |
| (0 = zero – 6 = six question correct) | (0.07) | (0.34) | (0.07) | (0.31) |
| Future Orientation | 0.06 | 0.12* | -0.09 | 0.20 |
| (factor1, Table 5) | (0.07) | (0.07) | (0.25) | (0.26) |
| **Procrastinate on Financial Matters** | -0.23*** | -0.11 | -0.23*** | -0.11 |
| (1 agree – 4 not agree) | (0.06) | (0.11) | (0.06) | (0.11) |
| Underestimate Knowledge[e] | 0.06 | 0.63** | 0.07 | 0.64** |
| | (0.16) | (0.31) | (0.16) | (0.29) |
| Overestimate Knowledge[e] | -0.13 | -0.89** | -0.12 | -0.92** |
| | (0.16) | (0.38) | (0.16) | (0.36) |
| Actual Savings Suffice | 0.08 | 0.11 | 0.09 | 0.11 |
| | (0.14) | (0.13) | (0.15) | (0.13) |
| Procrastinate*Future Orient. | | | 0.05 | -0.01 |
| (interaction term) | | | (0.07) | (0.07) |
| A.P.Knowledge*Future Orie. | | | 0.01 | -0.03 |
| (interaction term) | | | (0.07) | (0.06) |
| Constant | 1.40 | 1.90* | 1.45 | 1.89* |
| | (1.07) | (0.98) | (1.07) | (0.97) |
| Wald test[f] | | 0.86 | | 0.90 |
| | | (0.67) | | (0.66) |
| N | 542.00 | 542.00 | 542.00 | 542.00 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, testing the null hypothesis $H_0: \rho = 0$.

Table 38 and Table 39 also reveal that the interaction effect does not significantly influence the probability to join a retirement seminar. In contrast to the first two hypothesis, the third hypothesis is applicable in this setting. The hypothesis is split into a strict and a relaxed version. The strict version implies that present biased preferences do not necessarily result in procrastination. If individuals are aware about their tendency to procrastinate, they can take measures to overcome procrastination. As a result these individuals may not be less likely to join a retirement seminar than individuals who are future orientated. Empirically this would mean that the coefficients of future orientation, procrastination and the interaction of those variables should be significant and the predicted probabilities should look like the ones in Figure 16 from chapter 4.3. The relaxed version of the hypothesis would only require the variable approximating if someone is aware of his/her potential procrastination behavior is negative and significant.

Having a look at Table 38 and Table 39 it can be observed that the interaction terms are not significant. Hence there is no evidence for the strict version of hypothesis three to be true. The variable procrastination on its own is, however, significant and negative in all model specifications estimating the probability of joining the intensive course. This is evidence in favor of the light version of hypothesis three.

The interaction terms are neither on their own nor jointly significant. They nevertheless often change the size and significance of the coefficients from which they are constructed considerably. In order to avoid this distortion, the following results are taken from the estimations which do not consider the interaction terms. For the intensive course the predicted age effect is supported by the data. Furthermore married or cohabiting individuals are less likely to be willing to join an intensive course than not married or cohabiting individuals. A significant and negative coefficient can also be observed for self-employed, who are, compared to the control group of individuals who are not employed, less willing to join an intensive course. Individuals who stated that they sometimes procrastinate on financial matters are more likely to participate in the seminar than individuals who state that they are rather less likely to procrastinate.

Table 39 shows that for the introductory course blue- and white-collar workers are significantly more likely to join such a course than unemployed individuals. The variable approximating actual pension knowledge has a significant and negative sign, which implies that individuals who have a good understanding of pension matters are less likely to be willing to join the seminar than individuals who were not able to answer many of the pension related questions correctly. As in the previously discussed model concerning the intensive course, people who state that they sometimes procrastinate on financial matters are more willing to attend the introductory seminar than individuals who state that they do not pro-

crastinate on financial matters. This finding is, however, less robust than the previous results, while the sign is the same over all models, the coefficients are only significant in the probit models but not in the instrument variable estimations. There are also two variables which are significant in the instrument variable estimation but not in the probit specification. These are the variables measuring the tendency to under- or overestimate ones pension level. Individuals who underestimate their pension as compared to individuals, who estimate their knowledge correctly, are more likely to join the introductory course and individuals who overestimate their pension level are less likely to join the course.

The results of Table 94 and Table 95 of the appendix which add several variables to the model which are connected with procrastination, point to a weak negative relationship between having time to deal with financial matters and the willingness to join one of the seminars.[87] This would mean that individuals who state that they have sufficient time to deal with financial matters are less likely to join the seminar than individuals who state that they do not that much time to deal with financial matters. This finding somehow contradicts the previous descriptive finding that many individuals stated they would not participate because they do not have time. It could be that the time to deal with financial matters is interpreted differently for some this might imply checking the account balance regularly and for others this might imply finding the investment product with the highest return on investment. This finding can therefore not neglect the importance of having sufficient time when deciding to join a seminar. Another weak finding from the results of Table 94 and Table 95 is that individuals who like to deal with financial matters are more likely to join a retirement seminar.

### 6.5.1 Discussion

Knowing the reasons why individuals refrain from joining a retirement seminar can help to increase participation rates in the future. Existing seminars could be reshaped and new seminars could be introduced such that they meet the requirements of individuals who would otherwise rather not participate. Retirement seminars are often targeted at specific groups of people. If it is not possible to get these individuals to participate in the seminar, the seminar could be rated as not effective. Target groups of retirement seminars are generally individuals who are expected to acquire only low statutory pension claims. These are

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[87] A weak relationship or weak finding in this paragraph means that the variable is only significant in either the probit or the instrument variable estimation and not in both.

people with low income, low education and women (Bundesministerium für Arbeit und Soziales 2008b).

The analysis of the FNA-Data has shown that there is no evidence that the courses are more likely to attract individuals with low income or education. Neither is there strong evidence that women are more willing to participate than men. Indeed the coefficient "male" is always negative, suggesting that women are more likely to participate. This finding, however, is not robust, since the negative coefficient is only significant in one of the model specifications estimating the probability to join an introductory course in the appendix (Table 95). It might be possible to increases the number of women participating in seminars, if introductory seminars were especially targeted at women. Within this seminar women have to be motivated to deal with their private retirement provision in order to increase the number of women who decide to join an intensive course afterwards. Increasing the financial education of women is necessary because women have generally been found to be less well informed about financial matters than men (e.g. Honekamp and Schwarze 2010, Lusardi and Mitchell 2008, Rooij van et al. 2011a). Moreover, women are more likely to face a pension gap than men because they often work part-time after the birth of their first child, which reduces their pension entitlement from the statutory pension system.

An important result is, that individuals with a low degree of pension knowledge are significantly more likely to join an introductory seminar that individuals with a high degree of financial knowledge. The reason might be that individuals who already know a lot about retirement provision think that a 90 minutes seminar would not provide any new information. A similar reasoning can be put forward when explaining why individuals who overestimate their pension knowledge would rather not participate in the introductory course while individuals who underestimate their knowledge are more likely to participate in the introductory course.

When comparing this result from the introductory course with the results from the intensive course, a different picture appears. Indeed the following results are not significant but a tendency can be observed. The coefficients of actual pension knowledge as well as the coefficient of overestimating ones pension level are positive and the coefficients of underestimation are negative, indicating that the more confident and knowledgeable individuals are, more likely to join the intensive course. For the design of an introductory course it should therefore be taken into account that the participants are likely to know less about pensions and also have low confidence in their knowledge. The introductory course can work on both and increase knowledge and confidence to the extent that they also follow the intensive course afterwards.

The variable measuring whether someone admits that he or she tends to procrastinate on financial matters, significantly influences the decision to participate in both of the seminars. Individuals who know that they are prone to procrastination can invest in resources to overcome their self-control problem (Becker and Mulligan 1997, O'Donoghue and Rabin 1998). In this case the investment would be participating in the seminar. People who are prone to procrastination may evaluate the seminar as an opportunity to stop procrastination. The seminar could then also serve as a commitment device, committing the individual to start saving for retirement after the course because otherwise the course would have been a waste of time and effort.

Individuals who are naïve, which means that they have not realized that they procrastinate on financial matters in contrast, will be less likely to participate in the seminar. In this thesis it is not possible to investigate if these individuals will be successful in translating their plans into action after the seminar.[88] It could well be that they start to procrastinate again and never start to save for retirement. This reasoning would be supported by the empirical evidence which found that many individuals do not translate their intentions into action after the seminar (e.g. Choi et al. 2006, Duflo and Saez 2003, Frommert 2008, Honekamp et al. 2012).

Besides the problem of naïveté which prevents individuals from joining a retirement seminar a problem which must not be neglected is time. Having not sufficient time was the main reason why individuals would rather not participate in any of the seminars. This problem was more prevalent in the case of the intensive course than in the introductory course. It would therefore be necessary to think about a structure of seminars which fits into the life of individuals without taking too much time. Suggestions about how existing seminars could be adjusted in order to meet the requirements of the participants in the light of the empirical findings will be provided in the conclusion. Besides attracting women, individuals with low income and education, a further goal for a retirement seminar would be to target individuals who procrastinate, who do not like to deal with financial matters and who are not well informed about pension issues.

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[88] Nor is it possible to investigate if individuals who state that they rather not procrastinate truly do not procrastinate on financial matters or if they are not aware about their procrastination. If individuals do not procrastinate they may already have obtained all relevant information such that a seminar is not necessary.

## 6.6 The Effectiveness of Retirement Seminars and Other Information

The evidence on the effectiveness of retirement seminars so far has been mixed (Hathaway and Khatiwada 2008). Participation is selective so that outcomes are likely to vary depending on the characteristics of the participants. Conclusions can therefore only be drawn for the specific group of people which has been investigated. Generalizations about how a seminar would affect individuals who do not have these characteristics are not possible. Another problem with studying the effect of seminars is that right after the seminar many individuals plan to change their retirement behavior but when asked several months later the number of individuals who have followed through their plans is very low. Conducting an interview right after the seminar is therefore not sufficient to rate the effectiveness of the seminar. The FNA-Data provides the opportunity to assess the effect of retirement seminars and other sources of information while controlling for the characteristic that some individuals like to deal with financial matters and others do not. The two underlying questions are as follows:

**Table 40: Questions About the Use of Different Kinds of Information**

| 1 | Which sources have you used to receive information about financial matters and retirement provision? |
|---|---|
| | No information |
| | Colleagues |
| | Friends, relatives, neighbours |
| | Stiftung Warentest[89] |
| | Internet |
| | Retirement seminar at the company |
| | Other retirement seminar |
| | German Pension Insurance |
| | Consumer Advice Centre |
| | Advisor, bank or insurance company |
| | Independent financial advisor |
| 2 | How willingly do you deal with financial matters? |
| | (1 do not like it – 4 like it very much) |

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[89] Stiftung Warentest is a journal which tests and compares products. A special issue, the "Finanztest" focuses on financial products and regularly also on private retirement provision.

**Figure 33: Sources of Information**
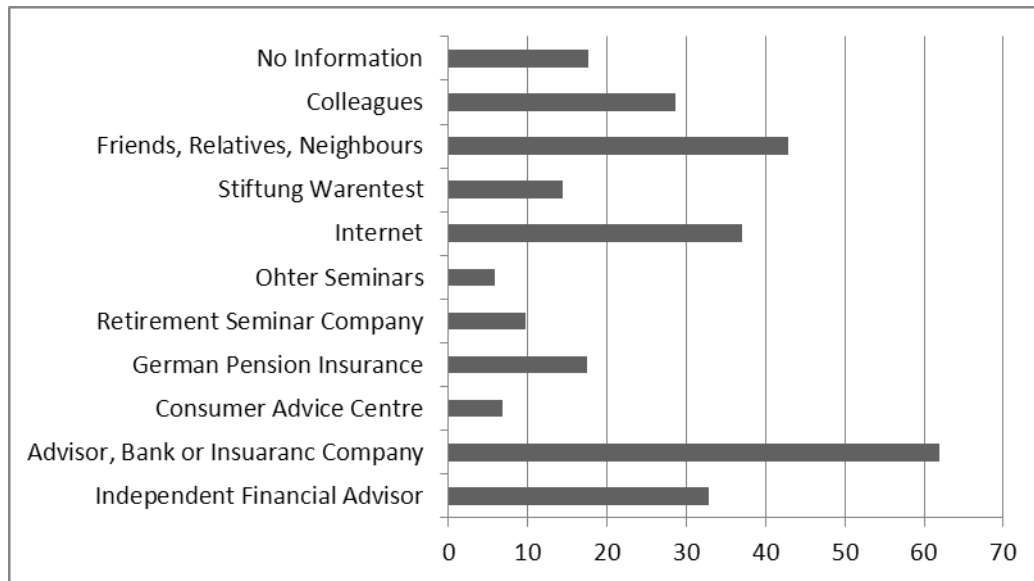
Note: Stiftung Warentest regularly evaluates products concerning certain characteristics. Among others they regularly test financial products.

Figure 33 shows that financial advisors working for banks or insurance companies are the source of information which is most popular. About 62% of the respondents have consulted these advisors to receive information about financial matters and retirement provision. Friends, relatives and neighbours (43%) and the internet (37%) are also frequently consulted for information. For the empirical analysis the sources of advice have been assigned to one of the following four categories:

**Figure 34: Sources of Information Categorized**

|                                          | %  |
|------------------------------------------|----|
| Seminars                                 | 15 |
| Advisor from Bank or Insurance Company   | 62 |
| Independent Financial Advisor            | 33 |
| Neutral Advice                           | 26 |
| Informal Information                     | 51 |
| Information Media                        | 42 |

Note: *Seminars:* Retirement seminar and other seminars; *Neutral Advice:* German Pension Insurance or Consumer Advice Centre; *Informal Information:* Friends, relatives, neighbours, colleagues; *Information Media:* Internet and Stiftung Warentest.

These sources of information will now be implemented into the models estimating the probability of owning one of the five measures to provide for retirement.

**Table 41: The Effect of Different Sources of Information on Saving for Retirement**

| Owning one of the following retirement savings vehicles | 6.6(1) Riester-Pension | 6.6(2) Company Pension | 6.6(3) Other Pension | 6.6(4) Capital Life Insurance | 6.6(5) Home Equity |
|---|---|---|---|---|---|
| Male | -0.15 | 0.05 | -0.16 | -0.05 | 0.11 |
| | (0.11) | (0.11) | (0.11) | (0.10) | (0.13) |
| Age | 0.09** | -0.01 | 0.01 | 0.06 | 0.06 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Age Squared | -0.00*** | 0.00 | -0.00 | -0.00 | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.02 | 0.14 | 0.07 | 0.18* | 0.66*** |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.12) |
| Children | 0.22*** | -0.03 | -0.12** | -0.05 | 0.18*** |
| (0 no – 4 four or more kids) | (0.05) | (0.05) | (0.05) | (0.05) | (0.06) |
| Middle Education[a] | 0.11 | -0.43*** | 0.21 | -0.08 | 0.35* |
| | (0.15) | (0.15) | (0.16) | (0.15) | (0.18) |
| High Education[a] | 0.10 | -0.30** | 0.09 | 0.05 | 0.31 |
| | (0.15) | (0.15) | (0.16) | (0.15) | (0.19) |
| Middle Individual net Income[b] | 0.09 | 0.56*** | 0.13 | 0.04 | 0.12 |
| | (0.12) | (0.13) | (0.13) | (0.12) | (0.16) |
| High Individual net Income[b] | -0.08 | 0.68*** | 0.49*** | 0.20 | 0.03 |
| | (0.16) | (0.15) | (0.16) | (0.14) | (0.19) |
| Middle Wealth[c] | 0.13 | 0.58*** | 0.10 | 0.18 | 0.72*** |
| | (0.14) | (0.15) | (0.16) | (0.13) | (0.14) |
| High Wealth[c] | -0.01 | 0.17 | 0.06 | 0.25 | 1.76*** |
| | (0.15) | (0.15) | (0.16) | (0.16) | (0.18) |
| Home Equity | 0.03 | 0.23* | 0.07 | 0.33*** | |
| | (0.12) | (0.13) | (0.12) | (0.12) | |
| Blue- or White Collar Worker[d] | 0.07 | 0.66*** | 0.13 | 0.29** | 0.05 |
| | (0.13) | (0.13) | (0.14) | (0.13) | (0.16) |
| Self-employed[d] | -0.24 | -0.40** | 0.43*** | 0.43*** | 0.48** |
| | (0.17) | (0.17) | (0.16) | (0.16) | (0.20) |
| Civil Servant[d] | 0.01 | -0.91*** | -0.14 | 0.15 | 0.82*** |
| | (0.22) | (0.24) | (0.22) | (0.21) | (0.31) |
| Future Orientation | 0.21*** | 0.06 | 0.09 | 0.19*** | 0.08 |
| (factor1, Table 5) | (0.06) | (0.06) | (0.06) | (0.06) | (0.07) |
| **Procrastinate on Financial Matters** | -0.03 | 0.01 | -0.05 | -0.01 | 0.08 |
| (1 agree – 4 not agree) | (0.05) | (0.05) | (0.05) | (0.05) | (0.06) |
| Like Dealing with Fin. Matters | 0.07 | -0.00 | 0.10* | 0.03 | 0.05 |
| (1: do not like it – 4 like it very much) | (0.06) | (0.06) | (0.05) | (0.05) | (0.07) |
| Information through Media | 0.11 | 0.08 | 0.11 | -0.19* | 0.11 |
| | (0.10) | (0.11) | (0.10) | (0.10) | (0.13) |
| Independent Finan. Advisor | 0.16* | -0.10 | 0.43*** | 0.28*** | 0.03 |
| | (0.10) | (0.10) | (0.09) | (0.09) | (0.12) |
| Advis. Bank or Ins. Company | 0.31*** | -0.01 | 0.10 | 0.23** | 0.32** |
| | (0.11) | (0.11) | (0.10) | (0.10) | (0.13) |
| Neutral Advice | -0.16 | 0.01 | 0.11 | 0.07 | -0.27* |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.14) |
| Informal Advice | 0.00 | 0.04 | 0.25** | 0.10 | -0.08 |
| | (0.11) | (0.11) | (0.10) | (0.10) | (0.13) |
| Finan.- / Retirememtseminar | 0.07 | 0.46*** | 0.02 | -0.17 | -0.10 |
| | (0.13) | (0.13) | (0.12) | (0.12) | (0.16) |
| Constant | -2.29*** | -1.12 | -1.65** | -2.16*** | -3.51*** |
| | (0.78) | (0.79) | (0.79) | (0.75) | (0.93) |
| N | 959.00 | 959.00 | 959.00 | 959.00 | 959.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

Because the acquisition of knowledge by consulting one of these sources of advice influences financial literacy and knowledge, the variables measuring financial literacy as well as the variables mapping the over and under confidence concerning financial knowledge have been omitted from the model. Otherwise the model specification is the same as the one used in chapter 6.4.

Since most of the results of the model have already been presented before, I will concentrate only on the variables of interest in this chapter. These are the variables mapping the sources of advice an individual has used. The reference group is individuals who have not used any source of advice yet. Table 41 reveals that individuals who have joined a retirement seminar are more likely to have a company pension plan. In contrast individuals who have consulted an advisor at their insurance company or bank are more likely to own a "Riester-Pension", a capital live insurance or to have housing equity. Individuals who instead asked an independent advisor for advice are more likely to own other private pension products, the "Riester-Pension" and capital life insurance. Participants who have searched for information in the internet or read the journal provided by Stiftung Warentest are significantly less likely to own a capital life insurance. Furthermore, individuals who turned to the German Pension Insurance or a consumer advice centre are less likely to have housing equity. The last source of advice which has been investigated is informal advice from friends, relatives or colleagues. If someone received informal advice he/she is more likely to own a retirement savings vehicle other than the ones explicitly examined (see model 6.6(3)).

**Table 42: Interest in Financial Matters and Participation Decision**

| How much do you like dealing with financial matters? | Individuals who participated in seminar | |
|---|---|---|
| | N | % |
| Don't like it at all (N=109) | 12 | 12 |
| Don't like it (N=336) | 38 | 13 |
| Like it (N=374) | 66 | 19 |
| Like it very much (N=180) | 74 | 27 |

Source: FNA-Data, 1. Telephone interview.

One problem of measuring the effectiveness of financial information and education is the selectivity of the participants. The variable which measures if someone likes to deal with financial matters has been used to mitigate this problem.

**Table 43: The Effect of Different Sources of Information on Saving for Retirement (interaction)**

| Having a | 6.6(6) Company Pension |
|---|---|
| Male | 0.06 |
| | (0.11) |
| Age | -0.00 |
| | (0.04) |
| Age Squared | 0.00 |
| | (0.00) |
| Married/Cohabiting | 0.14 |
| | (0.12) |
| Children | -0.03 |
| (0 no – 4 four or more kids) | (0.05) |
| Middle Education[a] | -0.43*** |
| | (0.15) |
| High Education[a] | -0.30** |
| | (0.15) |
| Middle Individual net Income[b] | 0.56*** |
| | (0.13) |
| High Individual net Income[b] | 0.68*** |
| | (0.15) |
| Middle Wealth[c] | 0.58*** |
| | (0.15) |
| High Wealth[c] | 0.17 |
| | (0.15) |
| Home Equity | 0.23* |
| | (0.13) |
| Blue- or White Collar Worker[d] | 0.66*** |
| | (0.14) |
| Self-employed[d] | -0.39** |
| | (0.17) |
| Civil Servant[d] | -0.89*** |
| | (0.24) |
| Future Orientation | 0.05 |
| (factor1, Table 5) | (0.06) |
| **Procrastinate on Financial Matters** | 0.01 |
| (1 agree – 4 not agree) | (0.05) |
| Like Dealing with Fin. Matters | 0.02 |
| (1: do not like it – 4 like it very much) | (0.06) |
| Information through Media | 0.08 |
| | (0.11) |
| Independent Finan. Advisor | -0.10 |
| | (0.10) |
| Advis. Bank or Ins. Company | -0.01 |
| | (0.11) |
| Neutral Advice | 0.01 |
| | (0.11) |
| Informal Advice | 0.03 |
| | (0.11) |
| Finan.- / Retirememtseminar | 0.88** |
| | (0.40) |
| Like Deal. Fin.Mat.*Seminar | -0.15 |
| (interaction term) | (0.13) |
| _cons | -1.20 |
| | (0.80) |
| N | 959.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

Furthermore, research has found that the effect of a retirement seminar differs depending on the general interest in retirement issues (Bernheim, Garrett 2003). Looking at individuals who participated in a retirement seminar, Table 42 reveals that a higher percentage of individuals who like dealing with financial matters participated in the seminars than individuals who do not like dealing with financial matters.

In order to prove the findings from Bernheim and Garrett (2003) that the seminar is more effective for individuals who are not interested in retirement issues, an interaction variable has been integrated into the model estimating the probability of owning a company pension. Owning a company pension has been chosen as the dependent variable, on the one hand because the seminars seem to be significant only for company pensions and on the other hand because most of the seminars considered have been conducted within the company, and hence concentrate on the specific features of the company's pension plan. The interaction variables will be "seminar" and "like dealing with financial matters".

Table 43 provides the results of the model with interaction term. The interaction term, however, is not significant at conventional levels. The F-test of joint significance concerning the two interacted variables and the interaction term confirms the significance of all three variables on the 1% level. For an easier interpretation of the results, the predicted probabilities of owning a company pension have been estimated and depicted in Table 44 and Figure 35 respectively.

**Table 44: Delta Method**

| | | | | | _at | Margin | Std. Err | P>\|z\| | 95% Conf. Interval | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1._at | like financial matters | = | 1 | | 1 | 0.31 | 0.08 | 0.00 | 0.15 | 0.47 |
| | seminar participation | = | 0 | | 2 | 0.31 | 0.15 | 0.04 | 0.02 | 0.61 |
| 2._at | like financial matters | = | 1 | | 3 | 0.22 | 0.05 | 0.00 | 0.11 | 0.33 |
| | seminar participation | = | 1 | | 4 | 0.59 | 0.13 | 0.00 | 0.35 | 0.84 |
| 3._at | like financial matters | = | 2 | | 5 | 0.24 | 0.06 | 0.00 | 0.13 | 0.36 |
| | seminar participation | = | 0 | | 6 | 0.41 | 0.10 | 0.00 | 0.21 | 0.60 |
| 4._at | like financial matters | = | 2 | | 7 | 0.30 | 0.08 | 0.00 | 0.15 | 0.45 |
| | seminar participation | = | 1 | | 8 | 0.33 | 0.10 | 0.00 | 0.13 | 0.52 |
| 5._at | like financial matters | = | 3 | | | | | | | |
| | seminar participation | = | 0 | | | | | | | |
| 6._at | like financial matters | = | 3 | | | | | | | |
| | seminar participation | = | 1 | | | | | | | |
| 7._at | like financial matters | = | 4 | | | | | | | |
| | seminar participation | = | 0 | | | | | | | |
| 8._at | like financial matters | = | 4 | | | | | | | |
| | seminar participation | = | 1 | | | | | | | |

The only significant difference can be observed between seminar participation and no seminar participation for individuals who do not like to deal with financial matters rated with value 2. Concerning these individuals who do not like to deal with financial matters very much, seminar participation raises the probability of owning a company pension plan from about 0.22 to 0.59. For individuals who dislike dealing with financial matters even more (value 1) no significant difference between seminar participation and no participation can be observed.

For individuals who like dealing with financial matters, the effect of seminar participation decreases as compared to the individuals who dislike dealing with financial matters rated by a value of 2. The most likely reason for this observation is that individuals who are interested in financial matters have already been engaged in private retirement provision before the seminar. Hence individuals who like to deal with financial matters are less likely to choose the company pension to provide for retirement due to the seminar.

**Figure 35: Adjusted Predictions of Interaction Term between Seminar Particiaption and Like Dealing with Financial Matters**
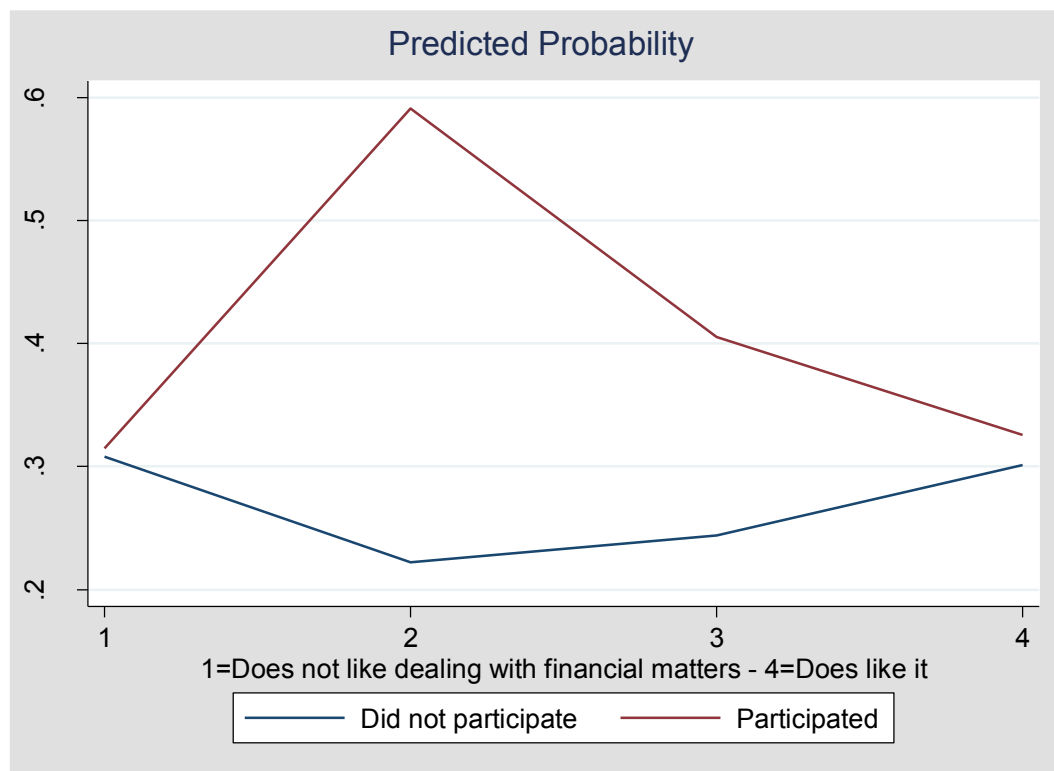


### 6.6.1 Discussion

An interesting finding is that the source of advice seems to have an important influence on the outcome. Individuals who participated in a seminar, which are mainly company based seminars are more likely to own a company pension. The information in these seminars is centered around the different retirement

savings opportunities offered within the company. Information about other savings vehicles like the "Riester-Pension", housing equity or capital life insurance will not be discussed in a company based information seminar. Employers generally offer these retirement seminars during working hours and they have a vested interest that many employees file for a company pension plan. Contributions to a company pension plan are deducted from gross income, such that only the remaining salary (after deducting the contribution) is subject to social insurance contributions and taxation. Since the employer also pays a part of the social insurance contributions for the employee, the employer can decrease these costs if employees file company pension contracts. Company based seminars are therefore not always independent sources of advice. They instead tend to steer the employees towards a company pension plan.

Banks and Insurance companies always have an interest to sell their own products and even independent advisors (depending on the composition of their sources of income) are unlikely to provide neutral information on all available retirement savings vehicles. For that reason products like the "Riester-Pension" plan and capital life insurances will be chosen if the consumer decides to consult these kinds of individual advisors. The German Pension Insurance or Consumer Advice Centres are more likely to provide independent information. However, only a small fraction of individuals consulted a Consumer Advice Centre or the German Pension Insurance compared to the number of individuals who received advice from their bank or insurance company. Receiving advice neither positively nor negatively influenced the probability of owning one or the other savings vehicle, with one exception. Individuals who consulted the German Pension Insurance or a consumer advice centre are less likely to have home equity.

The explanation for this significant negative effect could simply be that on the one hand individuals who do consult these sources of advice are not interested in building or buying a house. Instead they would like to have a general advice about appropriate ways to provide for retirement. On the other hand, individuals, who would like to purchase a house, are interested in getting a cheap loan. The first source they would turn to for advice is a bank. The analysis above also confirmed that receiving advice from a bank or insurance company increases the likelihood of having home equity.

Individuals who search for advice in the internet or journals are significantly less likely to own a capital life insurance. Searching for advice themselves without consulting a financial expert is a demanding task. In the case that individuals are able to find independent information and to process this information, their action will be less biased by third parties than the actions taken by individuals relying on other sources of information. Using this kind of information

does not lead these individuals to choose a specific retirement savings product. It could however be shown that they are less likely to choose the capital life insurance. People relying only on their own ability when making financial decisions are likely to be experts themselves so that they may choose other retirement savings vehicles from the ones presented in this analysis.

In Table 43 an interaction term has been added to the model estimating the likelihood of owning a company pension plan. This term makes it possible to test if seminar participation differently affects individuals who like to deal with financial matters compared to individuals who do not like to deal with financial matters. Indeed it was found that the seminar participation had a much greater effect on individuals who do not like to deal with financial matters. Individuals who do not like to deal with financial matters are unlikely to search for information about retirement issues themselves because their perceived costs of information seeking and processing them is very high compared to individuals who like to deal with financial matters. It is therefore important to decrease the costs of information gathering for individuals who do not like to deal with financial matters.

# 7 Discussion and Conclusion

Several pension reforms have led to a decreasing replacement rate of the statutory pension. The decreasing replacement rate and work histories with times of unemployment or part time work make it difficult to accumulate sufficient pension claims to live adequately after leaving the labour force. This responsibility is new and many individuals may not have sufficient knowledge or do not have the intellectual capability to make optimal savings decisions.

The aim of this thesis was to find out more about individual retirement savings behavior. An empirical analysis has been conducted in order to examine why many individuals know that they should save more but still fail to start saving. Different steps on the way towards private retirement provision, like thinking about future retirement income, planning for retirement and actual saving for retirement, have been investigated. The underlying data had especially been designed to investigate retirement savings behavior and the effect of pension literacy on the savings decision. The problem in this research is that pension knowledge might not be endogenous to the chosen variables to be investigated. If the aim is to analyse the effect of pension literacy on owning a company pension for example it could be that someone decided to file a company pension contract because of his/her knowledge about retirement issues. It could, however, also be that the individual is interested in a retirement plan and because of this interest he/she gathers information and then decides to participate in the plan. Hence the direction of causality is not clear. In order to deal with this problem, an instrumental variable estimation had been conducted.

The first question which is of particular interest is the question whether financial literate people are better able to provide for retirement than individuals who lack financial literacy.[90] Not only in Germany is this question relevant but also in many other countries in which the importance of private retirement provision, combined with greater individual responsibility, is increasing. The review of the theoretical literature on savings behavior ranged from the psychological motives of saving over the classical life cycle model of saving to behavioral and institutional economics. Theoretically there seems to be a consensus that financial literacy should at least have some effect on retirement savings. Individuals with conflicting selves, namely the planner who would like to save for retirement and the doer who would like to spend his/her money immediately, will find it less costly to discipline the doer to save for retirement if he/she is financial literate as compared to someone who is not financially literate (Shefrin and

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[90] This reasoning has been accommodated into hypothesis 1, chapter 4.3.

Thaler 1981). Generally it has been argued that financial knowledge reduces the costs of retirement planning and makes it easier for the individual to imagine the future (Becker and Mulligan 1993, O'Donoghue and Rabin 1999).

Based on the FNA Data employed in this work the effect of pension literacy on owning a specific retirement savings product has been analysed. When endogeneity is controlled for via IV estimation it has been found that the degree of pension knowledge positively influences the likelihood of owning a company pension and having housing equity. In none of the other models investigating for example planning behavior, could a positive effect of pension knowledge be observed when accounting for endogeneity.

The success of retirement seminars which increase pension knowledge would according to these findings be effective in fostering company pension plans or housing equity but increasing pension knowledge would not be sufficient to make people think about an appropriate retirement income, to induce people to make concrete savings plans and to increase the number of individuals who translate these plans into action.

Behavioral and new institutional economic researches suggest that financial education might not be the best solution to combat a lack of financial capability (e.g. Chater and Huck 2010, de Meza and Irlenbusch 2008). Instead they point to cognitive biases which limit financial capability. Biases or anomalies just mean that behavior is not in line with the assumptions and predictions of the traditional life-cycle model of saving. It has been observed that individuals generally prefer to stick with their current position even though a better alternative may exist. Choosing another alternative, however, does entail effort costs which the individual wants to avoid (status quo bias chapter 2.1.3). Another very important bias for retirement savings decisions is choice overload (chapter 2.1.3). Individuals who face too much choice or information about pension products may, in the worst case, not make a decision at all, procrastinate, or fall back on heuristics to simplify decisions. Lyengar and Kamenica (2006) argue that the benefit of information would decrease as the information load and complexity increases.

Chater et al. (2010) state that individuals are more likely to reveal biased behavior if they do not possess the necessary knowledge and skills. They even argue that it could be that there are no deviations from rational behavior if individuals possess the necessary knowledge and skills. In this thesis it has been assumed that present orientated preferences are a deviation from rational behavior which can be mitigated through pension knowledge. Theoretically, this reasoning has been supported by Becker and Mulligan (1997) who argue that individuals who know that they excessively discount future utilities can invest in future orientat-

ed capital in order to reduce their discount rate. Furthermore, their model implies that additional pension information is more effective in decreasing the discount rate for individuals who have an initially high discount rate than for individuals who are already future orientated.

The empirical analysis of the FNA data did generally neither confirm nor reject this effect of pension knowledge coupled with future orientation which also has been formulated in the second hypothesis. A different picture than the one predicted could be observed for housing equity. In fact pension literacy was more effective to increase housing equity for the individuals who were medium or highly future orientated as opposed to individuals with a very low degree of future orientation. I am curious, however, about these results. It could be that the variables chosen to approximate initial future orientation were not appropriate. Time preferences have been measured by a variable generated out of two questions which measure how important it is for an individual to save for retirement and how important it is to save for care dependency. It is likely that information received before the interview had been conducted already changed the mind of the individual to the extent that the measured time preference is not truly initial but instead influenced by information received before the interview. Furthermore, respondents might have been affected by the interviewer bias, answering in a socially desirable way. In this case the effect of the interaction effect would be underestimated which would then explain why it is not significant in most regressions.

Even though there is no clear evidence which supports the hypothesis that pension knowledge influences time preferences it can also not be rejected. It was not possible to proof that financial literacy does decrease other behavioral biases in any way based on the data at hand. Nevertheless I assume that basic pension knowledge does not lead to an information overload but instead increases the likelihood that the individual chooses the correct heuristic and that he/she does not rely on default settings if these settings are not an optimal choice for him/her (see also Chater et al. 2010). Based on the FNA-Data, evidence has been found that individuals own retirement products but at the same time state that they have never thought about how much money they would need to live adequately during retirement. This suggests that individuals started to save without any a priori planning concerning the amount of money necessary to achieve a certain retirement income. In this respect it could be assumed that several savers relied on heuristics when deciding to join a retirement plan.

Indeed the theory of savings and its psychological refinements suggest that individuals will engage in retirement planning when expected utility gained from planning outweighs the psychological and monetary costs of planning. Leinert (2005) argues that individuals for whom the costs of planning are higher than

the potential utility gain from planning may skip the whole planning process and start saving for retirement right away. The prerequisite for skipping the whole planning process is the availability of heuristics.[91] Heuristics simplify decisions such that the costs of applying them are very low. Heuristics are an opportunity to get people to start saving, who, in the absence of heuristics, would otherwise never have started to save for retirement.

In Germany several heuristics have been supplied by the government and other heuristics just derive without any intervention from the government. A legitimate question would be if we have to be concerned about the widespread use of heuristics. The use of heuristics is indisputably only a second best solution and it is likely that utility could be increased if individuals would engage in retirement planning. This utility gain, however, would not outweigh the costs individuals would face if planning for retirement. Hence using heuristics is a rational choice. But problems of heuristics could be that the savings rate is too high or too low or that it directs individuals towards savings devices which are not optimal for the individual. Individuals might not be capable of foreseeing the future consequences of applying the heuristic.[92] The utility loss incurred by using the heuristic might be much greater than estimated by the individual at the time the individual retires. To avoid savings decisions based on heuristics which may entail a great utility loss, it is important that individuals at least are cursorily involved in retirement planning. In order to get more people to think about retirement and to plan it is necessary to decrease the costs of planning and/or to increase future utility of income (e.g. Becker and Mulligan 1997, Thaler and Shefrin 1981). Planning costs could for example be reduced if savings products would be less complex and easier to compare. Oehler (2009) suggests increasing comparability and decreasing complexity of financial products (see also Leinert 2005, Oehler 2012c, 2013).

Not only do the financial products themselves lack transparency but also the statutory regulations concerning subsidies and the tax benefit for retirement plans are unclear. Coppola and Gasche (2011) conclude for example that the circulation and the acceptance of the "Riester-Pension" could be increased by providing more information and by simplifying the rules of eligibility, the sub-

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[91] Information about which kinds of heuristics are available in the course of retirement savings see chapter 2.3.5.

[92] The same argument which has been put forward would also hold for the introduction of opting out company pension plans. Opting out reduces the costs of the decision to join a retirement plan even more than heuristics. The problems which could arise if individuals' are not well informed about the company pension plans regulation are similar to the ones which could arise after the use of heuristics.

sidy and the tax treatment. At present there are several "Riester-Pension" contracts possible. One is the classical "Riester-Pension" as introduced in 2004, the second would be the so-called "Housing-Pension," and a third variant would be the "Company-Riester".[93] Each of these "Riester-Plans" has its own rules about the tax treatment or the rules to be applied differ when drawing on the accumulated capital. In addition to these savings opportunities there is also the company pension. Within the company pension employees have the right for deferred contributions. Hence there is scope for the government to simplify and to harmonize rules.

Chapter 6.4 deals with different retirement savings vehicles and the determinants influencing the decision to save in one of these products. It has been found that women and individuals with children are more likely to have a "Riester-Pension" plan than men and individuals without children. Hence the monetary incentives set with the "Riester-Pension" are effective in in this respect.[94] Individual income has not been found to influence the likelihood of owning a "Riester-Pension. The company pension in contrast is more likely to be chosen from individuals with a medium or high income. This supports the finding from Leinert (2003) who also detected that the opting in company pension plans in Germany are less likely to be chosen from individuals with low income and women.

Interestingly, the empirical results have shown that lower educated individuals were better informed about the right for deferred contributions and they were also more likely to own a company pension plan than middle and higher educated individuals. Employees who joined a retirement seminar were also more likely to join the company pension plan than individuals who did not participate in a seminar.[95] Low educated employees have to exert more effort in gathering and processing information concerning retirement savings than high educated employees. For that reason low educated employees may welcome retirement seminars as they would not have to search for information themselves because the seminar offers all the relevant information. Higher educated individuals may already have searched for information themselves and are therefore less open for new information about for example a pension plan. Furthermore, these individuals may already save for retirement within an alternative retirement savings vehicle.

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[93] A detailed description of the "Riester-Pension" can be found in chapter 2.2.

[94] Nevertheless, it could be that these individuals in fact own a „Riester Pension" but that they do not take advantage of the full „Riester-Subsidy".

[95] Confirms hypothesis 4, chapter 4.3.

Furthermore it has been shown that many individuals hold a retirement plan without having thought about an appropriate retirement income before. This, lack of planning, is more prevalent for individuals owning "Riester-Pension" than for individual owning a company pension plan. The empirical evidence suggests that company pension plan owners are better informed than individuals who own a "Riester-Pension" which could be attributed to the information provided by employers. The "Riester-Pension", however, has the advantage of attracting women and individuals with children.

Within the existing pension system it would be possible to combine the advantage of both pension plans because it is also possible to obtain a "Company-Riester" plan. "Company Riester" plans, however, have an important disadvantage compared to the classical "Riester-Pension" at the time the pension is due to be paid. This disadvantage is, that individuals have to pay health insurance contributions based on their income received from the "Company-Riester" plan despite having contributed to the plan out of their income after taxes and social insurance contributions. If the government would change the regulations for "Company-Riester" such that it is the same as for the "Riester-Pension" it might be possible to increase the number of "Riester-Savers" within the domain of the company and additionally to increase the knowledge about the "Riester-Pension" such that less "Riester-Savers" start saving without having spent any time to think about retirement provision.

A problem of providing seminars is the selectivity of participants. Often individuals who are most in need to receive information and to save for retirement are not among the participants. Honekamp and Uehleke (2012) have shown that low educated, low income and young individuals are underrepresented in the adult education seminar "Old-Age provision goes to School" (see also Frommert 2008, Oehler and Wilhelm-Oehler 2009, 2011). Furthermore, the research in this thesis indicated that the most important factor for not participating in the seminar is time. In order to attract more individuals and especially those who are most in need to join the seminar it might be necessary to make retirement seminars the standard, a seminar which every adult should attend at least once during his or her working life.

Attaining such a spread of seminars requires extended networks between for example employers, the statutory pension insurance, trade unions, consumer advice centres, debt advisors, and job centres. Such an extension of partnerships with existing organizations has also been suggested by Oehler and Werner (2008). Furthermore, they propose the targeting of individuals in their environment at different stages in an individual's life. Such stages could be, when starting to work for a company, when getting married or at the birth of a child. According to Whitehouse (2000), individuals who are just at the beginning of a

new stage in their life are especially open to advice and willing to make changes. The advertisement for a course which is targeted at a specific group is, according to Whitehouse, also more effective than advertising a course for an unspecified target group.

Oehler and Wilhelm-Oehler (2009, 2011) advanced these ideas, results and conclusions analyzing the data from „Altersvorsorge macht Schule" („retirement planning goes school").[96] They recommend a practice-oriented, case-based financial education as well as a „meta education" to improve the „meta literacy" as shown by Oehler (2004, 2009, 2011, 20112a, 2012d-e, 2013a-b). „Meta literacy" in this sense means that it is more important to know methods or people who can solve the problem than acquiring a lot of information to be able to solve each potential problem (Oehler and Wilhelm-Oehler 2009, 2011, Oehler 2011, 2012a, 2012d-e, 2013a-b).

Another solution investigated by Oehler (WDR 2012) is providing information about specific financial topics in the form of a radio broadcast, television and the internet. He argues that it is important to provoke individual consternation followed by practical advice which helps to solve the specific problem. Constructing information after the concept of "Meta Bildung" would therefore avoid an information overload and encourage individuals to continue dealing with the specific topic.

A radio or television broadcast would be able to attract the attention of private old-age provision even for individuals who haven't thought about it before. These individuals may be deterred from dealing with this topic because of behavioral biases like a high degree of present orientation, information overload or status quo bias.[97] There are, however, also individuals who are not in the situation that they come across such information. For them it is important to know when it is time to look out for more information. Starting retirement planning just before someone retires would for example be too late. Hence individuals either need some basic knowledge which enables them to decide when it is time to gather more information or there needs to be a benevolent third party which provides the relevant information at the time it is needed.

The retirement seminar "Old-Age Provision goes to School" could also be revised and provide more specific information concentrating only on one topic instead of providing a bulk of information which is thought to be necessary for everyone. In the light of time constraints which many individuals indicated

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[96] See also Frommert 2008
[97] For a description of behavioral biases see chapter 2.1.3.

when asked if they would participate in the intensive course, a shorter more specific course might attract the interest of more individuals. Some of the individuals in the FNA-Survey also stated that such a course would not be of any help to them. These individuals might also revise their statement if the course were organized as to meet their individual needs.

Company-based seminars could be targeted at newly hired employees, catching especially young individuals which were underrepresented in the course "Old-Age Provision goes to School". A further advantage of providing an employer based seminar is the potential peer effect which has been described in the literature review (e.g. Duflo and Saez 2003). In the case that key employees who are the role models for many other employees can be convinced that company pension plans are a good choice then they will follow and the number of individuals filing a company pension plan can be increased considerably.[98]

The downside of company based seminars is, however, that they generally focus on company pension plans and therefore direct demand towards these plans. The seminars therefore do not necessarily contribute to an informed decision of the individual based on independent information about all available savings vehicles. A solution to this problem would be that an independent organisation like the German pension insurance provides this information, similar to the course "Old-Age Provision goes to School".[99]

Seminars offered to the unemployed in job centres could be targeted at individuals with low income and lower education, and seminars offered from debt advisors could be targeted at individuals who have to repay consumer credits or other forms of debt. Furthermore the seminar "Old-Age-Provision goes to School" could also address specific life-stages. Honekamp and Uehleke (2012) suggest targeting young families by providing seminars with a child minder to look after the children while the parents learn more about old-age provision.

The advantages of targeted seminars such as the ones discussed above are twofold. Firstly, they are more effective in transferring information: Participants would have the same interests and questions concerning retirement. The complexity and difficulty of the seminar can be adjusted to meet the needs of the participants. Individuals may be less prone to ask questions in a homogenous group and they are likely to be more enthusiastic if they can readily apply the information which is provided. Furthermore, providing information in this

[98] I am grateful to Pension Solutions, a company offering retirement seminars for companies and administering their pension plans, for sharing this information with me.

[99] If companies are interested, referees from the statutory pension insurance already provide information about retirement provision on a company level.

form is more likely to entail a discussion among participants about their financial experience which increases the intensity with which individuals deal with their retirement issues. The second advantage is that it is possible to solve the time problem in most cases. Employer based seminars may take place during working time, the unemployed have to take part in measures provided by the job centre and young parents would have to look after their children anyway.

The research conducted in this thesis provides even more evidence which can be used to develop measures to foster retirement planning and to increase the number of individuals participating in retirement seminars. The groundwork underlying these findings is one of the hypotheses, which states that individuals who know that they tend to procrastinate on financial matters (sophisticates) are more likely to plan and save for retirement than individuals who do not realise that they procrastinate (naïve).

It has been found that individuals who are aware of their self-control problem, meaning that they know that they tend to delay decisions concerning retirement provision, are (given their present-biased preferences) more likely to plan joining a retirement seminar than naïve individuals. It has been argued that a retirement seminar might serve as a commitment device, committing the individual to attend and to start saving afterwards. Nevertheless research has shown that most individuals who plan changes in their retirement behavior do not translate these plans into action (e.g. Choi et al. 2006, Clark et al. 2006, Honekamp and Uehleke 2012). One reason could be that the retirement seminars were not effective in committing the participants to start saving. Further explanations for the discrepancy between planning and action could be unexpected events which had not been taken into account in retirement planning. This could for example include situations such as becoming unemployed or divorced, but also changes in the pension system or a financial crisis could deter individuals from translating their plans into action.

If the reason lies in the individuals who, even though they know that they should save for retirement delay the implementation of their plans again, it might be worthwhile looking at the seminar content more closely. Seminars provide information about retirement provision but no information about how to combat procrastination. Procrastination is a problem which not only arises in connection with retirement planning and saving. Instead procrastination is widespread. Students procrastinate in their course works and bachelor theses, smokers procrastinate in stopping smoking, and unathletic people procrastinate joining the gym, and so forth (Rabin Bui 2007, O'Donoghue and Rabin 2008, Wilkinson and Sherman 1991). Implementing a short module on how to overcome procrastination in retirement seminars might be effective in increasing

the number of individuals who actually start saving after the seminar. After implementing such a module it is necessary to find out if the information provided does indeed lead to the expected outcome. A course evaluation comparing seminars with and without a procrastination module would therefore be necessary.

Further evaluating the problem that many individuals do not act according to their plan after the retirement seminar, empirical results suggest that the confidence in one's own knowledge is more important than actual knowledge when translating retirement plans into action. In this respect measures could be taken in order to increase the confidence of individuals. The measures which will be suitable to increases confidence will also decrease the costs of planning and saving for retirement for the individual and hence reduce the number of individuals who will procrastinate. Confidence can be increased through practice. Within a seminar individuals could receive the task to invite offers for an artificial individual with specific characteristics (Bayerisches Staatsministerium der Justiz und für Verbraucherschutz und Bayerischer Volkshochschulverband e.V. 2012; Oehler 2013). Within the next seminar session offers can be discussed and individuals can share their experiences with each other. Furthermore, simple and standardized products make it easier to compare products for everyone hence the confidence in dealing with retirement products will increase. A further measure to increase confidence would be to provide a manual, describing as briefly as possible the most important things to be considered during the process of finding an appropriate product. Such a manual has already been provided on the homepage of the course "Old-Age Provision goes to School" (Old-Age Provision goes to School 2009). However, an evaluation of the usefulness of this manual or its effectiveness has not yet taken place.

Empirical evidence has also shown that the level of pension knowledge and the confidence in dealing with pension issues alone are not sufficient to induce people to make concrete plans for retirement even though they know that they should save more. Individuals therefore procrastinate on planning concrete changes regardless of financial knowledge and confidence. This finding and the finding that sophisticated individuals are more likely to join a retirement seminar than naives can also be used to rethink information campaigns. Such campaigns are on the one hand designed to provide general information about pension provision and appeal to the need for private retirement provision, and on the other hand campaigns that advertise retirement seminars. Making individuals' sensitive not only to retirement issues but also with respect to procrastination could lead to an increased awareness of the problem. If such campaigns are successful then naïve individuals would become sophisticated and try to overcome their problem. This would, according to the empirical findings increase participation in retirement seminars.

Without a sound knowledge about the pension system and the factors to be considered when making savings decisions even the best heuristic may lead to an unexpected result in the end. It is essential that individuals know that they are eligible to receive a savings subsidy either in the form of a lump sum or tax deferral. Furthermore, it is important to know that consumer credits are expensive and that it is unlikely that the return on any investment could outweigh these costs. This basic financial and pension knowledge can attenuate the problems which could be entailed through the application of heuristics. Heuristics and simplifications in retirement provision are important to foster retirement savings but this should not be done at the costs of educating people about pension matters.

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# 9 Appendix

## 9.1 Questionnaire CATI 1

---

**1**                                                                              **INTRO**

Kommentare zur Wiedervorlage: <LIN1 > <LIN2 > <LIN3 >
=> /+1***ERR
if NOT (INT01 = FT OR INT01=NF)

wenn gelesen, weiter........................................33        D   => /LASTQ (ERR)

---

**2**                                                                              **INT02**

*Wenn ZP nicht erreichbar (Freizeichen, besetzt, AB, keine Zeit etc.)  bitte wieder auf "Abbruch" und U*
Kommentare zur Wiedervorlage: <LIN1 > <LIN2 > <LIN3>
$N
=> /+1***ERR
if NOT (INT =NT)

ZP am Telefon........................................ 22        D   => /LASTQ (ERR)

---

**3**                                                                              **INT01**

*Bei Rückfrage zu einem Ansprechpartner: {br}Universität Bamberg | Lehrstuhl für Volkswirtschaftslei*
Guten Tag/Abend, mein Name ist … Ich rufe im Auftrag der Universität Bamberg an. Wir führen
zurzeit eine Umfrage bei Personen zwischen 20 und 60 Jahren zu dem aktuellen Thema
„Altersvorsorge" durch. Ihre Telefonnummer wurde zufällig für diese Befragung ausgewählt. Die
Ergebnisse dienen rein wissenschaftlichen Zwecken. Haben Sie jetzt Zeit an der Befragung
teilzunehmen?
$N

| | | |
|---|---|---|
| OK weiter | OK | => /LASTQ (ERR) |
| Fester Termin | FT | => /CB |
| Nicht fester Termin | NF | => /CB |
| Besetzt | BE | => /END |
| Anrufbeantworter | AB | => /END |
| Freizeichen | NE | => /END |
| Fax | FA | => /END |
| kein Anschluss | KA | => /END |
| Verweigert | KV | => /END |
| Neue Telefonnummer | NN | => /TEL01 |

---

**4**                                                                              **S06**

Sind Sie bereits in Rente, Pension oder Frührentner wegen voller Erwerbsminderung (also höchstens
drei Stunden am Tag erwerbstätig)?

| | | |
|---|---|---|
| Nein | 1 | => /S02 |
| Rentner | 2 | => /INT99 |
| Pensionär | 3 | => /INT99 |
| Frührentner | 4 | => /S02 |

---

**5**                                                                              **S02**

screen [template 1] -> S02

In welchem Jahr sind Sie geboren?

| | |
|---|---|
| 1950 | 1950 |
| 1951 | 1951 |
| 1952 | 1952 |
| 1953 | 1953 |
| 1954 | 1954 |
| 1955 | 1955 |
| 1956 | 1956 |
| 1957 | 1957 |
| 1958 | 1958 |
| 1959 | 1959 |

VOXCO, Interviewer 5.0

## 9.2 Questionnaire CATI 2

**1**                   **INTRO**

|  | | single |
|---|---|---|
| min = 1 | max = 1 | 1 = 2 |

2011.02.23 11:40
Kommentare zur Wiedervorlage: <LIN1 > <LIN2 > <LIN3 >
=> /+1***ERR
if NOT (INT01 = FT OR INT01=NF)

wenn gelesen, weiter_____33   D => /LASTQ (ERR)

---

**2**                   **INT02**

|  | | single |
|---|---|---|
| min = 1 | max = 1 | 1 = 2 |

2011.02.23 11:39
*Wenn ZP nicht erreichbar (Freizeichen, besetzt, AB, keine Zeit etc.)  bitte wieder auf "Abbruch" und "*
Kommentare zur Wiedervorlage: <LIN1 > <LIN2 > <LIN3 >
$N
=> /+1***ERR
if NOT (INT =NT)

ZP am Telefon_____22   D => /LASTQ (ERR)

---

**3**                   **INT01**

|  | | single |
|---|---|---|
| min = 1 | max = 1 | 1 = 2 |

2011.03.23 13:21
Guten Tag, mein Name ist $I.
$N
OK weiter_____OK   => /LASTQ (ERR)
Fester Termin_____FT   => /CB
Nicht fester Termin_____NF   => /CB
Besetzt_____BE   => /END
Anrufbeantworter_____AB   => /END
Freizeichen_____NE   => /END
Fax_____FA   => /END
Kein Anschluss_____KA   => /END
Verweigert_____KV   => /END
Neue Telefonnummer_____NN   => /TEL01

---

**4**                   **T17**

|  | | single |
|---|---|---|
| min = 1 | max = 1 | 1 = 1 |

2011.04.06 11:29
Haben Sie sich seit der ersten Befragung im <Monat> über Finanzangelegenheiten und
Altersvorsorge informiert?
Ja_____1   => /T18
Nein_____2   => /T2A
Keine Angabe_____9   => /T2A

---

**5**                   **T18**

|  | | multiple, open |
|---|---|---|
| min = 1 | max = 11 | 1 = 2 |

## 9.3 Objective Pension Knoweldge

| | (1)<br>Financial<br>Matters | (2)<br>Statutory<br>Pension | (3)<br>Company<br>Pension | (4)<br>Capital<br>Life Ins. | (5)<br>"Riester-<br>Pension" |
|---|---|---|---|---|---|
| Male | 0.13 | -0.07 | -0.00 | 0.02 | -0.33*** |
| | (0.13) | (0.13) | (0.13) | (0.13) | (0.13) |
| Age | 0.01 | 0.03*** | 0.01 | 0.01** | -0.04*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married or living | 0.25* | -0.19 | 0.15 | 0.11 | -0.10 |
| together | (0.14) | (0.13) | (0.14) | (0.13) | (0.14) |
| Number of children | -0.06 | 0.03 | -0.01 | 0.03 | 0.16*** |
| (max. 3 or more) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) |
| Education low | .ref | . | . | . | . |
| Education middle | 0.30 | 0.38** | 0.05 | 0.42** | 0.22 |
| | (0.20) | (0.19) | (0.20) | (0.19) | (0.19) |
| Education high | -0.15 | 0.02 | -0.21 | 0.25 | 0.03 |
| | (0.19) | (0.18) | (0.19) | (0.18) | (0.19) |
| Individual net income | 0.47*** | 0.24*** | 0.52*** | 0.51*** | 0.22** |
| (low, middle, high) | (0.10) | (0.09) | (0.11) | (0.10) | (0.10) |
| Objective knowledge | 0.21*** | 0.21*** | 0.29*** | 0.13** | 0.30*** |
| | (0.05) | (0.05) | (0.06) | (0.06) | (0.05) |
| Unemployed | .ref | . | . | . | . |
| Blue- or white collar | -0.26 | 0.11 | 0.45*** | -0.34** | -0.16 |
| | (0.17) | (0.16) | (0.17) | (0.17) | (0.16) |
| Self-employed | -0.10 | -0.27 | -0.56** | -0.19 | -0.29 |
| | (0.22) | (0.21) | (0.22) | (0.21) | (0.22) |
| Public servant | -0.63** | -1.72*** | -1.55*** | -0.51* | 0.08 |
| | (0.29) | (0.30) | (0.31) | (0.29) | (0.28) |
| Living in east Germany | 0.06 | 0.12 | -0.27 | -0.06 | 0.22 |
| | (0.16) | (0.16) | (0.17) | (0.16) | (0.16) |
| Cut1_cons | -2.66*** | -0.89*** | 0.09 | -0.49 | -2.46*** |
| | (0.39) | (0.34) | (0.34) | (0.34) | (0.35) |
| Cut2_cons | -1.69*** | 0.17 | 0.64* | 0.11 | -1.89*** |
| | (0.36) | (0.33) | (0.34) | (0.34) | (0.34) |
| Cut3_cons | -0.35 | 1.03*** | 1.15*** | 0.73** | -1.33*** |
| | (0.34) | (0.33) | (0.34) | (0.34) | (0.34) |
| Cut4_cons | 0.86** | 1.91*** | 1.80*** | 1.44*** | -0.65* |
| | (0.34) | (0.34) | (0.34) | (0.34) | (0.34) |
| Cut5_cons | 2.38*** | 3.13*** | 2.68*** | 2.34*** | 0.31 |
| | (0.35) | (0.34) | (0.35) | (0.35) | (0.34) |
| Cut6_cons | 3.58*** | 4.08*** | 3.56*** | 3.37*** | 1.30*** |
| | (0.36) | (0.35) | (0.36) | (0.35) | (0.34) |
| *N* | 1010 | 1010 | 1010 | 1010 | 1010 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: FNA-Data, first telephone interview, imputed data, coefficients are the mean of ten imputed datasets

Note: Ordered-Logit. This model serves as a comparison with the OLS alternative in Table 22.

## 9.4 Thinking about an appropriate retirement income (Ch. 6.1)

In chapter 4.1 and 4.2 several variables have been discussed which measure time preferences, procrastination and pension knowledge. The variables measuring actual pension knowledge are summarized in Table 11 and the variable measuring time preferences and procrastination are summarized in Table 5 of the respective chapter. In order to discriminate between models using different of these measures, the Baysian and the Akaide information criteria (BIC and AIC) will be used. The models to be compared are not nested in each other for that reason using the likelihood-ratio test would not be appropriate here. Stata 12 uses the following scaling of the two measures:

$$AIC = -3lnL + 2k$$

$$BIC = -2lnL + klnN$$

Smaller values of these criteria are preferred, because higher log likelihood is preferred. Penalties for model size are the quantities *2k* and *klnN* respectively with *k*, the number of estimated parameters and *N*, the sample size.

The results in Table 45 indicate that "Actual Pension Knowledge", which is the variable summing up the correct answers from all knowledge questions, has the lowest BIC and AIC. This variable will therefore be chosen in all models estimating the likelihood of having thought about an appropriate retirement income. Furthermore, it has been tested if the variable measuring how often someone stated that he/she does not know the correct answer to the pension literacy question, adds anything in explaining the dependent variable. As can be seen in model 9.1(6), the coefficient of SumDk is not significant and the BIC and AIC are higher than in model 9.1(1) and (2). The likelihood-ratio test, testing the hypothesis that the coefficient of SumDk is zero cannot be rejected. The corresponding p-value is 0.71.

**Table 45: AIC and BIC for Choosing Actual Knowledge Variable (Ch. 6.1)**

| Having thought about an appropriate retirement income | 9.4(1) | 9.4(2) | 9.4(3) | 9.4(4) | 9.4(5) | 9.4(6) |
|---|---|---|---|---|---|---|
| Male | -0.09 | -0.11 | -0.06 | -0.10 | -0.12 | -0.12 |
| | (0.14) | (0.14) | (0.14) | (0.14) | (0.14) | (0.14) |
| Age | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.10 | -0.11 | -0.09 | -0.10 | -0.12 | -0.11 |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) |
| Children | -0.02 | -0.02 | -0.03 | -0.03 | -0.02 | -0.02 |
| (0 no – 4 four or more kids) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) |
| Middle Education[a] | -0.32 | -0.34 | -0.33 | -0.32 | -0.34 | -0.33 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| High Education[a] | -0.15 | -0.17 | -0.16 | -0.15 | -0.16 | -0.17 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| Middle Individual net Income[b] | 0.28* | 0.28* | 0.26* | 0.28* | 0.28* | 0.28* |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) |
| High Individual net Income[b] | 0.27 | 0.29 | 0.26 | 0.29 | 0.30* | 0.29 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Middle Wealth[c] | 0.04 | 0.06 | 0.07 | 0.05 | 0.07 | 0.05 |
| | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) |
| High Wealth[c] | -0.15 | -0.14 | -0.14 | -0.15 | -0.14 | -0.14 |
| | (0.17) | (0.17) | (0.17) | (0.17) | (0.18) | (0.17) |
| Underestimate Knowledge[e] | -0.18 | -0.13 | 0.00 | -0.10 | -0.14 | -0.13 |
| | (0.17) | (0.16) | (0.15) | (0.16) | (0.16) | (0.16) |
| Overestimate Knowledge[e] | 0.59*** | 0.58*** | 0.44*** | 0.56*** | 0.58*** | 0.57*** |
| | (0.16) | (0.16) | (0.15) | (0.16) | (0.16) | (0.16) |
| Experience Fin. Matters | 0.06* | 0.06* | 0.08** | 0.06** | 0.06* | 0.06* |
| (no. of different assests) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Actual Pension Knowledge | 0.33*** | | | | | |
| (0 = low – 2 = high) | (0.11) | | | | | |
| Actual Pension Knowledge | | 0.23*** | | | | 0.22*** |
| (0 = zero – 6 = six question correct) | | (0.07) | | | | (0.08) |
| Factor Actual Knowledge | | | 0.09 | | | |
| | | | (0.07) | | | |
| Actual Pension Knowledge | | | | 0.36*** | | |
| (0=low – 2= high, equal space) | | | | (0.13) | | |
| Pension Reduction | | | | | 0.27 | |
| (question correct) | | | | | (0.19) | |
| Company Pension | | | | | 0.28** | |
| (question correct) | | | | | (0.14) | |
| Riester | | | | | 0.25 | |
| (question correct) | | | | | (0.20) | |
| Interest | | | | | 0.12 | |
| (question correct) | | | | | (0.14) | |
| Contribution Rate | | | | | 0.18 | |
| (question correct) | | | | | (0.17) | |
| Statutory Pension | | | | | 0.33** | |
| (question correct) | | | | | (0.16) | |
| No. Don't' Know Answers | | | | | | -0.02 |
| | | | | | | (0.06) |
| Constant | -1.29*** | -1.10*** | -0.75** | -1.35*** | -1.05*** | -1.03** |
| | (0.40) | (0.38) | (0.37) | (0.42) | (0.40) | (0.43) |
| N | 531.00 | 531.00 | 531.00 | 531.00 | 531.00 | 531.00 |
| AIC | 608.61 | 608.13 | 616.50 | 610.08 | 616.67 | 609.99 |
| BIC | 672.73 | 672.25 | 680.63 | 674.20 | 702.17 | 678.39 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

Table 46 and Table 47 show the estimations whith variing variables measuring time preferneces and procrastination. On theoretical grounds it would be necessary, to include a variable approximating procrastination of retirement saving decisions and a variable measuring time preferences with respect to future orientation.

**Table 46: AIC and BIC for Choosing Time Preference and Procrastination Variable (1) (Ch. 6.1)**

| Having thought about an appropriate retirement income | 9.4(7) | 9.4(8) | 9.4(9) | 9.4(10) | 9.4(11) | 9.4(12) |
|---|---|---|---|---|---|---|
| Male | -0.06 | -0.13 | -0.13 | -0.12 | -0.11 | -0.11 |
| | (0.14) | (0.14) | (0.14) | (0.14) | (0.14) | (0.14) |
| Age | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.08 | -0.11 | -0.11 | -0.09 | -0.14 | -0.12 |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) |
| Children | -0.03 | -0.04 | -0.04 | -0.04 | -0.02 | -0.02 |
| (0 no – 4 four or more kids) | (0.07) | (0.07) | (0.07) | (0.07) | (0.06) | (0.06) |
| Middle Education[a] | -0.32 | -0.36* | -0.39* | -0.37* | -0.33 | -0.33 |
| | (0.22) | (0.21) | (0.21) | (0.22) | (0.21) | (0.21) |
| High Education[a] | -0.16 | -0.19 | -0.26 | -0.24 | -0.17 | -0.18 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| Middle Individual net Income[b] | 0.33** | 0.30** | 0.30** | 0.30** | 0.28* | 0.27* |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) |
| High Individual net Income[b] | 0.35* | 0.32* | 0.32* | 0.34* | 0.27 | 0.29 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Wealth | -0.03 | -0.05 | -0.04 | -0.04 | -0.07 | -0.07 |
| | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) |
| Underestimate Knowledge[e] | -0.09 | -0.11 | -0.10 | -0.11 | -0.11 | -0.12 |
| | (0.17) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| Overestimate Knowledge[e] | 0.48*** | 0.55*** | 0.57*** | 0.57*** | 0.57*** | 0.58*** |
| | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| Experience Fin. Matters | 0.04 | 0.05* | 0.06* | 0.06* | 0.06* | 0.06** |
| (no. of different assests) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Actual Pension Knowledge | 0.22*** | 0.21*** | 0.23*** | 0.23*** | 0.24*** | 0.23*** |
| (0 = zero – 6 = six question correct) | (0.08) | (0.08) | (0.08) | (0.08) | (0.07) | (0.07) |
| Future Orientation | 0.28*** | | | | | |
| (factor1 Table 5) | (0.08) | | | | | |
| Procrastination | | 0.20** | | | | |
| (factor2 Table 5) | | (0.09) | | | | |
| Future Orientation | | | -0.11 | | | |
| (factor3 Table 5) | | | (0.09) | | | |
| Procrastination | | | | 0.00 | | |
| (factor4 Table 5) | | | | (0.09) | | |
| Timepreference Urgent | | | | | -0.03 | |
| (Table 5) | | | | | (0.02) | |
| Timepreference Results | | | | | | -0.01 |
| (Table 5) | | | | | | (0.02) |
| Constant | -1.04*** | -0.94** | -0.99** | -1.00*** | -0.99** | -1.09*** |
| | (0.39) | (0.39) | (0.38) | (0.39) | (0.39) | (0.40) |
| N | 520.00 | 520.00 | 520.00 | 520.00 | 531.00 | 530.00 |
| AIC | 586.07 | 593.50 | 597.15 | 598.64 | 606.94 | 607.95 |
| BIC | 649.88 | 657.30 | 660.96 | 662.45 | 671.06 | 672.05 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

Deciding on behalf of the AIC and BIC, factor1 should be chosen to measure time preferences and factor2 to measure procrastination. Using a factor using the information from several variables measuring procrastination is, however, problematic, when testing hypothesis 3.

**Table 47: AIC and BIC for Choosing Time Preference and Procrastination Variable (2) (Ch. 6.1)**

| Having thought about an appropriate retirement income | 9.4(13) | 9.4(14) | 9.4(15) | 9.4(16) | 9.4(17) | 9.4(18) | 9.4(19) |
|---|---|---|---|---|---|---|---|
| Male | -0.07 | -0.06 | -0.10 | -0.12 | -0.13 | -0.12 | -0.12 |
| | (0.14) | (0.14) | (0.14) | (0.14) | (0.14) | (0.14) | (0.14) |
| Age | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** | 0.02*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.09 | -0.10 | -0.11 | -0.13 | -0.12 | -0.13 | -0.14 |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) |
| Children | -0.02 | -0.02 | -0.02 | -0.03 | -0.02 | -0.02 | -0.02 |
| (0 no – 4 four or more kids) | (0.06) | (0.07) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) |
| Middle Education[a] | -0.29 | -0.31 | -0.35* | -0.31 | -0.35* | -0.33 | -0.32 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.22) |
| High Education[a] | -0.12 | -0.16 | -0.20 | -0.16 | -0.18 | -0.16 | -0.14 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| Middle Individual net Income[b] | 0.29* | 0.31** | 0.30** | 0.28* | 0.29* | 0.28* | 0.29* |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) | (0.15) |
| High Individual net Income[b] | 0.29 | 0.31* | 0.30* | 0.31* | 0.31* | 0.28 | 0.27 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Wealth | -0.08 | -0.05 | -0.06 | -0.07 | -0.06 | -0.08 | -0.06 |
| | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) |
| Underestimate Knowledge[e] | -0.09 | -0.11 | -0.11 | -0.12 | -0.11 | -0.13 | -0.10 |
| | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| Overestimate Knowledge[e] | 0.49*** | 0.54*** | 0.57*** | 0.56*** | 0.57*** | 0.56*** | 0.57*** |
| | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| Experience Fin. Matters | 0.05 | 0.05 | 0.06* | 0.06* | 0.06** | 0.07** | 0.05 |
| (no. of different assests) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Actual Pension Knowledge (0 = | 0.22*** | 0.23*** | 0.23*** | 0.23*** | 0.23*** | 0.23*** | 0.21*** |
| zero – 6 = six question correct) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.08) |
| Timepreference | 0.11*** | | | | | | |
| (saving for old age Table 5) | (0.03) | | | | | | |
| Timepreference (saving for | | 0.06** | | | | | |
| long-term care Table 5) | | (0.02) | | | | | |
| Time Deal. Fin. Matters | | | 0.02 | | | | |
| (Table 5) | | | (0.07) | | | | |
| Retire Disuse | | | | 0.05 | | | |
| (Table 5) | | | | (0.08) | | | |
| Retire Illness | | | | | -0.03 | | |
| (Table 5) | | | | | (0.07) | | |
| Procrastination | | | | | | 0.08 | |
| (Table 5) | | | | | | (0.06) | |
| Like Deal. Fin. Matters | | | | | | | 0.19*** |
| (Table 5) | | | | | | | (0.07) |
| Constant | -1.95*** | -1.50*** | -1.15*** | -1.25*** | -1.04** | -1.31*** | -1.58*** |
| | (0.45) | (0.43) | (0.43) | (0.45) | (0.41) | (0.41) | (0.43) |
| N | 530.00 | 528.00 | 530.00 | 530.00 | 528.00 | 530.00 | 528.00 |
| AIC | 595.69 | 599.82 | 606.98 | 607.06 | 606.78 | 606.33 | 598.12 |
| BIC | 659.79 | 663.85 | 671.08 | 671.16 | 670.82 | 670.42 | 662.15 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

**Table 48: Factor Variable "Procrastination" vs Orignial Variables (Ch. 6.1)**

| Having thougt about an appropriate retirement Income | 9.4(20) Imputed Probit | 9.4(21) Imputed IV-Probit | 9.4(22) Imputed Probit | 9.4(23) Imputed IV-Probit |
|---|---|---|---|---|
| Male | -0.06 | -0.09 | -0.04 | -0.09 |
| | (0.10) | (0.18) | (0.10) | (0.17) |
| Age | 0.03*** | 0.03*** | 0.02*** | 0.02*** |
| | (0.01) | (0.01) | (0.00) | (0.00) |
| Married/Cohabiting | -0.17 | -0.17 | -0.14 | -0.15 |
| | (0.11) | (0.11) | (0.11) | (0.11) |
| Children | 0.04 | 0.04 | 0.05 | 0.05 |
| (0 no – 4 four or more kids) | (0.05) | (0.05) | (0.05) | (0.05) |
| Middle Education[a] | -0.11 | -0.13 | -0.11 | -0.14 |
| | (0.15) | (0.17) | (0.15) | (0.16) |
| High Education[a] | 0.15 | 0.13 | 0.13 | 0.10 |
| | (0.15) | (0.18) | (0.15) | (0.18) |
| Middle Individual net Income[b] | 0.36*** | 0.35** | 0.36*** | 0.35** |
| | (0.13) | (0.14) | (0.13) | (0.14) |
| High Individual net Income[b] | 0.20 | 0.18 | 0.21 | 0.18 |
| | (0.15) | (0.17) | (0.14) | (0.17) |
| Middle Wealth[c] | 0.15 | 0.12 | 0.16 | 0.12 |
| | (0.14) | (0.19) | (0.14) | (0.18) |
| High Wealth[c] | 0.03 | -0.00 | 0.05 | 0.00 |
| | (0.13) | (0.20) | (0.13) | (0.19) |
| Blue- or White Collar Worker[d] | 0.03 | 0.02 | 0.05 | 0.04 |
| | (0.13) | (0.13) | (0.12) | (0.13) |
| Self-employed[d] | 0.22 | 0.22 | 0.27* | 0.28* |
| | (0.16) | (0.16) | (0.16) | (0.29) |
| Civil Servant[d] | -0.34 | -0.29 | -0.34* | -0.28 |
| | (0.21) | (0.29) | (0.21) | (0.28) |
| Actual Pension Knowledge | 0.20*** | 0.32 | 0.20*** | 0.35 |
| (0 = zero – 6 = six question correct) | (0.05) | (0.52) | (0.05) | (0.49) |
| Future Orientation | 0.16*** | 0.15** | 0.16*** | 0.15** |
| (factor1, Table 5) | (0.06) | (0.07) | (0.06) | (0.07) |
| **Procrastinate on Financial Matters** | 0.03 | 0.03 | | |
| (1 agree – 4 not agree) | (0.05) | (0.05) | | |
| Like Deal. Fin. Matters | 0.18*** | 0.16 | | |
| (Table 5) | (0.06) | (0.10) | | |
| Time Deal. Fin. Matters | -0.05 | -0.06 | | |
| (Table 5) | (0.05) | (0.06) | | |
| Underestimate Knowledge[e] | -0.16 | -0.25 | -0.15 | -0.27 |
| | (0.13) | (0.43) | (0.13) | (0.40) |
| Overestimate Knowledge[e] | 0.33*** | 0.42 | 0.31*** | 0.44 |
| | (0.12) | (0.46) | (0.11) | (0.44) |
| Procrastinate (Factor Variable) | | | 0.18*** | 0.14 |
| | | | (0.06) | (0.13) |
| Constant | -1.76*** | -1.84*** | -1.24*** | -1.46* |
| | (0.33) | (0.49) | (0.28) | 0.74 |
| Wald test[f] | | -0.10 | | -0.14 |
| | | (0.48) | | (0.46) |
| N | 984.00 | 984.00 | 984 | 984 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

For this hypothesis variable needs to indicate if individuals are aware of their procrastination behavior. This requirement is only fulfilled by the variable procrastination. From the other two variables, measuring if someone likes dealing

with financial matters or if someone has time to deal with financial matters, it is not possible to deduce if someone knows that he/she procrastinates on financial decisions or not. Hence it is important to consider both variables, on the one hand factor and on the other hand the variable procrastination.

**Table 49: Test for Weak Instruments (Ch. 6.1)**

|  | 9.4(24) Imputed Pension knowl. | 9.4(25) Original Pension knowl. |
|---|---|---|
| Male | 0.27*** | 0.28*** |
|  | (0.07) | (0.09) |
| Age | 0.00 | 0.00 |
|  | (0.00) | (0.00) |
| Married/Cohabiting | 0.04 | 0.00 |
|  | (0.07) | (0.10) |
| Children | -0.05 | -0.02 |
| (0 no – 4 four or more kids) | (0.03) | (0.04) |
| Middle Education[a] | 0.15 | 0.17 |
|  | (0.11) | (0.13) |
| High Education[a] | 0.16 | 0.26** |
|  | (0.11) | (0.13) |
| Middle Individual net Income[b] | 0.07 | -0.02 |
|  | (0.09) | (0.11) |
| High Individual net Income[b] | 0.16* | 0.04 |
|  | (0.09) | (0.12) |
| Middle Wealth[c] | 0.23*** | 0.18* |
|  | (0.08) | (0.10) |
| High Wealth[c] | 0.30*** | 0.23** |
|  | (0.09) | (0.10) |
| Blue- or White Collar Worker[d] | 0.10 | 0.18 |
|  | (0.08) | (0.11) |
| Self-employed[d] | -0.05 | 0.07 |
|  | (0.10) | (0.14) |
| Civil Servant[d] | -0.34** | -0.26 |
|  | (0.15) | (0.19) |
| Future Orientation | 0.06 | 0.08 |
| (factor1, Table 5) | (0.04) | (0.05) |
| **Procrastinate on Financial Matters** | 0.20*** | 0.15** |
| (1 agree – 4 not agree) | (0.04) | (0.06) |
| Underestimate Knowledge[e] | 0.81*** | 0.76*** |
|  | (0.08) | (0.10) |
| Overestimate Knowledge[e] | -0.90*** | -0.93*** |
|  | (0.07) | (0.09) |
| Economics at school | 0.07*** | 0.05* |
| (0 none – 4 a lot) | (0.02) | (0.03) |
| Euro conversion | -0.00 | -0.02 |
| (0 easy- 4 hard)) | (0.04) | (0.05) |
| Constant | 1.39*** | 1.43*** |
|  | (0.25) | (0.28) |
| N | 1016.00 | 504.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

**Table 50: Overidentified vs just Identified Model (Ch. 6.1)**

| Having thougt about an appropriate retirement income | 9.4(26) Imputed IV-Probit cveridentif. | 9.4(27) Imputed IV-Probit just identif. |
|---|---|---|
| Male | -0.09 | -0.09 |
| | (0.17) | (0.17) |
| Age | 0.02*** | 0.02*** |
| | (0.00) | (0.01) |
| Married/Cohabiting | -0.15 | -0.15 |
| | (0.11) | (0.11) |
| Children | 0.05 | 0.05 |
| (0 no – 4 four or more kids) | (0.05) | (0.05) |
| Middle Education[a] | -0.14 | -0.14 |
| | (0.16) | (0.16) |
| High Education[a] | 0.10 | 0.10 |
| | (0.18) | (0.18) |
| Middle Individual net Income[b] | 0.35** | 0.35** |
| | (0.14) | (0.14) |
| High Individual net Income[b] | 0.18 | 0.18 |
| | (0.17) | (0.17) |
| Middle Wealth[c] | 0.12 | 0.12 |
| | (0.18) | (0.18) |
| High Wealth[c] | 0.00 | 0.00 |
| | (0.19) | (0.19) |
| Blue- or White Collar Worker[d] | 0.04 | 0.04 |
| | (0.13) | (0.13) |
| Self-employed[d] | 0.28* | 0.28* |
| | (0.29) | (0.16) |
| Civil Servant[d] | 0.15 | -0.28 |
| | (0.67) | (0.29) |
| Actual Pension Knowledge | 0.35 | 0.35 |
| (0 = zero – 6 = six question correct) | (0.49) | (0.49) |
| Future Orientation | 0.15** | 0.15** |
| (factor1, Table 5) | (0.07) | (0.07) |
| **Procrastinate on Financial Matters** | 0.14 | 0.14 |
| (1 agree – 4 not agree) | (0.13) | (0.14) |
| Underestimate Knowledge[e] | -0.27 | -0.27 |
| | (0.40) | (0.41) |
| Overestimate Knowledge[e] | 0.44 | 0.44 |
| | (0.44) | (0.44) |
| Constant | -1.46* | -1.46 |
| | 0.74 | 0.75 |
| Wald test[f] | -0.14 | -0.14 |
| | (0.46) | (0.46) |
| N | 984 | 984 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

## 9.5 Planning Concrete Changes (Ch. 6.2)

The results in Table 51 indicate that t3_objwissen, which is the variable which categorizes actual knowledge into three categories with in even distribution of respondents within each category has the lowest BIC an AIC. The categories range from low knowledge (1) over medium knowledge (2) to high knowledge (3). This variable will therefore be chosen in all models estimating the likelihood of having thought about an appropriate retirement income. Furthermore, it has been tested if the variable measuring how often someone stated that he/she does not know the correct answer to the pension literacy question, adds anything in explaining the dependent variable. The likelihood-ratio test, testing the hypothesis that the coefficient of SumDk is zero cannot be rejected. The corresponding p-value is 0.8.

Table 52 and Table 53 show the estimations whith variing variables measuring time preferneces and procrastination. On theoretical grounds it would be necessary to include a variable approximating procrastination of retirement saving decisions and a variable measuring time preferences with respect to future orientation. Deciding on behalf of the AIC and BIC, factor1 should be chosen to measure time preferences and factor2 to measure procrastination. Using a factor which is composed of the information from several variables measuring procrastination is, however, problematic, when testing hypothesis 3. For this hypothesis the variable needs to indicate if individuals are aware of their procrastination behavior or not. This requirement is only fulfilled by the variable procrastination. From the other two variables, measuring if someone likes dealing with financial matters or if someone has time to deal with financial matters it is not possible to deduce if someone knows that he/she procrastinates on financial decisions or not. Hence it is important to consider both variables, on the one hand that of factor and on the other hand the variable of procrastination.

The estimation results in chapter 6.2 will only consider the variable procrastination because the main purpose is to test the hypothesis. In this Appendix, the models will have also been estimated on the one hand with the factor2 variable for procrastination and on the other hand by including each of the variable into the estimation which are part of factor2. The results in Table 54 show that the only variable which is significant is the variable measuring how much an individual likes dealing with financial matters. This variable has a positive influence on concrete retirement planning for individuals who think they already save enough.

**Table 51: AIC and BIC for Choosing Actual Knowledge Variable (Ch. 6.2)**

| Planning Concrete Changes | 9.5 (1) | 9.5 (2) | 9.5 (3) | 9.5(4) | 9.5 (5) |
|---|---|---|---|---|---|
| Male | 0.11 | 0.10 | 0.12 | 0.10 | 0.10 |
| | (0.15) | (0.16) | (0.16) | (0.15) | (0.16) |
| Age | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.20 | -0.20 | -0.21 | -0.20 | -0.21 |
| | (0.17) | (0.17) | (0.17) | (0.17) | (0.18) |
| Children | 0.07 | 0.08 | 0.07 | 0.08 | 0.07 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | 0.11 | 0.10 | 0.11 | 0.09 | 0.10 |
| | (0.27) | (0.27) | (0.27) | (0.27) | (0.27) |
| High Education[a] | 0.51** | 0.51** | 0.52** | 0.50** | 0.50** |
| | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) |
| Middle Individual net Income[b] | -0.05 | -0.06 | -0.05 | -0.06 | -0.05 |
| | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) |
| High Individual net Income[b] | -0.25 | -0.25 | -0.25 | -0.25 | -0.24 |
| | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) |
| Middle Wealth[c] | -0.12 | -0.13 | -0.12 | -0.13 | -0.13 |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) |
| High Wealth[c] | -0.07 | -0.07 | -0.07 | -0.07 | -0.06 |
| | (0.20) | (0.20) | (0.20) | (0.20) | (0.20) |
| Actual Savings Suffice | -0.45*** | -0.46*** | -0.46*** | -0.46*** | -0.46*** |
| | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| Underestimate Knowledge[e] | 0.09 | 0.02 | 0.04 | 0.01 | -0.01 |
| | (0.19) | (0.18) | (0.18) | (0.18) | (0.19) |
| Overestimate Knowledge[e] | 0.02 | 0.09 | 0.05 | 0.10 | 0.11 |
| | (0.18) | (0.17) | (0.17) | (0.17) | (0.18) |
| Experience Fin. Matters | 0.09** | 0.08** | 0.08** | 0.08** | 0.08** |
| (no. of different assests) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Actual Pension Knowledge | -0.13 | | | | |
| (0 = low – 2 = high) | (0.12) | | | | |
| Actual Pension Knowledge | | -0.02 | | | |
| (0 = zero – 6 = six question correct) | | (0.08) | | | |
| Factor Actual Knowledge | | | -0.09 | | |
| | | | (0.08) | | |
| Actual Pension Knowledge | | | | -0.01 | |
| (0=low – 2= high, equal space) | | | | (0.14) | |
| Pension Reduction | | | | | -0.17 |
| (question correct) | | | | | (0.22) |
| Company Pension | | | | | 0.02 |
| (question correct) | | | | | (0.15) |
| Riester | | | | | -0.01 |
| (question correct) | | | | | (0.21) |
| Interest | | | | | -0.01 |
| (question correct) | | | | | (0.16) |
| Contribution Rate | | | | | -0.11 |
| (question correct) | | | | | (0.19) |
| Statutory Pension | | | | | 0.20 |
| (question correct) | | | | | (0.18) |
| Constant | 0.08 | -0.09 | -0.16 | -0.09 | -0.14 |
| | (0.45) | (0.43) | (0.42) | (0.46) | (0.45) |
| N | 489.00 | 489.00 | 489.00 | 489.00 | 489.00 |
| AIC | 482.99 | 484.20 | 483.01 | 484.26 | 491.71 |
| BIC | 550.07 | 551.28 | 550.09 | 551.34 | 579.75 |

Source: F N A-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

**Table 52: AIC and BIC for Choosing Time Preference and Procrastination Variable (1) (Ch. 6.2)**

| Planning Concrete Changes | 9.5(6) | 9.5 (7) | 9.5(8) | 9.5 (9) | 9.5 (10) | 9.5 (11) |
|---|---|---|---|---|---|---|
| Male | 0.16 | 0.13 | 0.12 | 0.13 | 0.10 | 0.10 |
| | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| Age | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.20 | -0.18 | -0.20 | -0.19 | -0.21 | -0.19 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.17) | (0.17) |
| Children | 0.09 | 0.09 | 0.08 | 0.08 | 0.07 | 0.06 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | 0.16 | 0.09 | 0.07 | 0.14 | 0.06 | 0.07 |
| | (0.27) | (0.27) | (0.27) | (0.27) | (0.27) | (0.27) |
| High Education[a] | 0.60** | 0.48* | 0.48* | 0.52** | 0.48* | 0.49* |
| | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) |
| Middle Individual net Income[b] | -0.07 | -0.10 | -0.12 | -0.10 | -0.06 | -0.07 |
| | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) |
| High Individual net Income[b] | -0.27 | -0.29 | -0.32 | -0.30 | -0.28 | -0.28 |
| | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) |
| Wealth | -0.02 | -0.04 | -0.03 | -0.05 | -0.02 | -0.04 |
| | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) |
| Actual Savings Suffice | -0.45*** | -0.44*** | -0.46*** | -0.47*** | -0.47*** | -0.46*** |
| | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| Underestimate Knowledge[e] | 0.04 | 0.02 | 0.04 | 0.03 | 0.02 | 0.02 |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.18) | (0.18) |
| Overestimate Knowledge[e] | 0.02 | 0.12 | 0.10 | 0.10 | 0.08 | 0.08 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.17) |
| Experience Fin. Matters | 0.07* | 0.09** | 0.08** | 0.08** | 0.07* | 0.08** |
| (no. of different assests) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Actual Pension Knowledge | -0.03 | -0.01 | -0.01 | -0.02 | -0.01 | -0.03 |
| (0 = zero – 6 = six question correct) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Future Orientation | 0.26** | | | | | |
| (factor1 Table 5) | (0.10) | | | | | |
| Procrastination | | -0.10 | | | | |
| (factor2 Table 5) | | (0.10) | | | | |
| Future Orientation | | | -0.14 | | | |
| (factor3 Table 5) | | | (0.10) | | | |
| Procrastination | | | | 0.12 | | |
| (factor4 Table 5) | | | | (0.10) | | |
| Timepreference Urgent | | | | | -0.04 | |
| (Table 5) | | | | | (0.02) | |
| Timepreference Results | | | | | | -0.03 |
| (Table 5) | | | | | | (0.03) |
| Constant | -0.07 | -0.13 | -0.08 | -0.05 | 0.12 | 0.06 |
| | (0.43) | (0.43) | (0.43) | (0.43) | (0.45) | (0.45) |
| N | 481.00 | 481.00 | 481.00 | 481.00 | 489.00 | 488.00 |
| AIC | 470.66 | 476.50 | 475.48 | 476.58 | 482.31 | 483.01 |
| BIC | 537.48 | 543.31 | 542.30 | 543.89 | 549.39 | 550.05 |
| N[1] | | | | | 481.00 | 481.00 |
| AIC[1] | | | | | 475.64 | 476.08 |
| BIC[1] | | | | | 542.46 | 542.89 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations (N=481) does not lead to a different conclusion.

**Table 53: AIC and BIC for Choosing Time Preference and Procrastination Variable (2) (Ch. 6.2)**

| Planning Concrete Changes | 9.5 (12) | 9.5 (13) | 9.5 (14) | 9.5(15) | 9.5 (16) | 9.5 (17) | 9.5(18) |
|---|---|---|---|---|---|---|---|
| Male | 0.12 | 0.14 | 0.10 | 0.11 | 0.12 | 0.11 | 0.12 |
|  | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| Age | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** |
|  | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.19 | -0.21 | -0.22 | -0.20 | -0.20 | -0.19 | -0.18 |
|  | (0.17) | (0.18) | (0.17) | (0.17) | (0.18) | (0.17) | (0.17) |
| Children | 0.07 | 0.10 | 0.08 | 0.07 | 0.07 | 0.08 | 0.08 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | 0.10 | 0.18 | 0.10 | 0.12 | 0.15 | 0.09 | 0.09 |
|  | (0.27) | (0.27) | (0.27) | (0.27) | (0.27) | (0.27) | (0.27) |
| High Education[a] | 0.53** | 0.63** | 0.51** | 0.52** | 0.51** | 0.50** | 0.50* |
|  | (0.25) | (0.26) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) |
| Middle Individual net Income[b] | -0.04 | -0.06 | -0.10 | -0.06 | -0.07 | -0.06 | -0.09 |
|  | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) |
| High Individual net Income[b] | -0.25 | -0.26 | -0.29 | -0.26 | -0.27 | -0.25 | -0.28 |
|  | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) |
| Wealth | -0.02 | -0.03 | -0.03 | -0.04 | -0.05 | -0.03 | -0.03 |
|  | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) |
| Actual Savings Suffice | -0.48*** | -0.44*** | -0.44*** | -0.47*** | -0.49*** | -0.45*** | -0.46*** |
|  | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) | (0.16) |
| Underestimate Knowledge[e] | 0.02 | 0.03 | -0.00 | 0.02 | -0.01 | 0.02 | 0.04 |
|  | (0.19) | (0.19) | (0.19) | (0.18) | (0.19) | (0.18) | (0.19) |
| Overestimate Knowledge[e] | 0.03 | 0.03 | 0.10 | 0.09 | 0.07 | 0.10 | 0.11 |
|  | (0.18) | (0.18) | (0.17) | (0.17) | (0.18) | (0.18) | (0.18) |
| Experience Fin. Matters | 0.07* | 0.07* | 0.08** | 0.08** | 0.08** | 0.08** | 0.08** |
| (no. of different assests) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Actual Pension Knowledge | -0.04 | -0.03 | -0.01 | -0.02 | -0.02 | -0.02 | -0.02 |
| (0 = zero – 6 = six question correct) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Timepreference Old Age (Table 5) | 0.07* |  |  |  |  |  |  |
|  | (0.04) |  |  |  |  |  |  |
| Timepreference Old Age (Table 5) |  | 0.08** |  |  |  |  |  |
|  |  | (0.03) |  |  |  |  |  |
| Time Deal. Fin. Matters (Table 5) |  |  | -0.12 |  |  |  |  |
|  |  |  | (0.07) |  |  |  |  |
| Retire Disuse (Table 5) |  |  |  | 0.07 |  |  |  |
|  |  |  |  | (0.09) |  |  |  |
| Retire Illness (Table 5) |  |  |  |  | 0.12 |  |  |
|  |  |  |  |  | (0.08) |  |  |
| Procrastination (Table 5) |  |  |  |  |  | -0.05 |  |
|  |  |  |  |  |  | (0.07) |  |
| Like Deal. Fin. Matters (Table 5) |  |  |  |  |  |  | -0.00 |
|  |  |  |  |  |  |  | (0.08) |
| Constant | -0.53 | -0.66 | 0.25 | -0.31 | -0.33 | 0.02 | -0.07 |
|  | (0.50) | (0.49) | (0.47) | (0.51) | (0.45) | (0.46) | (0.47) |
| N | 488.00 | 488.00 | 489.00 | 489.00 | 486.00 | 488.00 | 487.00 |
| AIC | 480.97 | 476.77 | 482.04 | 483.89 | 480.69 | 483.56 | 480.02 |
| BIC | 548.01 | 543.82 | 549.11 | 550.97 | 547.67 | 550.61 | 547.03 |
| N[1] | 481.00 | 481.00 | 481.00 | 481.00 | 481.00 | 481.00 | 481.00 |
| AIC[1] | 474.31 | 470.68 | 476.50 | 476.81 | 476.68 | 477.07 | 477.38 |
| BIC[1] | 541.13 | 537.50 | 543.31 | 543.63 | 543.84 | 543.88 | 544.20 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations (N=481) does not lead to a different conclusion.

**Table 54: Factor Variable "Procrastination" vs Orignial Variables (Savings Suffice (1))**

| Planning concrete changes if savings suffice | 9.5 (19) Probit | 9.5 (20) IV-Probit | 9.5 (21) Probit Factor-Var. | 9.5 (22) IV-Probit Factor-Var. |
|---|---|---|---|---|
| Male | 0.15 | 0.10 | 0.20 | 0.16 |
| | (0.19) | (0.23) | (0.19) | (0.26) |
| Age | -0.03*** | -0.03*** | -0.03*** | -0.03*** |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.07 | -0.06 | -0.01 | -0.01 |
| | (0.21) | (0.21) | (0.21) | (0.21) |
| Children | 0.02 | 0.03 | 0.00 | 0.01 |
| (0 no – 4 four or more kids) | (0.09) | (0.09) | (0.09) | (0.09) |
| Middle Education[a] | 0.60 | 0.57 | 0.56 | 0.54 |
| | (0.38) | (0.40) | (0.37) | (0.39) |
| High Education[a] | 0.88** | 0.80* | 0.85** | 0.81* |
| | (0.37) | (0.47) | (0.37) | (0.45) |
| Middle Individual net Income[b] | -0.42* | -0.42* | -0.35 | -0.36 |
| | (0.26) | (0.26) | (0.26) | (0.26) |
| High Individual net Income[b] | -0.27 | -0.28 | -0.23 | -0.24 |
| | (0.24) | (0.24) | (0.25) | (0.25) |
| Middle Wealth[c] | -0.26 | -0.33 | -0.28 | -0.33 |
| | (0.22) | (0.28) | (0.23) | (0.30) |
| High Wealth[c] | -0.39* | -0.43* | -0.39 | -0.42 |
| | (0.23) | (0.25) | (0.24) | (0.27) |
| Blue- or White Collar Worker[d] | -0.13 | -0.14 | -0.00 | -0.02 |
| | (0.25) | (0.25) | (0.25) | (0.27) |
| Self-employed[d] | 0.39 | 0.44 | 0.47 | 0.50 |
| | (0.29) | (0.32) | (0.29) | (0.31) |
| Civil Servant[d] | -0.31 | -0.18 | -0.25 | -0.16 |
| | (0.37) | (0.54) | (0.37) | (0.56) |
| Actual Pension Knowledge | -0.13 | 0.28 | -0.11 | 0.19 |
| (0 = zero – 6 = six question | (0.15) | (1.19) | (0.15) | (1.32) |
| correct) | | | | |
| Future Orientation | 0.16 | 0.14 | 0.17 | 0.15 |
| (factor1, Table 5) | (0.12) | (0.12) | (0.11) | (0.13) |
| **Procrastinate on Financial Matters** | -0.05 | -0.06 | | |
| (1 agree – 4 not agree) | (0.09) | (0.10) | | |
| Like Deal. Fin. Matters | 0.21** | 0.15 | | |
| (Table 5) | (0.11) | (0.22) | | |
| Time Deal. Fin. Matters | -0.00 | -0.02 | | |
| (Table 5) | (0.10) | (0.11) | | |
| Underestimate Knowledge[e] | 0.02 | -0.24 | -0.02 | -0.20 |
| | (0.24) | (0.76) | (0.24) | (0.82) |
| Overestimate Knowledge[e] | -0.16 | 0.17 | -0.17 | 0.07 |
| | (0.22) | (0.98) | (0.22) | (1.08) |
| Procrastinate (Factor Variable) | | | 0.17 | 0.10 |
| | | | (0.12) | (0.31) |
| Constant | -0.05 | -0.56 | 0.14 | -0.41 |
| | (0.66) | (1.59) | (0.62) | (2.51) |
| Wald test[f] | | -0.24 | | -0.17 |
| | | (0.69) | | (0.76) |
| N | 511.00 | 511.00 | 511.00 | 511.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

**Table 55: Factor Variable "Procrastination" vs Orignial Variables (Savings do not Suffice (2))**

| Planning concrete changes if savings do not suffice | 9.5 (23) Probit | 9.5 (24) IV-Probit | 9.5 (25) Probit Factor-Var. | 9.5 (26) IV-Probit Factor-Var. |
|---|---|---|---|---|
| Male | 0.36** | 0.18 | 0.40** | 0.18 |
| | (0.17) | (0.38) | (0.18) | (0.37) |
| Age | -0.03*** | -0.02 | -0.03*** | -0.02 |
| | (0.01) | (0.02) | (0.01) | (0.02) |
| Married/Cohabiting | -0.52*** | -0.42 | -0.54*** | -0.39 |
| | (0.19) | (0.34) | (0.20) | (0.34) |
| Children | 0.22** | 0.18 | 0.24*** | 0.18 |
| (0 no – 4 four or more kids) | (0.09) | (0.14) | (0.09) | (0.14) |
| Middle Education[a] | 0.50* | 0.32 | 0.45 | 0.24 |
| | (0.28) | (0.46) | (0.28) | (0.42) |
| High Education[a] | 0.76*** | 0.58 | 0.71*** | 0.51 |
| | (0.27) | (0.51) | (0.27) | (0.46) |
| Middle Individual net Income[b] | -0.12 | -0.15 | -0.11 | -0.12 |
| | (0.21) | (0.21) | (0.22) | (0.21) |
| High Individual net Income[b] | -0.32 | -0.37 | -0.27 | -0.31 |
| | (0.28) | (0.28) | (0.28) | (0.27) |
| Middle Wealth[c] | 0.19 | 0.05 | 0.20 | 0.02 |
| | (0.24) | (0.33) | (0.23) | (0.31) |
| High Wealth[c] | 0.46* | 0.12 | 0.45* | 0.09 |
| | (0.25) | (0.62) | (0.25) | (0.53) |
| Blue- or White Collar Worker[d] | -0.08 | -0.21 | -0.08 | -0.22 |
| | (0.21) | (0.25) | (0.21) | (0.23) |
| Self-employed[d] | -0.03 | -0.11 | -0.14 | -0.23 |
| | (0.25) | (0.25) | (0.26) | (0.24) |
| Civil Servant[d] | -0.14 | 0.07 | -0.15 | 0.08 |
| | (0.53) | (0.61) | (0.54) | (0.58) |
| Actual Pension Knowledge | -0.05 | 0.94 | -0.02 | 1.07 |
| (0 = zero – 6 = six question | (0.14) | (1.39) | (0.14) | (1.12) |
| correct) | | | | |
| Future Orientation | 0.22** | 0.10 | 0.21** | 0.07 |
| (factor1, Table 5) | (0.10) | (0.25) | (0.10) | (0.22) |
| **Procrastinate on Financial Matters** | -0.13 | -0.11 | | |
| (1 agree – 4 not agree) | (0.08) | (0.10) | | |
| Like Deal. Fin. Matters | 0.15 | 0.08 | | |
| (Table 5) | (0.10) | (0.16) | | |
| Time Deal. Fin. Matters | -0.07 | -0.11 | | |
| (Table 5) | (0.08) | (0.10) | | |
| Underestimate Knowledge[e] | -0.16 | -0.91 | -0.16 | -0.98 |
| | (0.24) | (1.03) | (0.24) | (0.81) |
| Overestimate Knowledge[e] | 0.14 | 0.60 | 0.15 | 0.67 |
| | (0.20) | (0.63) | (0.20) | (0.53) |
| Procrastinate (Factor Variable) | | | -0.02 | -0.11 |
| | | | (0.11) | (0.13) |
| Constant | 0.11 | -1.14 | -0.08 | -1.76 |
| | (0.56) | (1.85) | (0.48) | (1.75) |
| Wald test[f] | | -0.65 | | -0.74 |
| | | (1.22) | | (1.06) |
| N | 368.00 | 368.00 | 368.00 | 368.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

## 9.6 Translating Plans into Action

The results in Table 56 indicate that objknowledge, which is the variable summing up the correct answers from all knowledge questions, has the lowest BIC an AIC. Table 57 and Table 58 show the estimations whith variing variables measuring time preferences and procrastination. On theoretical grounds it would be necessary, to include a variable approximating procrastination of retirement saving decisions and a variable measuring time preferences with respect to future orientation. Deciding on behalf of the AIC and BIC, "timepreference results" should be chosen to measure time preferences and factor2 to measure procrastination. Using a factor which is composed of the information from several variables measuring procrastination is, however, problematic, when testing hypothesis 3. For this hypothesis the variable needs to indicate if individuals are aware of their procrastination behavior or not. This requirement is only fulfilled by the variable procrastination. From the other two variables, measuring if someone likes dealing with financial matters or if someone has time to deal with fi-nancial matters it is not possible to deduce if someone knows that he/she procrasti-nates on financial decisions or not. Hence it is important to consider both variables, on the one hand factor and on the other hand the variable procrastination.

Counter intuitive the favoured time preferencs variable has a positive coefficient, which would mean that indi-viduals are more likely to have changed their savings behavior during the year if they care more about urgent matters because future problems often resolve themselves and if they think that actions with immediate results are more important than actions with results far in the future. This is surprising, since taking action in the form of sav-ing for retirement would entail results only far in the future, at the point of retirement.

The estimation results in chapter 6.3 will only consider the variable procrastination because the main purpose is to test the hypothesis. In this Appendix, however, the models have been estimated twice, on the one hand with the factor2 variable for pro-crastination and on the other hand by including each of the variables into the estima-tion which are part of factor2.

The results in Table 59 show that the only variable which is significant is the variable measuring how much an individual likes dealing with financial matters in the instrument variable estimation. This variable has a positive influence on changing retirement savings behavior.

**Table 56: AIC and BIC for Choosing Actual Knowledge Variable (Ch. 6.3)**

| Started to Save more for Retirement | 9.6(1) | 9.6(2) | 9.6(3) | 9.6(4) | 9.6(5) |
|---|---|---|---|---|---|
| Male | 0.02 | 0.01 | 0.03 | 0.02 | 0.01 |
| | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) |
| Age | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.08 | -0.09 | -0.08 | -0.08 | -0.09 |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) |
| Children | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | 0.35 | 0.34 | 0.35 | 0.35 | 0.35 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| High Education[a] | 0.08 | 0.07 | 0.08 | 0.08 | 0.10 |
| | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) |
| Middle Individual net Income[b] | 0.38* | 0.38* | 0.38* | 0.39* | 0.36* |
| | (0.20) | (0.20) | (0.20) | (0.20) | (0.20) |
| High Individual net Income[b] | 0.54** | 0.54** | 0.53** | 0.54** | 0.55** |
| | (0.23) | (0.23) | (0.23) | (0.23) | (0.24) |
| Middle Wealth[c] | -0.11 | -0.11 | -0.10 | -0.10 | -0.11 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.22) |
| High Wealth[c] | 0.06 | 0.06 | 0.07 | 0.07 | 0.05 |
| | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) |
| Actual Savings Suffice | -0.22 | -0.22 | -0.21 | -0.21 | -0.22 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Underestimate Knowledge[e] | -0.17 | -0.14 | -0.07 | -0.09 | -0.18 |
| | (0.22) | (0.21) | (0.20) | (0.20) | (0.21) |
| Overestimate Knowledge[e] | 0.22 | 0.22 | 0.12 | 0.16 | 0.23 |
| | (0.20) | (0.19) | (0.18) | (0.19) | (0.20) |
| Experience Fin. Matters | 0.10** | 0.10** | 0.10** | 0.10** | 0.10** |
| (no. of different assests) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Actual Pension Knowledge (0 = low – 2 = high) | 0.15 (0.13) | | | | |
| Actual Pension Knowledge (0 = zero – 6 = six question correct) | | 0.11 (0.09) | | | |
| Factor Actual Knowledge | | | 0.02 (0.09) | | |
| Actual Pension Knowledge (0=low – 2= high, equal space) | | | | 0.10 (0.15) | |
| Pension Reduction (question correct) | | | | | 0.27 (0.21) |
| Company Pension (question correct) | | | | | 0.09 (0.17) |
| Riester (question correct) | | | | | 0.21 (0.23) |
| Interest (question correct) | | | | | 0.03 (0.17) |
| Contribution Rate (question correct) | | | | | -0.16 (0.21) |
| Statutory Pension (question correct) | | | | | 0.26 (0.20) |
| Constant | -1.49*** | -1.41*** | -1.23** | -1.39** | -1.39** |
| | (0.56) | (0.54) | (0.52) | (0.57) | (0.55) |
| N | 322.00 | 322.00 | 322.00 | 322.00 | 322.00 |
| AIC | 426.88 | 426.66 | 428.12 | 427.76 | 433.20 |
| BIC | 487.27 | 487.06 | 488.51 | 488.15 | 512.46 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

**Table 57: AIC and BIC for Choosing Time Preference and Procrastination Variable (1) (Ch. 6.3)**

| Started to Save more for Retirement | 9.6(6) | 9.6(7) | 9.6(8) | 9.6(9) | 9.6(10) | 9.6(11) |
|---|---|---|---|---|---|---|
| Male | 0.01 | 0.00 | 0.03 | 0.01 | 0.00 | 0.03 |
| | (0.18) | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) |
| Age | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.05 | -0.06 | -0.05 | -0.05 | -0.08 | -0.09 |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.18) | (0.19) |
| Children | 0.00 | 0.00 | 0.02 | 0.00 | 0.01 | 0.05 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | 0.35 | 0.32 | 0.36 | 0.33 | 0.33 | 0.38 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| High Education[a] | 0.05 | 0.05 | 0.06 | 0.05 | 0.07 | 0.09 |
| | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) |
| Middle Individual net Income[b] | 0.38* | 0.38* | 0.39* | 0.39* | 0.37* | 0.38* |
| | (0.20) | (0.20) | (0.21) | (0.20) | (0.20) | (0.20) |
| High Individual net Income[b] | 0.58** | 0.58** | 0.60** | 0.58** | 0.54** | 0.57** |
| | (0.24) | (0.24) | (0.24) | (0.24) | (0.23) | (0.24) |
| Wealth | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.06 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) |
| Actual Savings Sufice | -0.25 | -0.27 | -0.23 | -0.24 | -0.23 | -0.24 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Underestimate Knowledge[e] | -0.21 | -0.20 | -0.23 | -0.21 | -0.14 | -0.17 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| Overestimate Knowledge[e] | 0.27 | 0.25 | 0.27 | 0.27 | 0.22 | 0.25 |
| | (0.20) | (0.20) | (0.20) | (0.20) | (0.19) | (0.19) |
| Experience Fin. Matters | 0.09** | 0.08** | 0.09** | 0.09** | 0.10** | 0.10** |
| (no. of different assests) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Actual Pension Knowledge | 0.14 | 0.13 | 0.14 | 0.14 | 0.10 | 0.13 |
| (0 = zero – 6 = six question | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) |
| correct) | | | | | | |
| Future Orientation | 0.01 | | | | | |
| (factor1 Table 5) | (0.10) | | | | | |
| Procrastination | | 0.10 | | | | |
| (factor2 Table 5) | | (0.12) | | | | |
| Future Orientation | | | 0.19* | | | |
| (factor3 Table 5) | | | (0.11) | | | |
| Procrastination | | | | -0.03 | | |
| (factor4 Table 5) | | | | (0.11) | | |
| Timepreference Urgent | | | | | 0.01 | |
| (Table 5) | | | | | (0.03) | |
| Timepreference Results | | | | | | 0.08*** |
| (Table 5) | | | | | | (0.03) |
| Constant | -1.48*** | -1.40** | -1.43*** | -1.49*** | -1.44*** | -1.78*** |
| | (0.54) | (0.55) | (0.54) | (0.54) | (0.55) | (0.55) |
| N | 316.00 | 316.00 | 316.00 | 316.00 | 322.00 | 321.00 |
| AIC | 417.41 | 416.64 | 414.39 | 417.35 | 427.13 | 416.29 |
| BIC | 477.50 | 476.73 | 474.49 | 477.44 | 487.53 | 476.63 |
| N[1] | | | | | 316.00 | 316.00 |
| AIC[1] | | | | | 417.34 | 410.45 |
| BIC[1] | | | | | 477.43 | 470.54 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations favours the variable Timepreference Results over factor3 to estimate time preferences.

**Table 58: AIC and BIC for Choosing Time Preference and Procrastination Var. (2) (Ch. 6.3)**

| Started to Save more for Retirement | 9.6(12) | 9.6(13) | 9.6(14) | 9.6(15) | 9.6(16) | 9.6(17) | 9.6(18) |
|---|---|---|---|---|---|---|---|
| Male | -0.03 | 0.03 | -0.00 | -0.01 | 0.00 | -0.01 | -0.02 |
| | (0.17) | (0.18) | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) |
| Age | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 | -0.00 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.07 | -0.07 | -0.09 | -0.07 | -0.08 | -0.09 | -0.09 |
| | (0.18) | (0.19) | (0.19) | (0.18) | (0.19) | (0.19) | (0.19) |
| Children | 0.01 | 0.00 | 0.01 | 0.01 | 0.02 | 0.01 | -0.00 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | 0.31 | 0.34 | 0.37 | 0.31 | 0.37 | 0.32 | 0.33 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| High Education[a] | 0.06 | 0.06 | 0.10 | 0.06 | 0.09 | 0.07 | 0.07 |
| | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) |
| Middle Individual net Income[b] | 0.38* | 0.41** | 0.35* | 0.38* | 0.36* | 0.37* | 0.39* |
| | (0.20) | (0.20) | (0.20) | (0.20) | (0.20) | (0.20) | (0.20) |
| High Individual net Income[b] | 0.52** | 0.57** | 0.51** | 0.53** | 0.53** | 0.53** | 0.55** |
| | (0.23) | (0.24) | (0.24) | (0.23) | (0.23) | (0.23) | (0.24) |
| Wealth | 0.05 | 0.04 | 0.05 | 0.05 | 0.03 | 0.04 | 0.04 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) |
| Actual Savings Suffice | -0.21 | -0.20 | -0.22 | -0.22 | -0.25 | -0.24 | -0.23 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Underestimate Knowledge[e] | -0.15 | -0.18 | -0.14 | -0.13 | -0.17 | -0.13 | -0.17 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| Overestimate Knowledge[e] | 0.24 | 0.21 | 0.23 | 0.22 | 0.23 | 0.21 | 0.20 |
| | (0.20) | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) |
| Experience Fin. Matters | 0.10** | 0.08* | 0.09** | 0.10** | 0.09** | 0.09** | 0.08* |
| (no. of different assests) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| Actual Pension Knowledge | 0.11 | 0.11 | 0.11 | 0.10 | 0.12 | 0.10 | 0.09 |
| (0 = zero – 6 = six question correct) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) |
| Timepreference Old Age (Table 5) | -0.03 (0.04) | | | | | | |
| Timepreference Old Age Need of Care (Table 5) | | 0.02 (0.03) | | | | | |
| Time Deal. Fin. Matters (Table 5) | | | -0.08 (0.08) | | | | |
| Retire Disuse (Table 5) | | | | -0.06 (0.10) | | | |
| Retire Illness (Table 5) | | | | | 0.05 (0.08) | | |
| Procrastination (Table 5) | | | | | | 0.05 (0.08) | |
| Like Deal. Fin. Matters (Table 5) | | | | | | | 0.11 (0.09) |
| Constant | -1.13* | -1.57*** | -1.21** | -1.21* | -1.53*** | -1.50*** | -1.61*** |
| | (0.61) | (0.58) | (0.57) | (0.62) | (0.57) | (0.57) | (0.57) |
| N | 321.00 | 321.00 | 322.00 | 322.00 | 320.00 | 322.00 | 320.00 |
| AIC | 425.86 | 423.62 | 426.47 | 427.00 | 424.44 | 426.97 | 422.44 |
| BIC | 486.20 | 483.96 | 486.87 | 487.39 | 484.74 | 487.36 | 482.73 |
| N[1] | 481.00 | 316.00 | 316.00 | 316.00 | 316.00 | 316.00 | 316.00 |
| AIC[1] | 474.31 | 416.89 | 416.72 | 416.87 | 417.06 | 417.23 | 415.52 |
| BIC[1] | 541.13 | 476.98 | 476.81 | 476.96 | 477.15 | 477.32 | 475.61 |

Source: F N A-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 59: Factor Variable "Procrastination" vs Orignial Variables**

| Started to Save more for Retirement | 9.6(19) Probit Factor procr. | 9.6(20) IV-Probit Factor procr. | 9.6(21) Probit | 9.6(22) IV-Probit |
|---|---|---|---|---|
| Male | 0.09 | 0.15 | 0.11 | 0.16 |
| | (0.14) | (0.14) | (0.14) | (0.14) |
| Age | -0.00 | -0.00 | -0.01 | -0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | -0.15 | -0.12 | -0.12 | -0.10 |
| | (0.15) | (0.15) | (0.15) | (0.15) |
| Children | -0.03 | -0.05 | -0.03 | -0.05 |
| (0 no – 4 four or more kids) | (0.06) | (0.06) | (0.06) | (0.06) |
| Middle Education[a] | 0.33 | 0.37* | 0.30 | 0.34* |
| | (0.22) | (0.21) | (0.21) | (0.21) |
| High Education[a] | 0.29 | 0.37* | 0.27 | 0.34 |
| | (0.21) | (0.21) | (0.21) | (0.21) |
| Middle Individual net Income[b] | 0.24 | 0.24 | 0.27 | 0.29 |
| | (0.18) | (0.18) | (0.17) | (0.18) |
| High Individual net Income[b] | 0.47** | 0.52** | 0.50** | 0.55*** |
| | (0.21) | (0.20) | (0.21) | (0.20) |
| Middle Wealth[c] | 0.05 | 0.17 | 0.05 | 0.16 |
| | (0.19) | (0.20) | (0.19) | (0.20) |
| High Wealth[c] | 0.22 | 0.36* | 0.22 | 0.36* |
| | (0.21) | (0.22) | (0.21) | (0.21) |
| Savings suffice | -0.13 | -0.08 | -0.14 | -0.08 |
| | (0.14) | (0.16) | (0.14) | (0.16) |
| Blue- or White Collar Worker[d] | 0.07 | 0.14 | 0.10 | 0.17 |
| | (0.17) | (0.18) | (0.17) | (0.17) |
| Self-employed[d] | -0.10 | -0.11 | -0.05 | -0.06 |
| | (0.21) | (0.20) | (0.21) | (0.20) |
| Civil Servant[d] | -0.03 | -0.26 | -0.01 | -0.24 |
| | (0.27) | (0.32) | (0.27) | (0.33) |
| Actual Pension Knowledge | 0.04 | -0.55 | 0.03 | -0.53 |
| (0 = zero – 6 = six question correct) | (0.07) | (0.54) | (0.07) | (0.52) |
| Future Orientation | 0.09 | 0.13* | 0.11 | 0.15** |
| (factor1, Table 5) | (0.07) | (0.07) | (0.07) | (0.07) |
| **Procrastinate on Financial Matters** | 0.05 | 0.05 | | |
| (1 agree – 4 not agree) | (0.06) | (0.06) | | |
| Like Deal. Fin. Matters | 0.08 | 0.16* | | |
| (Table 5) | (0.07) | (0.10) | | |
| Time Deal. Fin. Matters | -0.07 | -0.03 | | |
| (Table 5) | (0.07) | (0.08) | | |
| Underestimate Knowledge[e] | -0.16 | 0.31 | -0.17 | 0.29 |
| | (0.17) | (0.47) | (0.17) | (0.46) |
| Overestimate Knowledge[e] | 0.10 | -0.53 | 0.09 | -0.52 |
| | (0.15) | (0.59) | (0.15) | (0.58) |
| Procrastinate (Factor Variable) | | | 0.08 | 0.19 |
| | | | (0.08) | (0.12) |
| Constant | -0.87* | -0.12 | -0.71* | 0.36 |
| | (0.45) | (0.89) | (0.41) | (1.12) |
| Wald test[f] | | 0.55 | | 0.54 |
| | | (0.61) | | (0.58) |
| N | 533.00 | 533.00 | 533.00 | 533.00 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

## 9.7 Saving for retirement

The results in Table 60 to Table 64 indicate that in two of these models objknowledge, which is the variable summing up the correct answers from all knowledge questions, has the lowest BIC an AIC. In another two models the variable where pension knowledge is combined to three categories with equal spaces has the lowest BIC and AIC. Since objknowledge is the variable of choice in the models of previous chapters, this variable will also be chosen here. Another advantage of this variable with seven categories instead of three is, that it can be treated as continous endogenous variable in an IV estimation setting.

**Table 60: AIC and BIC for Choosing Actual Knowledge Variable (Riester)**

| "Riester Pension" | 9.7(1) | 9.7(2) | 9.7(3) | 9.7(4) | 9.7(5) |
|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + |
| Actual Pension Knowledge (0 = low – 2 = high) | 0.30*** (0.11) | | | | |
| Actual Pension Knowledge (0 = zero – 6 = six question correct) | | 0.22*** (0.07) | | | |
| Actual Pension Knowledge (0=low – 2= high, equal space) | | | 0.28** (0.12) | | |
| Factor Actual Knowledge | | | | 0.16** (0.07) | |
| Pension Reduction (question correct) | | | | | -0.13 (0.19) |
| Company Pension (question correct) | | | | | 0.28** (0.13) |
| Riester (question correct) | | | | | 0.82*** (0.19) |
| Interest (question correct) | | | | | 0.09 (0.14) |
| Contribution Rate (question correct) | | | | | 0.00 (0.17) |
| Statutory Pension (question correct) | | | | | 0.14 (0.16) |
| Constant | -2.81*** (1.06) | -2.63** (1.06) | -2.88*** (1.07) | -2.39** (1.07) | -2.28** (1.09) |
| N | 513.00 | 513.00 | 513.00 | 513.00 | 513.00 |
| ll | -298.97 | -298.23 | -300.69 | -300.51 | -290.43 |
| AIC | 639.94 | 638.46 | 643.38 | 643.01 | 632.86 |
| BIC | 728.99 | 727.50 | 732.42 | 732.06 | 743.11 |

Source: FNA-Data, 1. Telephone Interview.
Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Furthermore, it has been tested if the variable measuring how often someone stated that he/she does not know the correct answer to the pension literacy question, adds anything in explaining the dependent variable. The likelihood-ratio test, testing the hypothesis that the coefficient of SumDk is zero cannot be rejected in all models but the model estimating the probability of owning a

"Riester Pension".[100] In this model the p-value is 0.0074 and the likelyhood of owning a "Riester Pension" decreases with the number of questions someone answered with don't know. In order to allow a comparison between all models, the variable SumDK will not be considered as explanatory variable.

Table 61: AIC and BIC for Choosing Actual Knowledge Variable (other private pension)

| Other private pension | 9.7(6) | 9.7(7) | 9.7(8) | 9.7(9) | 9.7(10) |
|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + |
| Actual Pension Knowledge (0 = low – 2 = high) | 0.31*** (0.10) | | | | |
| Actual Pension Knowledge (0 = zero – 6 = six question correct) | | 0.20*** (0.07) | | | |
| Actual Pension Knowledge (0=low – 2= high, equal space) | | | 0.36*** (0.12) | | |
| Factor Actual Knowledge | | | | 0.10 (0.07) | |
| Pension Reduction (question correct) | | | | | -0.02 (0.18) |
| Company Pension (question correct) | | | | | 0.26** (0.13) |
| Riester (question correct) | | | | | 0.19 (0.19) |
| Interest (question correct) | | | | | 0.09 (0.14) |
| Contribution Rate (question correct) | | | | | 0.41** (0.16) |
| Statutory Pension (question correct) | | | | | 0.20 (0.16) |
| Constant | -1.96*** (0.52) | -1.73*** (0.50) | -2.02*** (0.52) | -1.47*** (0.50) | -1.77*** (0.52) |
| N | 513.00 | 513.00 | 513.00 | 513.00 | 513.00 |
| ll | -293.96 | -294.48 | -294.26 | -297.28 | -292.34 |
| AIC | 627.91 | 628.96 | 628.52 | 634.56 | 634.68 |
| BIC | 712.72 | 713.76 | 713.32 | 719.37 | 740.68 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 60 to Table 74 show the estimations whith variing variables measuring time preferneces and procrastination. On theoretical grounds it would be necessary to include a variable approximating procrastination of retirement saving decisions and a variable measuring time preferences with respect to future orientation. The two factors approximating time preferences are factor1 and factor3 and the other two factors, factor2 and factor4 approximate procrastination. De-

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[100] Likelyhood-ratio test for sumDK: other penison p-value 0.57, capital life insurance p-value 0.66, company pension p-value 0.71, home equity p-value 0.23.

ciding on behalf of the AIC and BIC, all models but the model estimating the probability of owning a company pension would favor factor1 as the variable of choice to approximate time preferences. For that reasons factor2 will be chosen to approximate time preferences in all models estimated in chapter 6.4. Concerning the approximation of procrastination, factor2 is favored over factor4 in three out of four models.

**Table 62: AIC and BIC for Choosing Actual Knowledge Variable (Capital Life Insurance)**

| Capital Life Insurance | 9.7(11) | 9.7(12) | 9.7(13) | 9.7 (14) | 9.7(15) |
|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + |
| Actual Pension Knowledge (0 = low – 2 = high) | 0.19* (0.10) | | | | |
| Actual Pension Knowledge (0 = zero – 6 = six question correct) | | 0.13* (0.07) | | | |
| Actual Pension Knowledge (0=low – 2= high, equal space) | | | 0.16 (0.12) | | |
| Factor Actual Knowledge | | | | 0.05 (0.07) | |
| Pension Reduction (question correct) | | | | | -0.07 (0.17) |
| Company Pension (question correct) | | | | | 0.27** (0.13) |
| Riester (question correct) | | | | | 0.05 (0.18) |
| Interest (question correct) | | | | | 0.24* (0.14) |
| Contribution Rate (question correct) | | | | | 0.25 (0.16) |
| Statutory Pension (question correct) | | | | | -0.08 (0.15) |
| Constant | -0.71 (0.48) | -0.59 (0.46) | -0.68 (0.49) | -0.43 (0.46) | -0.81* (0.48) |
| N | 513.00 | 513.00 | 513.00 | 513.00 | 513.00 |
| AIC | 667.26 | 667.03 | 668.87 | 670.07 | 670.52 |
| BIC | 752.06 | 751.83 | 753.68 | 754.88 | 776.53 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

As described before, using a factor which is composed of the information from several variables measuring procrastination is, however, problematic when testing hypothesis 3. For this hypothesis the variable needs to indicate if individuals are aware of their procrastination behavior or not. This requirement is only fulfilled by the variable procrastination. From the other two variables, measuring if someone likes dealing with financial matters or if someone has time to deal with financial matters it is not possible to deduce if someone knows that he/she procrastinates on financial decisions or not. Hence it is important to consider both variables, on the one hand, that of factor and on the other hand the variable procrastination.

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**Table 63: AIC and BIC for Choosing Actual Knowledge Variable (Company Pension)**

| Company Pension | 9.7(16) | 9.7(17) | 9.7(18) | 9.7(19) | 9.7(20) |
|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + |
| Actual Pension Knowledge (0 = low – 2 = high) | 0.46*** (0.11) | | | | |
| Actual Pension Knowledge (0 = zero – 6 = six question correct) | | 0.29*** (0.07) | | | |
| Actual Pension Knowledge (0=low – 2= high, equal space) | | | 0.60*** (0.13) | | |
| Factor Actual Knowledge | | | | 0.14* (0.07) | |
| Pension Reduction (question correct) | | | | | 0.30 (0.19) |
| Company Pension (question correct) | | | | | 0.58*** (0.14) |
| Riester (question correct) | | | | | 0.20 (0.20) |
| Interest (question correct) | | | | | 0.15 (0.15) |
| Contribution Rate (question correct) | | | | | 0.26 (0.17) |
| Statutory Pension (question correct) | | | | | 0.17 (0.17) |
| Constant | -2.02*** (0.53) | -1.66*** (0.51) | -2.18*** (0.54) | -1.25** (0.49) | -1.84*** (0.53) |
| N | 513.00 | 513.00 | 513.00 | 513.00 | 513.00 |
| AIC | 576.74 | 579.06 | 573.54 | 591.02 | 582.15 |
| BIC | 661.55 | 663.86 | 658.35 | 675.82 | 688.15 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In this Appendix the models have been estimated twice, on the one hand with the factor2 variable for procrastination and on the other hand by including each of the variables into the estimation which are part of factor2. The results can be found from Table 76 onwards. The factor variable is negative and significant only in the model estimating the probability of owning a capital life insurance (Table 79). The variable which is the driving force is the variable measuring if someone has sufficient time to deal with financial matters. The results indicate that individuals who have sufficient time to deal with financial matters are significantly less likely to have a capital life insurance than individual who do not have sufficient time.

**Table 64: AIC and BIC for Choosing Actual Knowledge Variable (Housing Equity)**

| Housing Equity | 9.7(21) | 9.7(22) | 9.7(23) | 9.7(24) | 9.7(25) |
|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + |
| Actual Pension Knowledge (0 = low – 2 = high) | 0.18 (0.13) | | | | |
| Actual Pension Knowledge (0 = zero – 6 = six question correct) | | 0.14 (0.09) | | | |
| Actual Pension Knowledge (0=low – 2= high, equal space) | | | 0.34** (0.17) | | |
| Factor Actual Knowledge | | | | 0.11 (0.09) | |
| Pension Reduction (question correct) | | | | | 0.36 (0.23) |
| Company Pension (question correct) | | | | | 0.11 (0.17) |
| Riester (question correct) | | | | | 0.18 (0.25) |
| Interest (question correct) | | | | | -0.10 (0.18) |
| Contribution Rate (question correct) | | | | | 0.15 (0.21) |
| Statutory Pension (question correct) | | | | | 0.24 (0.20) |
| Constant | -2.16*** (0.60) | -2.04*** (0.57) | -2.37*** (0.61) | -1.85*** (0.57) | -1.88*** (0.59) |
| N | 514.00 | 514.00 | 514.00 | 514.00 | 514.00 |
| AIC | 411.93 | 411.36 | 409.47 | 412.35 | 417.82 |
| BIC | 492.53 | 491.96 | 490.08 | 492.95 | 519.64 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A similar result can be dectected in the model estimating the probability of owning a house (Table 85). In this case the factor variable is not significant but the variable measuring if some has sufficient time is negative and significant. This would again suggest that individuals who have sufficient time are less likely to have home equity than someone who does not have sufficient time. In this case, the causality could go both ways. It might be that individuals who are house owners are busy with gardening, repairs and other things which have to be considered when owning a house and hence there is less time for financial matters.

**Table 65: AIC and BIC Time Preferences and Procrastination Variable (Riester 1)**

| "Riester Pension" | 9.7(26) | 9.7 (27) | 9.7(28) | 9.7(29) | 9.7(30) | 9.7(31) |
|---|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + | + |
| Future Orientation (factor1 Table 5) | 0.29*** (0.08) | | | | | |
| Procrastination (factor2 Table 5) | | 0.02 (0.09) | | | | |
| Future Orientation (factor3 Table 5) | | | -0.11 (0.09) | | | |
| Procrastination (factor4 Table 5) | | | | -0.11 (0.09) | | |
| Timepreference Urgent (Table 5) | | | | | -0.05** (0.02) | |
| Timepreference Results (Table 5) | | | | | | -0.00 (0.02) |
| _cons | -0.22 (0.38) | -0.12 (0.37) | -0.11 (0.37) | -0.17 (0.37) | 0.12 (0.38) | -0.12 (0.39) |
| N | 506.00 | 506.00 | 506.00 | 506.00 | 517.00 | 516.00 |
| AIC | 626.29 | 638.92 | 637.23 | 637.35 | 644.56 | 646.63 |
| BIC | 702.37 | 714.99 | 713.30 | 713.43 | 721.03 | 723.06 |
| N[1] | | | | | 506.00 | 506.00 |
| AIC[1] | | | | | 638.31 | 643.16 |
| BIC[1] | | | | | 714.60 | 719.45 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 66: AIC and BIC Time Preferences and Procrastination Variable (Riester 2)**

| "Riester-Pension" | 9.7(32) | 9.7(33) | 9.7(34) | 9.7(35) | 9.7(36) | 9.7(37) | 9.7(38) |
|---|---|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + | + | + |
| Timepreference Old Age (Table 5) | 0.09*** (0.03) | | | | | | |
| Timepreference Old Age (Table 5) | | 0.08*** (0.02) | | | | | |
| Time Deal. Fin. Matters (Table 5) | | | -0.03 (0.07) | | | | |
| Retire Disuse (Table 5) | | | | -0.09 (0.07) | | | |
| Retire Illness (Table 5) | | | | | -0.03 (0.06) | | |
| Procrastination (Table 5) | | | | | | -0.02 (0.06) | |
| Like Deal. Fin. Matters (Table 5) | | | | | | | 0.06 (0.07) |
| Constant | -0.84* (0.45) | -0.78* (0.43) | -0.01 (0.42) | 0.16 (0.43) | -0.04 (0.39) | -0.06 (0.40) | -0.26 (0.41) |
| N | 516.00 | 514.00 | 516.00 | 516.00 | 514.00 | 516.00 | 514.00 |
| AIC | 639.88 | 637.21 | 649.00 | 648.25 | 646.97 | 649.36 | 646.93 |
| BIC | 716.31 | 713.57 | 725.43 | 724.68 | 723.33 | 725.79 | 723.29 |
| $N^1$ | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 |
| $AIC^1$ | 633.96 | 633.46 | 643.07 | 641.03 | 642.99 | 642.85 | 642.40 |
| $BIC^1$ | 710.25 | 709.75 | 719.36 | 717.32 | 719.28 | 719.14 | 718.69 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. $N^1$, $AIC^1$ and $BIC^1$ shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 67: AIC and BIC Time Preferences and Procrastination Variable (Other Private Pension 1)**

| Other private pension | 9.7(39) | 9.7(40) | 9.7(41) | 9.7 (42) | 9.7(43) | 9.7(45) |
|---|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + | + |
| Future Orientation (factor1 Table 5) | 0.17** (0.08) | | | | | |
| Procrastination (factor2 Table 5) | | 0.13 (0.09) | | | | |
| Future Orientation (factor3 Table 5) | | | -0.07 (0.09) | | | |
| Procrastination (factor4 Table 5) | | | | 0.11 (0.09) | | |
| Timepreference Urgent (Table 5) | | | | | -0.02 (0.02) | |
| Timepreference Results (Table 5) | | | | | | -0.01 (0.02) |
| _cons | -1.61*** (0.41) | -1.55*** (0.40) | -1.56*** (0.40) | -1.51*** (0.40) | -1.47*** (0.41) | -1.53*** (0.42) |
| N | 506.00 | 506.00 | 506.00 | 506.00 | 517.00 | 516.00 |
| AIC | 617.73 | 620.05 | 621.35 | 620.55 | 632.26 | 631.48 |
| BIC | 693.80 | 696.13 | 697.42 | 696.63 | 708.72 | 707.91 |
| $N^1$ | | | | | 506.00 | 506.00 |
| $AIC^1$ | | | | | 625.39 | 626.24 |
| $BIC^1$ | | | | | 701.68 | 702.53 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. $N^1$, $AIC^1$ and $BIC^1$ shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 68: AIC and BIC Time Preferences and Procrastination Variable (Other Private Pension 2)**

| Other private pension | 9.7(46) | 9.7(47) | 9.7(48) | 9.7(49) | 9.7(50) | 9.7(51) | 9.7(52) |
|---|---|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + | + | + |
| Timepreference Old Age (Table 5) | 0.07** | | | | | | |
| | (0.03) | | | | | | |
| Timepreference Old Age (Table 5) | | 0.03 | | | | | |
| | | (0.02) | | | | | |
| Time Deal. Fin. Matters (Table 5) | | | 0.09 | | | | |
| | | | (0.07) | | | | |
| Retire Disuse (Table 5) | | | | 0.14* | | | |
| | | | | (0.08) | | | |
| Retire Illness (Table 5) | | | | | 0.02 | | |
| | | | | | (0.06) | | |
| Procrastination (Table 5) | | | | | | 0.02 | |
| | | | | | | (0.06) | |
| Like Deal. Fin. Matters (Table 5) | | | | | | | 0.10 |
| | | | | | | | (0.07) |
| Constant | -2.12*** | -1.81*** | -1.83*** | -1.97*** | -1.61*** | -1.61*** | -1.85*** |
| | (0.48) | (0.45) | (0.45) | (0.46) | (0.42) | (0.43) | (0.45) |
| N | 516.00 | 514.00 | 516.00 | 516.00 | 514.00 | 516.00 | 514.00 |
| AIC | 627.57 | 627.06 | 631.27 | 628.88 | 631.67 | 633.08 | 625.47 |
| BIC | 704.00 | 703.42 | 707.70 | 705.31 | 708.03 | 709.51 | 701.83 |
| $N^1$ | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 |
| $AIC^1$ | 620.61 | 624.71 | 624.56 | 623.45 | 626.24 | 626.25 | 624.14 |
| $BIC^1$ | 696.90 | 701.00 | 700.85 | 699.74 | 702.53 | 702.54 | 700.43 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. $N^1$, $AIC^1$ and $BIC^1$ shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 69: AIC and BIC Time Preferences and Procrastination Variable (Capital Life Insurance 1)**

| Captital life insurance | (53) | (54) | (55) | (56) | (57) | (58) |
|---|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + | + |
| Future Orientation (factor1 Table 5) | 0.19** (0.08) | | | | | |
| Procrastination (factor2 Table 5) | | -0.01 (0.09) | | | | |
| Future Orientation (factor3 Table 5) | | | -0.08 (0.09) | | | |
| Procrastination (factor4 Table 5) | | | | 0.06 (0.09) | | |
| Timepreference Urgent (Table 5) | | | | | -0.03 (0.02) | |
| Timepreference Results (Table 5) | | | | | | -0.01 (0.02) |
| _cons | -1.08*** (0.38) | -1.00*** (0.37) | -0.99*** (0.37) | -0.97** (0.38) | -0.89** (0.38) | -0.96** (0.39) |
| N | 506.00 | 506.00 | 506.00 | 506.00 | 517.00 | 516.00 |
| AIC | 646.40 | 651.37 | 651.50 | 651.86 | 670.24 | 671.27 |
| BIC | 722.48 | 727.44 | 727.58 | 727.94 | 746.71 | 747.70 |
| N[1] | | | | | 506.00 | 506.00 |
| AIC[1] | | | | | 650.61 | 652.21 |
| BIC[1] | | | | | 726.68 | 728.29 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 70: AIC and BIC Time Preferences and Procrastination Variable (Capital Life Insurance 2)**

| Capital Life Insurance | 9.7(59) | 9.7(60) | 9.7(61) | 9.7(62) | 9.7(63) | 9.7(64) | 9.7(65) |
|---|---|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + | + | + |
| Timepreference Old Age (Table 5) | 0.06** (0.03) | | | | | | |
| Timepreference Old Age (Table 5) | | 0.05** (0.02) | | | | | |
| Time Deal. Fin. Matters (Table 5) | | | 0.01 (0.07) | | | | |
| Retire Disuse (Table 5) | | | | 0.09 (0.07) | | | |
| Retire Illness (Table 5) | | | | | 0.02 (0.06) | | |
| Procrastination (Table 5) | | | | | | -0.04 (0.06) | |
| Like Deal. Fin. Matters (Table 5) | | | | | | | -0.00 (0.07) |
| Constant | -1.51*** (0.45) | -1.43*** (0.43) | -1.05** (0.42) | -1.26*** (0.43) | -1.09*** (0.39) | -0.92** (0.40) | -0.99** (0.42) |
| N | 516.00 | 514.00 | 516.00 | 516.00 | 514.00 | 516.00 | 514.00 |
| AIC | 666.59 | 665.26 | 671.66 | 668.77 | 662.82 | 671.66 | 667.75 |
| BIC | 743.02 | 741.62 | 748.09 | 745.20 | 739.18 | 748.09 | 744.11 |
| N[1] | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 |
| AIC[1] | 648.09 | 648.27 | 652.22 | 651.20 | 652.31 | 652.21 | 652.38 |
| BIC[1] | 724.16 | 724.35 | 728.30 | 727.28 | 728.39 | 728.28 | 728.46 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 71: AIC and BIC Time Preferences and Procrastination Variable (Company Pension 1)**

| Company pension | 9.7(66) | 9.7(67) | 9.7(68) | 9.7(69) | 9.7(70) | 9.7(71) |
|---|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + | + |
| Future Orientation (factor1 Table 5) | 0.03 (0.08) | | | | | |
| Procrastination (factor2 Table 5) | | 0.04 (0.09) | | | | |
| Future Orientation (factor3 Table 5) | | | -0.13 (0.09) | | | |
| Procrastination (factor4 Table 5) | | | | 0.10 (0.09) | | |
| Timepreference Urgent (Table 5) | | | | | -0.02 (0.02) | |
| Timepreference Results (Table 5) | | | | | | -0.05* (0.03) |
| _cons | -1.86*** (0.41) | -1.85*** (0.41) | -1.86*** (0.41) | -1.80*** (0.41) | -1.73*** (0.42) | -1.59*** (0.42) |
| N | 506.00 | 506.00 | 506.00 | 506.00 | 517.00 | 516.00 |
| AIC | 574.12 | 573.02 | 572.18 | 573.18 | 578.56 | 575.56 |
| BIC | 650.20 | 649.09 | 648.26 | 649.26 | 655.03 | 651.99 |
| N[1] | | | | | 506.00 | 506.00 |
| AIC[1] | | | | | 573.78 | 570.55 |
| BIC[1] | | | | | 649.86 | 646.63 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations would suggest to choose the variable "Timepreference Results" instead of "factor3".

**Table 72: AIC and BIC Time Preferences and Procrastination Variable (Company Pension 2)**

| Company pension | 9.7(72) | 9.7(73) | 9.7(74) | 9.7(75) | 9.7(76) | 9.7(77) | 9.7(78) |
|---|---|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + | + | + |
| Timepreference Old Age (Table 5) | (0.14) 0.02 (0.03) | (0.15) | (0.14) | (0.14) | (0.14) | (0.14) | (0.14) |
| Timepreference Old Age (Table 5) | | 0.00 (0.02) | | | | | |
| Time Deal. Fin. Matters (Table 5) | | | 0.11 (0.07) | | | | |
| Retire Disuse (Table 5) | | | | 0.04 (0.08) | | | |
| Retire Illness (Table 5) | | | | | 0.06 (0.07) | | |
| Procrastination (Table 5) | | | | | | 0.05 (0.07) | |
| Like Deal. Fin. Matters (Table 5) | | | | | | | -0.04 (0.07) |
| Constant _cons | -1.99*** (0.48) | -1.84*** (0.46) | -2.16*** (0.47) | -1.93*** (0.47) | -1.92*** (0.43) | -1.93*** (0.44) | -1.73*** (0.46) |
| N | 516.00 | 514.00 | 516.00 | 516.00 | 514.00 | 516.00 | 514.00 |
| AIC | 577.96 | 577.02 | 575.61 | 577.77 | 577.78 | 578.41 | 576.83 |
| BIC | 654.39 | 653.38 | 652.04 | 654.20 | 654.14 | 654.84 | 653.19 |
| N[1] | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 | 506.00 |
| AIC[1] | 573.74 | 574.23 | 571.92 | 573.88 | 573.20 | 573.77 | 573.99 |
| BIC[1] | 649.82 | 650.31 | 648.00 | 649.96 | 649.28 | 649.85 | 650.06 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 73: AIC and BIC Time Preferences and Procrastination Variable (Housing Equity 1)**

| Housing Equity | 9.7(79) | 9.7(80) | 9.7(81) | 9.7(82) | 9.7(83) | 9.7(84) |
|---|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + | + |
| Future Orientation (factor1 Table 5) | 0.12 (0.10) | | | | | |
| Procrastination (factor2 Table 5) | | 0.02 (0.11) | | | | |
| Future Orientation (factor3 Table 5) | | | -0.12 (0.11) | | | |
| Procrastination (factor4 Table 5) | | | | -0.07 (0.11) | | |
| Timepreference Urgent (Table 5) | | | | | -0.03 (0.03) | |
| Timepreference Results (Table 5) | | | | | | -0.02 (0.03) |
| _cons | -2.37*** (0.47) | -2.32*** (0.47) | -2.32*** (0.47) | -2.36*** (0.47) | -2.30*** (0.47) | -2.33*** (0.49) |
| N | 507.00 | 507.00 | 507.00 | 507.00 | 518.00 | 517.00 |
| AIC | 403.38 | 404.75 | 403.50 | 404.34 | 415.37 | 416.27 |
| BIC | 475.26 | 476.64 | 475.39 | 476.23 | 487.61 | 488.48 |
| N[1] | | | | | 507.00 | 507.00 |
| AIC[1] | | | | | 401.98 | 404.62 |
| BIC[1] | | | | | 473.87 | 476.51 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations would suggest to choose the variable "Timepreference Urgent" instead of "factor1".

**Table 74: AIC and BIC Time Preferences and Procrastination Variable (Housing Equity 2)**

| Housing Equity | 9.7(85) | 9.7(86) | 9.7(87) | 9.7(89) | 9.7(90) | 9.7(91) | 9.7(92) |
|---|---|---|---|---|---|---|---|
| Demographics and other control variables | + | + | + | + | + | + | + |
| Timepreference Old Age (Table 5) | 0.03 (0.04) | | | | | | |
| Timepreference Old Age (Table 5) | | 0.04 (0.03) | | | | | |
| Time Deal. Fin. Matters (Table 5) | | | 0.03 (0.08) | | | | |
| Retire Disuse (Table 5) | | | | 0.04 (0.09) | | | |
| Retire Illness (Table 5) | | | | | -0.08 (0.08) | | |
| Procrastination (Table 5) | | | | | | -0.05 (0.08) | |
| Like Deal. Fin. Matters (Table 5) | | | | | | | 0.05 (0.09) |
| Constant | -2.63*** (0.55) | -2.68*** (0.55) | -2.45*** (0.53) | -2.57*** (0.54) | -2.26*** (0.49) | -2.30*** (0.50) | -2.48*** (0.52) |
| N | 517.00 | 515.00 | 517.00 | 517.00 | 515.00 | 517.00 | 515.00 |
| AIC | 416.80 | 408.23 | 412.63 | 416.28 | 414.00 | 416.60 | 410.85 |
| BIC | 489.02 | 480.38 | 484.85 | 488.50 | 486.15 | 488.81 | 483.00 |
| N[1] | 507.00 | 507.00 | 507.00 | 507.00 | 507.00 | 507.00 | 507.00 |
| AIC[1] | 404.49 | 402.63 | 404.72 | 404.74 | 403.86 | 404.49 | 404.46 |
| BIC[1] | 476.37 | 474.51 | 476.61 | 476.63 | 475.74 | 476.37 | 476.35 |

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 75: Determinants of Owning Different Vehicles to Provide for Retirement (probit)**

| Probit estimation<br>Owning a | 9.7(93)<br>Riester<br>Pension | 9.7(94)<br>Capital<br>Life | 9.7(95)<br>Compa-<br>ny Pen-<br>sion | 9.7(96)<br>Other<br>Private | 9.7(97)<br>Housing<br>Equity | 9.7(98)<br>Private<br>Saving |
|---|---|---|---|---|---|---|
| Male | -0.19* | -0.11 | 0.03 | -0.19* | 0.10 | 0.02 |
| | (0.11) | (0.10) | (0.11) | (0.10) | (0.13) | (0.13) |
| Age | 0.09** | 0.06* | -0.01 | 0.03 | 0.02*** | 0.08* |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.01) | (0.04) |
| Age Squared | -0.00*** | -0.00* | 0.00 | -0.00 | | -0.00** |
| | (0.00) | (0.00) | (0.00) | (0.00) | | (0.00) |
| Married/Cohabiting | 0.02 | 0.17 | 0.13 | 0.08 | 0.72*** | 0.03 |
| | (0.11) | (0.11) | (0.12) | (0.11) | (0.12) | (0.14) |
| Children | 0.25*** | -0.06 | -0.01 | -0.11** | 0.18*** | 0.07 |
| (0 no – 4 four or more kids) | (0.05) | (0.05) | (0.05) | (0.05) | (0.06) | (0.06) |
| Middle Education[a] | 0.11 | -0.15 | -0.42*** | 0.23 | 0.31* | 0.08 |
| | (0.16) | (0.15) | (0.15) | (0.15) | (0.19) | (0.19) |
| High Education[a] | 0.10 | -0.01 | -0.23 | 0.12 | 0.32* | 0.01 |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.19) | (0.18) |
| Middle Individual net Income[b] | 0.08 | 0.10 | 0.54*** | 0.20 | 0.10 | 0.45*** |
| | (0.13) | (0.13) | (0.13) | (0.13) | (0.17) | (0.17) |
| High Individual net Income[b] | -0.11 | 0.26 | 0.60*** | 0.55*** | 0.02 | 0.53*** |
| | (0.16) | (0.16) | (0.17) | (0.14) | (0.19) | (0.20) |
| Middle Wealth[c] | 0.15 | 0.18 | 0.52*** | 0.20 | 0.71*** | 0.54*** |
| | (0.15) | (0.13) | (0.17) | (0.16) | (0.13) | (0.18) |
| High Wealth[c] | -0.05 | 0.23 | 0.10 | 0.18 | 1.81*** | 0.44** |
| | (0.15) | (0.16) | (0.18) | (0.16) | (0.18) | (0.18) |
| Home Equity | -0.03 | 0.37*** | 0.19 | 0.04 | | 0.29* |
| | (0.13) | (0.12) | (0.14) | (0.13) | | (0.15) |
| Blue- or White Collar Worker[d] | 0.10 | 0.25* | 0.69*** | 0.11 | 0.16 | 0.45*** |
| | (0.13) | (0.13) | (0.14) | (0.13) | (0.15) | (0.15) |
| Self-employed[d] | -0.14 | 0.46*** | -0.36* | 0.45*** | 0.61*** | 0.27 |
| | (0.17) | (0.16) | (0.18) | (0.16) | (0.20) | (0.20) |
| Civil Servant[d] | 0.15 | 0.15 | -0.80*** | -0.13 | 0.95*** | -0.12 |
| | (0.22) | (0.21) | (0.24) | (0.21) | (0.29) | (0.25) |
| Actual Pension Knowledge | 0.19*** | 0.12** | 0.31*** | 0.11** | 0.04 | 0.28*** |
| (0 = zero – 6 = six question correct) | (0.05) | (0.05) | (0.06) | (0.05) | (0.07) | (0.08) |
| Future Orientation | 0.22*** | 0.18*** | 0.03 | 0.12** | 0.09 | 0.18*** |
| (factor1, Table 5) | (0.06) | (0.06) | (0.06) | (0.06) | (0.07) | (0.07) |
| **Procrastinate on Financial Matters** | -0.00 | -0.03 | -0.02 | -0.01 | 0.10* | -0.18*** |
| (1 agree – 4 not agree) | (0.05) | (0.05) | (0.05) | (0.05) | (0.06) | (0.06) |
| Underestimate Knowledge[e] | -0.28** | -0.13 | -0.45*** | -0.20 | -0.24 | -0.43*** |
| | (0.13) | (0.12) | (0.15) | (0.13) | (0.16) | (0.16) |
| Overestimate Knowledge[e] | 0.18 | 0.34*** | 0.42*** | 0.11 | -0.16 | 0.58*** |
| | (0.12) | (0.12) | (0.13) | (0.12) | (0.15) | (0.18) |
| Constant | -2.18*** | -2.01*** | -1.61** | -1.58** | -2.48*** | -1.38 |
| | (0.76) | (0.75) | (0.81) | (0.78) | (0.38) | (0.90) |
| N | 901.00 | 951.00 | 951 | 951.00 | 951.00 | 951.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

## Table 76: Owning a "Riester-Pension" (1)

| Owning a "Riester-Pension" | 9.7(99) Probit | 9.7(100) IV-Probit | 9.7(101) Probit | 9.7(102) IV-Probit | 9.7(103) IV-Probit Original Data | 9.7(104) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | -0.19* | -0.16 | -0.16 | -0.11 | -0.06 | -0.06 |
| | (0.11) | (0.17) | (0.11) | (0.17) | (0.27) | (0.27) |
| Age | 0.09** | 0.10** | 0.10** | 0.10** | 0.11** | 0.11** |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.06) | (0.05) |
| Age Squared | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.02 | 0.03 | 0.02 | 0.02 | 0.05 | 0.05 |
| | (0.11) | (0.12) | (0.12) | (0.12) | (0.15) | (0.16) |
| Children | 0.25*** | 0.25*** | 0.24*** | 0.23*** | 0.24*** | 0.24*** |
| (0 no – 4 four or more kids) | (0.05) | (0.07) | (0.05) | (0.07) | (0.07) | (0.07) |
| Middle Education[a] | 0.11 | 0.12 | 0.12 | 0.14 | 0.24 | 0.24 |
| | (0.16) | (0.17) | (0.16) | (0.17) | (0.24) | (0.23) |
| High Education[a] | 0.10 | 0.11 | 0.12 | 0.14 | 0.18 | 0.18 |
| | (0.15) | (0.17) | (0.16) | (0.17) | (0.27) | (0.27) |
| Middle Individual net Income[b] | 0.08 | 0.09 | 0.11 | 0.13 | 0.09 | 0.10 |
| | (0.13) | (0.14) | (0.14) | (0.14) | (0.17) | (0.17) |
| High Individual net Income[b] | -0.11 | -0.10 | -0.10 | -0.06 | -0.21 | -0.20 |
| | (0.16) | (0.18) | (0.16) | (0.19) | (0.21) | (0.21) |
| Middle Wealth[c] | 0.15 | 0.17 | 0.14 | 0.17 | 0.04 | 0.04 |
| | (0.15) | (0.18) | (0.15) | (0.17) | (0.21) | (0.21) |
| High Wealth[c] | -0.05 | -0.03 | -0.04 | 0.00 | -0.07 | -0.07 |
| | (0.15) | (0.19) | (0.15) | (0.19) | (0.22) | (0.23) |
| Home Equity | -0.03 | -0.03 | -0.05 | -0.04 | -0.02 | -0.01 |
| | (0.13) | (0.13) | (0.13) | (0.14) | (0.20) | (0.22) |
| Blue- or White Collar Worker[d] | 0.10 | 0.11 | 0.05 | 0.06 | 0.14 | 0.14 |
| | (0.13) | (0.14) | (0.14) | (0.14) | (0.21) | (0.21) |
| Self-employed[d] | -0.14 | -0.15 | -0.22 | -0.24 | -0.20 | -0.21 |
| | (0.17) | (0.18) | (0.18) | (0.18) | (0.25) | (0.25) |
| Civil Servant[d] | 0.15 | 0.11 | 0.10 | 0.01 | 0.08 | 0.07 |
| | (0.22) | (0.30) | (0.22) | (0.31) | (0.40) | (0.41) |
| Actual Pension Knowledge | 0.19*** | 0.11 | 0.21*** | 0.02 | 0.17 | 0.16 |
| (0 = zero – 6 = six question correct) | (0.05) | (0.45) | (0.05) | (0.48) | (0.75) | (0.79) |
| Future Orientation | 0.22*** | 0.22*** | 0.15 | 0.17 | 0.27*** | 0.22 |
| (factor1, Table 5) | (0.06) | (0.07) | (0.20) | (0.21) | (0.10) | (0.37) |
| **Procrastinate on Financial Matters** | -0.00 | 0.00 | -0.01 | 0.01 | -0.04 | -0.04 |
| (1 agree – 4 not agree) | (0.05) | (0.05) | (0.05) | (0.06) | (0.07) | (0.07) |
| Underestimate Knowledge[e] | -0.28** | -0.21 | -0.24* | -0.08 | -0.24 | -0.23 |
| | (0.13) | (0.39) | (0.13) | (0.42) | (0.60) | (0.60) |
| Overestimate Knowledge[e] | 0.18 | 0.11 | 0.21* | 0.05 | 0.16 | 0.15 |
| | (0.12) | (0.41) | (0.12) | (0.44) | (0.71) | (0.78) |
| Procrastinate*Future Orient. (interaction term) | | | 0.03 | 0.03 | | 0.03 |
| | | | (0.06) | (0.06) | | (0.08) |
| A.P.Knowledge*Future Orie. (interaction term) | | | 0.00 | -0.01 | | -0.01 |
| | | | (0.05) | (0.06) | | (0.12) |
| Constant | -2.18*** | -2.11** | -2.26*** | -2.07** | -2.66** | -2.61* |
| | (0.76) | (0.85) | (0.79) | (0.95) | (1.26) | (1.37) |
| Wald test[f] | | 0.08 | | 0.16 | 0.03 | 0.04 |
| | | (0.40) | | (0.42) | (0.63) | (0.66) |
| N | 901.00 | 901.00 | 901.00 | 901.00 | 498.00 | 498.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

## Table 77: Owning a "Riester-Pension" (2)

| Owning "Riester-Pension" | 9.7(105) Probit | 9.7(106) IV-Probit | 9.7(107) Probit | 9.7(108) IV-Probit | 9.7(109) IV-Probit Original Data | 9.7(110) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | -0.19* | -0.15 | -0.17 | -0.10 | -0.05 | -0.05 |
| | (0.11) | (0.19) | (0.11) | (0.19) | (0.32) | (0.31) |
| Age | 0.10** | 0.10** | 0.10** | 0.10*** | 0.13** | 0.12** |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.06) | (0.06) |
| Age Squared | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.01 | 0.02 | 0.01 | 0.02 | 0.02 | 0.04 |
| | (0.12) | (0.12) | (0.12) | (0.12) | (0.16) | (0.15) |
| Children | 0.26*** | 0.24*** | 0.25*** | 0.23*** | 0.24*** | 0.24*** |
| (0 no – 4 four or more kids) | (0.05) | (0.07) | (0.05) | (0.07) | (0.08) | (0.08) |
| Middle Education[a] | 0.11 | 0.14 | 0.12 | 0.14 | 0.28 | 0.24 |
| | (0.16) | (0.17) | (0.16) | (0.17) | (0.26) | (0.25) |
| High Education[a] | 0.11 | 0.14 | 0.13 | 0.17 | 0.24 | 0.20 |
| | (0.16) | (0.18) | (0.16) | (0.18) | (0.33) | (0.31) |
| Middle Individual net Income[b] | 0.07 | 0.09 | 0.11 | 0.13 | 0.08 | 0.08 |
| | (0.13) | (0.14) | (0.14) | (0.15) | (0.17) | (0.17) |
| High Individual net Income[b] | -0.12 | -0.09 | -0.11 | -0.07 | -0.22 | -0.22 |
| | (0.16) | (0.19) | (0.16) | (0.20) | (0.21) | (0.20) |
| Middle Wealth[c] | 0.15 | 0.18 | 0.13 | 0.17 | 0.06 | 0.03 |
| | (0.16) | (0.18) | (0.15) | (0.17) | (0.22) | (0.20) |
| High Wealth[c] | -0.05 | -0.02 | -0.05 | 0.01 | -0.05 | -0.08 |
| | (0.15) | (0.19) | (0.15) | (0.20) | (0.25) | (0.23) |
| Home Equity | -0.03 | -0.03 | -0.06 | -0.04 | -0.02 | -0.02 |
| | (0.13) | (0.13) | (0.13) | (0.14) | (0.21) | (0.21) |
| Blue- or White Collar Worker[d] | 0.09 | 0.10 | 0.05 | 0.07 | 0.12 | 0.15 |
| | (0.13) | (0.14) | (0.14) | (0.14) | (0.21) | (0.22) |
| Self-employed[d] | -0.16 | -0.18 | -0.22 | -0.24 | -0.26 | -0.20 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.25) | (0.24) |
| Civil Servant[d] | 0.15 | 0.08 | 0.10 | -0.00 | 0.03 | 0.07 |
| | (0.22) | (0.32) | (0.22) | (0.33) | (0.45) | (0.43) |
| Actual Pension Knowledge | 0.19*** | 0.03 | 0.20*** | -0.04 | 0.06 | 0.13 |
| (0 = zero – 6 = six question correct) | (0.05) | (0.54) | (0.06) | (0.56) | (0.99) | (0.90) |
| Underestimate Knowledge[e] | -0.28** | -0.15 | -0.24* | -0.03 | -0.16 | -0.21 |
| | (0.13) | (0.46) | (0.13) | (0.49) | (0.79) | (0.72) |
| Overestimate Knowledge[e] | 0.17 | 0.03 | 0.20 | -0.02 | 0.07 | 0.12 |
| (1 agree – 4 not agree) | (0.12) | (0.49) | (0.12) | (0.51) | (0.92) | (0.86) |
| Future Orientation | 0.22*** | 0.22*** | 0.22*** | 0.23*** | 0.27*** | 0.27*** |
| (factor1) | (0.06) | (0.06) | (0.06) | (0.06) | (0.09) | (0.10) |
| **Procrastinate on Financial Matters** | -0.02 | -0.02 | | | -0.07 | |
| (1 agree – 4 not agree) | (0.05) | (0.05) | | | (0.07) | |
| Like Dealing with Fin.Matters | 0.06 | 0.08 | | | 0.13 | |
| (1 do not like it – 4 like it) | (0.06) | (0.09) | | | (0.18) | |
| Time for Financial Matters | -0.01 | 0.00 | | | -0.03 | |
| (1 not time – 4 yes have time) | (0.05) | (0.07) | | | (0.08) | |
| Procrastination | | | 0.05 | 0.09 | | 0.03 |
| (factor2) | | | (0.07) | (0.13) | | (0.17) |
| Constant | -2.33*** | -2.28*** | -2.30*** | -2.03* | -2.86** | -2.73** |
| | (0.78) | (0.81) | (0.77) | (1.05) | (1.19) | (1.37) |
| Wald test[f] | | 0.14 | | 0.21 | 0.11 | 0.06 |
| | | (0.47) | | (0.49) | (0.82) | (0.75) |
| N | 901.00 | 901.00 | 862.00 | 862.00 | 498.00 | 498.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

**Table 78: Owning "Capital Life Insurance" (1)**

| Owning "Capital Life Insurance" | 9.7(111) Probit | 9.7(112) IV-Probit | 9.7(113) Probit | 9.7(114) IV-Probit | 9.7(115) IV-Probit Original Data | 9.7(116) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | -0.11 | -0.22* | -0.11 | -0.22* | -0.24 | -0.25 |
| | (0.10) | (0.13) | (0.10) | (0.13) | (0.21) | (0.20) |
| Age | 0.06* | 0.04 | 0.05 | 0.04 | -0.01 | -0.01 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.05) | (0.05) |
| Age Squared | -0.00* | -0.00 | -0.00 | -0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.17 | 0.15 | 0.17 | 0.14 | 0.26 | 0.26 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.16) | (0.16) |
| Children | -0.06 | -0.02 | -0.05 | -0.02 | -0.12 | -0.12 |
| (0 no – 4 four or more kids) | (0.05) | (0.05) | (0.05) | (0.05) | (0.09) | (0.09) |
| Middle Education[a] | -0.15 | -0.19 | -0.15 | -0.19 | -0.19 | -0.18 |
| | (0.15) | (0.14) | (0.15) | (0.14) | (0.20) | (0.20) |
| High Education[a] | -0.01 | -0.07 | -0.02 | -0.08 | -0.10 | -0.10 |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.24) | (0.23) |
| Middle Individual net Income[b] | 0.10 | 0.05 | 0.10 | 0.05 | 0.08 | 0.09 |
| | (0.13) | (0.13) | (0.13) | (0.13) | (0.16) | (0.16) |
| High Individual net Income[b] | 0.26 | 0.15 | 0.27* | 0.16 | 0.34 | 0.34 |
| | (0.16) | (0.19) | (0.16) | (0.19) | (0.25) | (0.26) |
| Middle Wealth[c] | 0.18 | 0.08 | 0.18 | 0.08 | 0.22 | 0.22 |
| | (0.13) | (0.16) | (0.13) | (0.16) | (0.24) | (0.25) |
| High Wealth[c] | 0.23 | 0.10 | 0.23 | 0.10 | 0.04 | 0.04 |
| | (0.16) | (0.19) | (0.16) | (0.19) | (0.22) | (0.23) |
| Home Equity | 0.37*** | 0.32** | 0.38*** | 0.32** | 0.39 | 0.38 |
| | (0.12) | (0.14) | (0.12) | (0.14) | (0.27) | (0.30) |
| Blue- or White Collar Worker[d] | 0.25* | 0.20 | 0.25** | 0.21 | 0.14 | 0.14 |
| | (0.13) | (0.14) | (0.13) | (0.14) | (0.23) | (0.23) |
| Self-employed[d] | 0.46*** | 0.48*** | 0.46*** | 0.47*** | 0.46* | 0.45* |
| | (0.16) | (0.16) | (0.16) | (0.16) | (0.25) | (0.25) |
| Civil Servant[d] | 0.15 | 0.33 | 0.16 | 0.34 | 0.10 | 0.11 |
| | (0.21) | (0.25) | (0.21) | (0.24) | (0.37) | (0.37) |
| Actual Pension Knowledge | 0.12** | 0.55 | 0.12** | 0.55 | 0.67 | 0.69 |
| (0 = zero – 6 = six question correct) | (0.05) | (0.35) | (0.05) | (0.35) | (0.55) | (0.57) |
| Future Orientation | 0.18*** | 0.14* | -0.00 | -0.06 | 0.12 | 0.06 |
| (factor1, Table 5) | (0.06) | (0.07) | (0.18) | (0.19) | (0.12) | (0.36) |
| **Procrastinate on Financial Matters** | -0.03 | -0.05 | -0.03 | -0.06 | -0.05 | -0.05 |
| (1 agree – 4 not agree) | (0.05) | (0.05) | (0.05) | (0.05) | (0.06) | (0.06) |
| Underestimate Knowledge[e] | -0.13 | -0.48 | -0.12 | -0.48 | -0.58 | -0.59 |
| | (0.12) | (0.30) | (0.13) | (0.30) | (0.43) | (0.41) |
| Overestimate Knowledge[e] | 0.34*** | 0.69** | 0.33*** | 0.69** | 0.94** | 0.96** |
| | (0.12) | (0.29) | (0.12) | (0.29) | (0.44) | (0.48) |
| Procrastinate*Future Orient. (interaction term) | | | 0.08 | 0.07 | | 0.02 |
| | | | (0.05) | (0.05) | | (0.08) |
| A.P.Knowledge*Future Orie. (interaction term) | | | -0.02 | -0.00 | | -0.00 |
| | | | (0.05) | (0.05) | | (0.11) |
| Constant | -2.01*** | -2.20*** | -1.95*** | -2.15*** | -1.44 | -1.43 |
| | (0.75) | (0.73) | (0.75) | (0.73) | (0.97) | (1.01) |
| Wald test[f] | | -0.42 | | -0.43 | -0.52 | -0.55 |
| | | (0.39) | | (0.39) | (0.64) | (0.67) |
| N | 951.00 | 951.00 | 951.00 | 951.00 | 498.00 | 498.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

## Table 79: Owning Capital Life Insurance" (2)

| Owning "Capital Life Insurance" | 9.7(117) Probit | 9.7(118) IV-Probit | 9.7(119) Probit | 9.7(120) IV-Probit | 9.7(121) IV-Probit Original Data | 9.7(122) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | -0.11 | -0.23* | -0.11 | -0.23* | -0.27 | -0.28 |
| | (0.10) | (0.12) | (0.10) | (0.12) | (0.19) | (0.19) |
| Age | 0.06 | 0.03 | 0.06 | 0.03 | -0.03 | -0.02 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.05) | (0.05) |
| Age Squared | -0.00 | -0.00 | -0.00 | -0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.17 | 0.14 | 0.18 | 0.15 | 0.26 | 0.25 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.17) | (0.17) |
| Children | -0.06 | -0.03 | -0.06 | -0.02 | -0.11 | -0.11 |
| (0 no – 4 four or more kids) | (0.05) | (0.05) | (0.05) | (0.05) | (0.10) | (0.09) |
| Middle Education[a] | -0.14 | -0.19 | -0.15 | -0.20 | -0.23 | -0.21 |
| | (0.15) | (0.14) | (0.15) | (0.14) | (0.20) | (0.19) |
| High Education[a] | -0.02 | -0.10 | -0.02 | -0.11 | -0.19 | -0.16 |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.26) | (0.24) |
| Middle Individual net Income[b] | 0.09 | 0.04 | 0.10 | 0.05 | 0.09 | 0.08 |
| | (0.13) | (0.13) | (0.13) | (0.13) | (0.15) | (0.15) |
| High Individual net Income[b] | 0.25 | 0.14 | 0.26 | 0.14 | 0.31 | 0.31 |
| | (0.16) | (0.19) | (0.16) | (0.19) | (0.27) | (0.26) |
| Middle Wealth[c] | 0.19 | 0.08 | 0.19 | 0.08 | 0.18 | 0.20 |
| | (0.13) | (0.16) | (0.13) | (0.16) | (0.27) | (0.24) |
| High Wealth[c] | 0.24 | 0.10 | 0.24 | 0.09 | 0.01 | 0.02 |
| | (0.16) | (0.19) | (0.16) | (0.19) | (0.23) | (0.21) |
| Home Equity | 0.37*** | 0.30** | 0.38*** | 0.31** | 0.34 | 0.34 |
| | (0.12) | (0.15) | (0.12) | (0.15) | (0.31) | (0.30) |
| Blue- or White Collar Worker[d] | 0.23* | 0.16 | 0.24* | 0.18 | 0.12 | 0.09 |
| | (0.13) | (0.14) | (0.13) | (0.14) | (0.24) | (0.24) |
| Self-employed[d] | 0.44*** | 0.45*** | 0.46*** | 0.46*** | 0.45* | 0.42 |
| | (0.16) | (0.16) | (0.16) | (0.16) | (0.26) | (0.26) |
| Civil Servant[d] | 0.14 | 0.32 | 0.14 | 0.33 | 0.16 | 0.15 |
| | (0.21) | (0.24) | (0.21) | (0.24) | (0.37) | (0.36) |
| Actual Pension Knowledge | 0.12** | 0.63* | 0.12** | 0.64* | 0.83 | 0.81 |
| (0 = zero – 6 = six question correct) | (0.05) | (0.36) | (0.05) | (0.36) | (0.55) | (0.51) |
| Underestimate Knowledge[e] | -0.13 | -0.54* | -0.13 | -0.55* | -0.70* | -0.69* |
| | (0.12) | (0.31) | (0.12) | (0.31) | (0.42) | (0.39) |
| Overestimate Knowledge[e] | 0.35*** | 0.77*** | 0.35*** | 0.77*** | 1.05*** | 1.05*** |
| (1 agree – 4 not agree) | (0.12) | (0.30) | (0.12) | (0.29) | (0.40) | (0.38) |
| Future Orientation | 0.18*** | 0.13 | 0.18*** | 0.13 | 0.10 | 0.10 |
| (factor1) | (0.06) | (0.08) | (0.06) | (0.08) | (0.14) | (0.13) |
| **Procrastinate on Financial Matters** | -0.02 | -0.02 | | | -0.01 | |
| (1 agree – 4 not agree) | (0.05) | (0.05) | | | (0.07) | |
| Like Dealing with Fin.Matters | -0.01 | -0.08 | | | -0.14 | |
| (1 do not like it – 4 like it) | (0.05) | (0.07) | | | (0.12) | |
| Time for Financial Matters | -0.06 | -0.09* | | | -0.02 | |
| (1 not time – 4 yes have time) | (0.05) | (0.05) | | | (0.07) | |
| Procrastination | | | -0.08 | -0.18** | | -0.16 |
| (factor2) | | | (0.06) | (0.09) | | (0.11) |
| Constant | -1.87** | -1.77** | -2.08*** | -2.30*** | -1.02 | -1.55* |
| | (0.77) | (0.78) | (0.74) | (0.71) | (0.98) | (0.90) |
| Wald test[f] | | -0.50 | | -0.51 | -0.71 | -0.69 |
| | | (0.44) | | (0.43) | (0.79) | (0.72) |
| N | 951.00 | 9515.00 | 951.00 | 951.00 | 498.00 | 498.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

## Table 80: Owning a "Company Pension" (1)

| Owning "Company Pension" | 9.7(123) Probit | 9.7(124) IV-Probit | 9.7(125) Probit | 9.7(126) IV-Probit | 9.7(127) IV-Probit Original Data | 9.7(128) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | 0.03 | -0.08 | 0.03 | -0.07 | 0.08 | 0.12 |
| | (0.11) | (0.15) | (0.11) | (0.15) | (0.31) | (0.29) |
| Age | -0.01 | -0.02 | -0.01 | -0.02 | -0.04 | -0.04 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.06) | (0.06) |
| Age Squared | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.13 | 0.11 | 0.13 | 0.11 | 0.40** | 0.37* |
| | (0.12) | (0.12) | (0.12) | (0.12) | (0.18) | (0.20) |
| Children | -0.01 | 0.01 | -0.01 | 0.01 | -0.09 | -0.09 |
| (0 no – 4 four or more kids) | (0.05) | (0.06) | (0.05) | (0.06) | (0.07) | (0.07) |
| Middle Education[a] | -0.42*** | -0.43*** | -0.41*** | -0.43*** | -0.56* | -0.51 |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.31) | (0.34) |
| High Education[a] | -0.23 | -0.27* | -0.24 | -0.28* | -0.12 | -0.08 |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.31) | (0.31) |
| Middle Individual net Income[b] | 0.54*** | 0.47*** | 0.54*** | 0.47*** | 0.35* | 0.35* |
| | (0.13) | (0.17) | (0.13) | (0.17) | (0.18) | (0.20) |
| High Individual net Income[b] | 0.60*** | 0.49** | 0.61*** | 0.50** | 0.65*** | 0.66*** |
| | (0.17) | (0.23) | (0.17) | (0.23) | (0.20) | (0.22) |
| Middle Wealth[c] | 0.52*** | 0.42* | 0.52*** | 0.42* | 0.59*** | 0.59*** |
| | (0.17) | (0.22) | (0.17) | (0.22) | (0.18) | (0.17) |
| High Wealth[c] | 0.10 | 0.01 | 0.10 | 0.01 | 0.20 | 0.22 |
| | (0.18) | (0.21) | (0.18) | (0.21) | (0.22) | (0.21) |
| Home Equity | 0.19 | 0.16 | 0.19 | 0.15 | 0.22 | 0.26 |
| | (0.14) | (0.14) | (0.14) | (0.14) | (0.20) | (0.20) |
| Blue- or White Collar Worker[d] | 0.69*** | 0.62*** | 0.69*** | 0.62*** | 0.82*** | 0.81*** |
| | (0.14) | (0.18) | (0.14) | (0.18) | (0.20) | (0.22) |
| Self-employed[d] | -0.36* | -0.29 | -0.36** | -0.29 | -0.35 | -0.36 |
| | (0.18) | (0.21) | (0.18) | (0.21) | (0.26) | (0.26) |
| Civil Servant[d] | -0.80*** | -0.59 | -0.80*** | -0.59 | -1.09*** | -1.11*** |
| | (0.24) | (0.36) | (0.24) | (0.36) | (0.37) | (0.33) |
| Actual Pension Knowledge | 0.31*** | 0.67* | 0.31*** | 0.67* | 0.01 | -0.16 |
| (0 = zero – 6 = six question correct) | (0.06) | (0.37) | (0.06) | (0.37) | (0.93) | (0.92) |
| Future Orientation | 0.03 | 0.00 | -0.11 | -0.15 | 0.02 | -0.08 |
| (factor1, Table 5) | (0.06) | (0.07) | (0.20) | (0.20) | (0.11) | (0.41) |
| **Procrastinate on Financial Matters** | -0.02 | -0.04 | -0.02 | -0.04 | 0.02 | 0.02 |
| (1 agree – 4 not agree) | (0.05) | (0.05) | (0.05) | (0.05) | (0.07) | (0.07) |
| Underestimate Knowledge[e] | -0.45*** | -0.74** | -0.45*** | -0.73** | -0.24 | -0.11 |
| | (0.15) | (0.31) | (0.15) | (0.31) | (0.76) | (0.75) |
| Overestimate Knowledge[e] | 0.42*** | 0.72** | 0.41*** | 0.72** | 0.17 | -0.01 |
| | (0.13) | (0.33) | (0.13) | (0.33) | (0.90) | (0.94) |
| Procrastinate*Future Orient. (interaction term) | | | 0.06 | 0.05 | | 0.07 |
| | | | (0.06) | (0.06) | | (0.08) |
| A.P.Knowledge*Future Orie. (interaction term) | | | -0.01 | 0.00 | | -0.04 |
| | | | (0.05) | (0.05) | | (0.12) |
| Constant | -1.61** | -1.81** | -1.57* | -1.78** | -0.62 | -0.37 |
| | (0.81) | (0.81) | (0.82) | (0.81) | (1.39) | (1.50) |
| Wald test[f] | | -0.36 | | -0.36 | 0.23 | 0.37 |
| | | (0.41) | | (0.41) | (0.78) | (0.81) |
| N | 951.00 | 951.00 | 951.00 | 951.00 | 498.00 | 498.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

## Table 81: Owning "Company Pension" (2)

| Owning "Company Pension" | 9.7(129) Probit | 9.7(130) IV-Probit | 9.7(131) Probit | 9.7(132) IV-Probit | 9.7(133) IV-Probit Original Data | 9.7(134) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | 0.03 | -0.07 | 0.03 | -0.08 | 0.20 | 0.16 |
| | (0.11) | (0.16) | (0.11) | (0.16) | (0.28) | (0.31) |
| Age | -0.01 | -0.02 | -0.01 | -0.02 | -0.02 | -0.03 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.08) | (0.07) |
| Age Squared | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.14 | 0.13 | 0.13 | 0.11 | 0.35 | 0.36 |
| | (0.12) | (0.12) | (0.12) | (0.12) | (0.28) | (0.23) |
| Children | -0.01 | 0.01 | -0.01 | 0.01 | -0.09 | -0.09 |
| (0 no – 4 four or more kids) | (0.05) | (0.06) | (0.05) | (0.06) | (0.07) | (0.07) |
| Middle Education[a] | -0.43*** | -0.45*** | -0.42*** | -0.43*** | -0.42 | -0.46 |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.51) | (0.43) |
| High Education[a] | -0.24 | -0.29* | -0.23 | -0.28* | 0.01 | -0.02 |
| | (0.15) | (0.16) | (0.15) | (0.16) | (0.40) | (0.37) |
| Middle Individual net Income[b] | 0.55*** | 0.48*** | 0.54*** | 0.47*** | 0.30 | 0.31 |
| | (0.14) | (0.18) | (0.13) | (0.18) | (0.25) | (0.22) |
| High Individual net Income[b] | 0.61*** | 0.50** | 0.60*** | 0.49** | 0.60* | 0.61** |
| | (0.17) | (0.24) | (0.17) | (0.24) | (0.33) | (0.27) |
| Middle Wealth[c] | 0.51*** | 0.41* | 0.52*** | 0.42* | 0.54** | 0.57*** |
| | (0.17) | (0.23) | (0.17) | (0.23) | (0.21) | (0.20) |
| High Wealth[c] | 0.10 | 0.01 | 0.10 | 0.01 | 0.22 | 0.23 |
| | (0.17) | (0.21) | (0.18) | (0.21) | (0.19) | (0.19) |
| Home Equity | 0.20 | 0.16 | 0.19 | 0.15 | 0.25 | 0.24 |
| | (0.14) | (0.14) | (0.14) | (0.14) | (0.17) | (0.18) |
| Blue- or White Collar Worker[d] | 0.71*** | 0.62*** | 0.69*** | 0.61*** | 0.80** | 0.80*** |
| | (0.14) | (0.20) | (0.14) | (0.20) | (0.36) | (0.25) |
| Self-employed[d] | -0.33* | -0.26 | -0.36* | -0.29 | -0.28 | -0.33 |
| | (0.18) | (0.21) | (0.18) | (0.21) | (0.25) | (0.27) |
| Civil Servant[d] | -0.79*** | -0.58 | -0.81*** | -0.59 | -1.06*** | -1.09*** |
| | (0.24) | (0.38) | (0.24) | (0.38) | (0.37) | (0.34) |
| Actual Pension Knowledge | 0.30*** | 0.69* | 0.31*** | 0.69* | -0.42 | -0.29 |
| (0 = zero – 6 = six question correct) | (0.06) | (0.42) | (0.06) | (0.42) | (1.00) | (1.00) |
| Underestimate Knowledge[e] | -0.45*** | -0.75** | -0.45*** | -0.75** | 0.14 | 0.01 |
| | (0.15) | (0.34) | (0.15) | (0.34) | (0.89) | (0.88) |
| Overestimate Knowledge[e] | 0.41*** | 0.74** | 0.41*** | 0.74** | -0.26 | -0.13 |
| (1 agree – 4 not agree) | (0.13) | (0.37) | (0.13) | (0.37) | (1.01) | (1.01) |
| Future Orientation | 0.03 | 0.00 | 0.03 | 0.00 | 0.05 | 0.04 |
| (factor1) | (0.06) | (0.07) | (0.06) | (0.07) | (0.10) | (0.11) |
| **Procrastinate on Finan. Matters** | -0.02 | -0.03 | | | 0.00 | |
| (1 agree – 4 not agree) | (0.05) | (0.05) | | | (0.07) | |
| Like Dealing with Fin.Matters | -0.02 | -0.08 | | | 0.04 | |
| (1 do not like it – 4 like it) | (0.06) | (0.08) | | | (0.20) | |
| Time for Financial Matters | 0.06 | 0.02 | | | 0.12 | |
| (1 not time – 4 yes have time) | (0.05) | (0.07) | | | (0.08) | |
| Procrastination | | | -0.01 | -0.09 | | 0.09 |
| (factor2) | | | (0.07) | (0.12) | | (0.17) |
| Constant | -1.67** | -1.64* | -1.66** | -1.90** | -0.57 | -0.28 |
| | (0.84) | (0.84) | (0.80) | (0.80) | (1.20) | (1.46) |
| Wald test[f] | | -0.38 | | -0.38 | 0.62 | 0.49 |
| | | (0.48) | | (0.47) | (1.03) | (0.94) |
| N | 951.00 | 9515.00 | 951.00 | 951.00 | 498.00 | 498.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

## Table 82: Owning "Other Private Pension" (1)

| Owning "Other Private Pension" | 9.7(135) Probit | 9.7(136) IV-Probit | 9.7(137) Probit | 9.7(138) IV-Probit | 9.7(139) IV-Probit Original Data | 9.7(140) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | -0.19* | -0.28** | -0.19* | -0.28** | -0.46*** | -0.45*** |
| | (0.10) | (0.14) | (0.10) | (0.14) | (0.17) | (0.17) |
| Age | 0.03 | 0.01 | 0.03 | 0.01 | -0.02 | -0.02 |
| | (0.04) | (0.04) | (0.04) | (0.04) | (0.05) | (0.05) |
| Age Squared | -0.00 | -0.00 | -0.00 | -0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.08 | 0.06 | 0.08 | 0.06 | 0.14 | 0.15 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.15) | (0.15) |
| Children | -0.11** | -0.07 | -0.11** | -0.07 | -0.11 | -0.11 |
| (0 no – 4 four or more kids) | (0.05) | (0.07) | (0.05) | (0.07) | (0.08) | (0.08) |
| Middle Education[a] | 0.23 | 0.16 | 0.23 | 0.16 | 0.09 | 0.12 |
| | (0.15) | (0.18) | (0.15) | (0.18) | (0.24) | (0.25) |
| High Education[a] | 0.12 | 0.05 | 0.12 | 0.05 | -0.02 | -0.00 |
| | (0.15) | (0.17) | (0.15) | (0.17) | (0.26) | (0.27) |
| Middle Individual net Income[b] | 0.20 | 0.15 | 0.20 | 0.15 | 0.18 | 0.20 |
| | (0.13) | (0.15) | (0.13) | (0.15) | (0.17) | (0.17) |
| High Individual net Income[b] | 0.55*** | 0.43* | 0.55*** | 0.43* | 0.57* | 0.60** |
| | (0.14) | (0.24) | (0.14) | (0.24) | (0.29) | (0.31) |
| Middle Wealth[c] | 0.20 | 0.11 | 0.20 | 0.11 | 0.04 | 0.04 |
| | (0.16) | (0.20) | (0.16) | (0.21) | (0.20) | (0.21) |
| High Wealth[c] | 0.18 | 0.06 | 0.18 | 0.06 | 0.03 | 0.04 |
| | (0.16) | (0.23) | (0.16) | (0.23) | (0.22) | (0.23) |
| Home Equity | 0.04 | 0.01 | 0.04 | 0.01 | -0.11 | -0.10 |
| | (0.13) | (0.13) | (0.13) | (0.14) | (0.18) | (0.20) |
| Blue- or White Collar Worker[d] | 0.11 | 0.07 | 0.11 | 0.07 | 0.06 | 0.07 |
| | (0.13) | (0.14) | (0.13) | (0.14) | (0.22) | (0.22) |
| Self-employed[d] | 0.45*** | 0.46*** | 0.45*** | 0.46*** | 0.50** | 0.49** |
| | (0.16) | (0.17) | (0.16) | (0.17) | (0.25) | (0.25) |
| Civil Servant[d] | -0.13 | 0.07 | -0.13 | 0.06 | -0.09 | -0.13 |
| | (0.21) | (0.31) | (0.21) | (0.31) | (0.41) | (0.43) |
| Actual Pension Knowledge | 0.11** | 0.52 | 0.11** | 0.52 | 0.71 | 0.68 |
| (0 = zero – 6 = six question correct) | (0.05) | (0.48) | (0.05) | (0.49) | (0.53) | (0.60) |
| Future Orientation | 0.12** | 0.08 | 0.11 | 0.05 | 0.10 | -0.22 |
| (factor1, Table 5) | (0.06) | (0.08) | (0.19) | (0.21) | (0.12) | (0.32) |
| **Procrastinate on Financial Matters** | -0.01 | -0.04 | -0.01 | -0.04 | -0.01 | -0.02 |
| (1 agree – 4 not agree) | (0.05) | (0.05) | (0.05) | (0.05) | (0.06) | (0.07) |
| Underestimate Knowledge[e] | -0.20 | -0.53 | -0.20 | -0.53 | -0.67* | -0.62 |
| | (0.13) | (0.40) | (0.13) | (0.40) | (0.40) | (0.43) |
| Overestimate Knowledge[e] | 0.11 | 0.47 | 0.11 | 0.46 | 0.55 | 0.53 |
| | (0.12) | (0.43) | (0.12) | (0.43) | (0.55) | (0.63) |
| Procrastinate*Future Orient. (interaction term) | | | 0.01 | 0.01 | | 0.09 |
| | | | (0.06) | (0.05) | | (0.09) |
| A.P.Knowledge*Future Orie. (interaction term) | | | -0.01 | 0.01 | | 0.04 |
| | | | (0.05) | (0.05) | | (0.10) |
| Constant | -1.58** | -1.78** | -1.57** | -1.78** | -1.60 | -1.58 |
| | (0.78) | (0.77) | (0.78) | (0.78) | (1.00) | (1.06) |
| Wald test[f] | | -0.41 | | -0.40 | -0.51 | -0.47 |
| | | (0.53) | | (0.53) | (0.63) | (0.67) |
| N | 951.00 | 951.00 | 951.00 | 951.00 | 498.00 | 498.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

**Table 83: Owning "Other Private Pension" (2)**

| Owning "Other Private Pension" | 9.7(141) Probit | 9.7(142) IV-Probit | 9.7(143) Probit | 9.7(144) IV-Probit | 9.7(145) IV-Probit Original Data | 9.7(146) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | -0.20* | -0.23 | -0.19* | -0.23 | -0.44** | -0.45** |
| | (0.10) | (0.22) | (0.10) | (0.21) | (0.20) | (0.19) |
| Age | 0.03 | 0.02 | 0.03 | 0.02 | -0.02 | -0.02 |
| | (0.04) | (0.05) | (0.04) | (0.05) | (0.06) | (0.06) |
| Age Squared | -0.00 | -0.00 | -0.00 | -0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.07 | 0.06 | 0.08 | 0.07 | 0.16 | 0.14 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.15) | (0.15) |
| Children | -0.11** | -0.09 | -0.11** | -0.09 | -0.11 | -0.11 |
| (0 no – 4 four or more kids) | (0.05) | (0.07) | (0.05) | (0.07) | (0.09) | (0.09) |
| Middle Education[a] | 0.24 | 0.20 | 0.23 | 0.19 | 0.10 | 0.11 |
| | (0.15) | (0.20) | (0.15) | (0.19) | (0.30) | (0.27) |
| High Education[a] | 0.14 | 0.09 | 0.13 | 0.08 | 0.00 | 0.01 |
| | (0.15) | (0.22) | (0.15) | (0.21) | (0.36) | (0.32) |
| Middle Individual net Income[b] | 0.19 | 0.17 | 0.20 | 0.18 | 0.19 | 0.18 |
| | (0.13) | (0.16) | (0.13) | (0.15) | (0.17) | (0.17) |
| High Individual net Income[b] | 0.54*** | 0.48* | 0.54*** | 0.49** | 0.61* | 0.59* |
| | (0.14) | (0.25) | (0.14) | (0.24) | (0.31) | (0.30) |
| Middle Wealth[c] | 0.20 | 0.15 | 0.19 | 0.15 | 0.04 | 0.04 |
| | (0.16) | (0.22) | (0.16) | (0.21) | (0.23) | (0.21) |
| High Wealth[c] | 0.17 | 0.12 | 0.17 | 0.12 | 0.05 | 0.04 |
| | (0.16) | (0.25) | (0.16) | (0.24) | (0.25) | (0.23) |
| Home Equity | 0.03 | 0.02 | 0.03 | 0.02 | -0.10 | -0.10 |
| | (0.13) | (0.14) | (0.13) | (0.14) | (0.19) | (0.19) |
| Blue- or White Collar Worker[d] | 0.10 | 0.08 | 0.11 | 0.09 | 0.10 | 0.07 |
| | (0.14) | (0.15) | (0.13) | (0.15) | (0.24) | (0.24) |
| Self-employed[d] | 0.43*** | 0.43** | 0.45*** | 0.45** | 0.54** | 0.51* |
| | (0.17) | (0.20) | (0.16) | (0.19) | (0.26) | (0.27) |
| Civil Servant[d] | -0.12 | -0.04 | -0.12 | -0.04 | -0.13 | -0.13 |
| | (0.21) | (0.39) | (0.21) | (0.37) | (0.48) | (0.46) |
| Actual Pension Knowledge | 0.10* | 0.28 | 0.10* | 0.30 | 0.62 | 0.65 |
| (0 = zero – 6 = six question correct) | (0.05) | (0.81) | (0.05) | (0.75) | (0.80) | (0.70) |
| Underestimate Knowledge[e] | -0.20 | -0.34 | -0.20 | -0.35 | -0.60 | -0.62 |
| | (0.13) | (0.67) | (0.13) | (0.62) | (0.60) | (0.53) |
| Overestimate Knowledge[e] | 0.10 | 0.26 | 0.10 | 0.27 | 0.46 | 0.48 |
| (1 agree – 4 not agree) | (0.12) | (0.72) | (0.12) | (0.66) | (0.79) | (0.71) |
| Future Orientation | 0.12** | 0.10 | 0.12** | 0.10 | 0.11 | 0.11 |
| (factor1) | (0.06) | (0.09) | (0.06) | (0.09) | (0.14) | (0.13) |
| **Procrastinate on Finan. Matters** | -0.03 | -0.03 | | | -0.02 | |
| (1 agree – 4 not agree) | (0.05) | (0.05) | | | (0.07) | |
| Like Dealing with Fin.Matters | 0.08 | 0.05 | | | 0.01 | |
| (1 do not like it – 4 like it) | (0.06) | (0.13) | | | (0.19) | |
| Time for Financial Matters | -0.01 | -0.02 | | | 0.06 | |
| (1 not time – 4 yes have time) | (0.05) | (0.08) | | | (0.08) | |
| Procrastination | | | 0.04 | -0.00 | | 0.02 |
| (factor2) | | | (0.06) | (0.17) | | (0.18) |
| Constant | -1.80** | -1.75** | -1.63** | -1.73* | -1.72 | -1.60 |
| | (0.80) | (0.85) | (0.77) | (0.95) | (1.09) | (1.02) |
| Wald test[f] | | -0.17 | | -0.19 | -0.42 | -0.45 |
| | | (0.80) | | (0.73) | (0.83) | (0.76) |
| N | 951.00 | 9515.00 | 951.00 | 951.00 | 498.00 | 498.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

**Table 84: Owning "Housing Equity" (1)**

| Owning "Housing Equity" | 9.7(147) Probit | 9.7(148) IV-Probit | 9.7(149) Probit | 9.7(150) IV-Probit | 9.7(151) IV-Probit Original Data | 9.7(152) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | 0.10 | -0.13 | 0.12 | -0.12 | -0.36*** | -0.33*** |
| | (0.13) | (0.15) | (0.13) | (0.15) | (0.13) | (0.13) |
| Age | 0.02*** | 0.01* | 0.02*** | 0.01* | 0.01 | 0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | 0.72*** | 0.48** | 0.72*** | 0.48** | 0.28 | 0.28 |
| | (0.12) | (0.21) | (0.12) | (0.21) | (0.19) | (0.19) |
| Children | 0.18*** | 0.17*** | 0.19*** | 0.17*** | 0.14* | 0.13 |
| (0 no – 4 four or more kids) | (0.06) | (0.06) | (0.06) | (0.06) | (0.08) | (0.08) |
| Middle Education[a] | 0.31* | 0.13 | 0.31* | 0.13 | -0.02 | -0.03 |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.20) | (0.20) |
| High Education[a] | 0.32* | 0.13 | 0.31 | 0.12 | -0.22 | -0.21 |
| | (0.19) | (0.20) | (0.19) | (0.20) | (0.19) | (0.18) |
| Middle Individual net Income[b] | 0.10 | -0.00 | 0.10 | -0.00 | -0.01 | -0.02 |
| | (0.17) | (0.14) | (0.17) | (0.14) | (0.14) | (0.14) |
| High Individual net Income[b] | 0.02 | -0.14 | 0.02 | -0.14 | -0.12 | -0.15 |
| | (0.19) | (0.16) | (0.19) | (0.16) | (0.17) | (0.17) |
| Middle Wealth[c] | 0.71*** | 0.35 | 0.70*** | 0.34 | 0.12 | 0.09 |
| | (0.13) | (0.25) | (0.13) | (0.25) | (0.23) | (0.22) |
| High Wealth[c] | 1.81*** | 1.09** | 1.82*** | 1.09** | 0.75 | 0.71 |
| | (0.18) | (0.51) | (0.18) | (0.52) | (0.53) | (0.54) |
| Blue- or White Collar Worker[d] | 0.16 | 0.06 | 0.17 | 0.06 | -0.11 | -0.11 |
| | (0.15) | (0.15) | (0.15) | (0.15) | (0.17) | (0.17) |
| Self-employed[d] | 0.61*** | 0.52** | 0.60*** | 0.51** | 0.46 | 0.45 |
| | (0.20) | (0.21) | (0.20) | (0.21) | (0.30) | (0.30) |
| Civil Servant[d] | 0.95*** | 1.01*** | 0.97*** | 1.02*** | 1.05** | 1.03** |
| | (0.29) | (0.27) | (0.29) | (0.27) | (0.41) | (0.42) |
| Actual Pension Knowledge | 0.04 | 0.80*** | 0.05 | 0.81*** | 1.12*** | 1.14*** |
| (0 = zero – 6 = six question correct) | (0.07) | (0.28) | (0.07) | (0.27) | (0.12) | (0.11) |
| Future Orientation | 0.09 | 0.01 | -0.22 | -0.26 | -0.03 | -0.31 |
| (factor1, Table 5) | (0.07) | (0.07) | (0.23) | (0.20) | (0.08) | (0.25) |
| **Procrastinate on Financial Matters** | 0.10* | 0.02 | 0.10* | 0.02 | -0.04 | -0.03 |
| (1 agree – 4 not agree) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) | (0.06) |
| Underestimate Knowledge[e] | -0.24 | -0.81*** | -0.21 | -0.79*** | -1.00*** | -0.97*** |
| | (0.16) | (0.23) | (0.17) | (0.23) | (0.14) | (0.14) |
| Overestimate Knowledge[e] | -0.16 | 0.55* | -0.13 | 0.58** | 0.95*** | 1.05*** |
| | (0.15) | (0.30) | (0.15) | (0.29) | (0.20) | (0.19) |
| Procrastinate*Future Orient. | | | 0.04 | 0.03 | | -0.05 |
| (interaction term) | | | (0.07) | (0.06) | | (0.07) |
| A.P.Knowledge*Future Orie. | | | 0.11* | 0.10* | | 0.21*** |
| (interaction term) | | | (0.06) | (0.05) | | (0.07) |
| Constant | -2.48*** | -2.80*** | -2.52*** | -2.83*** | -2.59*** | -2.71*** |
| | (0.38) | (0.38) | (0.38) | (0.39) | (0.48) | (0.51) |
| Wald test[f] | | -0.86* | | -0.87* | -1.39** | -1.43** |
| | | (0.47) | | (0.48) | (0.54) | (0.56) |
| N | 951.00 | 951.00 | 951.00 | 951.00 | 499.00 | 499.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

# Table 85: Owning "Housing Equity" (2)

| Owning "Housing Equity" | 9.7(153) Probit | 9.7(154) IV-Probit | 9.7(155) Probit | 9.7(156) IV-Probit | 9.7(157) IV-Probit Original Data | 9.7(158) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | 0.10 | -0.15 | 0.10 | -0.15 | -0.35*** | -0.37*** |
| | (0.13) | (0.13) | (0.13) | (0.14) | (0.12) | (0.12) |
| Age | 0.02*** | 0.01* | 0.02*** | 0.01* | 0.01 | 0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Married/Cohabiting | 0.70*** | 0.43** | 0.72*** | 0.45** | 0.27 | 0.26 |
| | (0.13) | (0.21) | (0.12) | (0.21) | (0.20) | (0.19) |
| Children | 0.18*** | 0.16*** | 0.19*** | 0.16*** | 0.12 | 0.13 |
| (0 no – 4 four or more kids) | (0.06) | (0.06) | (0.06) | (0.06) | (0.08) | (0.08) |
| Middle Education[a] | 0.32* | 0.10 | 0.32* | 0.11 | -0.09 | -0.06 |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.20) | (0.20) |
| High Education[a] | 0.33* | 0.07 | 0.34* | 0.08 | -0.29 | -0.26 |
| | (0.19) | (0.21) | (0.19) | (0.20) | (0.18) | (0.18) |
| Middle Individual net Income[b] | 0.09 | -0.01 | 0.10 | -0.01 | 0.01 | 0.00 |
| | (0.17) | (0.14) | (0.17) | (0.14) | (0.14) | (0.14) |
| High Individual net Income[b] | 0.01 | -0.14 | 0.02 | -0.13 | -0.09 | -0.10 |
| | (0.19) | (0.15) | (0.19) | (0.15) | (0.16) | (0.17) |
| Middle Wealth[c] | 0.71*** | 0.30 | 0.71*** | 0.31 | 0.08 | 0.11 |
| | (0.13) | (0.24) | (0.13) | (0.24) | (0.23) | (0.22) |
| High Wealth[c] | 1.81*** | 0.98* | 1.81*** | 0.99* | 0.62 | 0.66 |
| | (0.18) | (0.51) | (0.18) | (0.51) | (0.56) | (0.54) |
| Blue- or White Collar Worker[d] | 0.15 | 0.01 | 0.17 | 0.03 | -0.11 | -0.13 |
| | (0.16) | (0.15) | (0.16) | (0.15) | (0.16) | (0.16) |
| Self-employed[d] | 0.59*** | 0.46** | 0.62*** | 0.49** | 0.42 | 0.40 |
| | (0.21) | (0.21) | (0.20) | (0.21) | (0.31) | (0.30) |
| Civil Servant[d] | 0.95*** | 0.94*** | 0.95*** | 0.96*** | 0.95** | 0.98** |
| | (0.29) | (0.28) | (0.29) | (0.27) | (0.43) | (0.42) |
| Actual Pension Knowledge | 0.04 | 0.88*** | 0.03 | 0.87*** | 1.16*** | 1.14*** |
| (0 = zero – 6 = six question correct) | (0.07) | (0.24) | (0.07) | (0.24) | (0.11) | (0.11) |
| Underestimate Knowledge[e] | -0.24 | -0.86*** | -0.24 | -0.85*** | -1.01*** | -1.01*** |
| | (0.16) | (0.19) | (0.16) | (0.20) | (0.14) | (0.14) |
| Overestimate Knowledge[e] | -0.16 | 0.64** | -0.16 | 0.64** | 0.99*** | 0.98*** |
| (1 agree – 4 not agree) | (0.15) | (0.27) | (0.15) | (0.27) | (0.19) | (0.19) |
| Future Orientation | 0.08 | -0.00 | 0.09 | 0.00 | -0.04 | -0.04 |
| (factor1) | (0.07) | (0.07) | (0.07) | (0.07) | (0.08) | (0.08) |
| **Procrastinate on Financial Matters** | 0.09 | 0.05 | | | 0.00 | |
| (1 agree – 4 not agree) | (0.06) | (0.05) | | | (0.06) | |
| Like Dealing with Fin.Matters | 0.05 | -0.08 | | | -0.16** | |
| (1 do not like it – 4 like it) | (0.07) | (0.07) | | | (0.07) | |
| Time for Financial Matters | -0.03 | -0.09* | | | -0.01 | |
| (1 not time – 4 yes have time) | (0.06) | (0.05) | | | (0.06) | |
| Procrastination | | | 0.11 | -0.10 | | -0.15* |
| (factor2) | | | (0.08) | (0.10) | | (0.08) |
| Constant | -2.49*** | -2.37*** | -2.21*** | -2.74*** | -2.12*** | -2.63*** |
| | (0.42) | (0.52) | (0.34) | (0.33) | (0.65) | (0.49) |
| Wald test[f] | | -1.00** | | -0.99** | -1.56** | -1.51** |
| | | (0.50) | | (0.49) | (0.66) | (0.62) |
| N | 951.00 | 9515.00 | 951.00 | 951.00 | 499.00 | 499.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

## Table 86: Private Saving for Retirement" (1)

| Owning "Private Saving for Retirement" | 9.7(159) Probit | 9.7(160) IV-Probit | 9.7(161) Probit | 9.7(162) IV-Probit | 9.7(163) IV-Probit Original Data | 9.7(164) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | 0.02 | -0.06 | 0.02 | -0.06 | 0.29 | 0.29 |
| | (0.13) | (0.21) | (0.13) | (0.21) | (0.21) | (0.19) |
| Age | 0.08* | 0.07 | 0.08* | 0.07 | 0.07 | 0.07 |
| | (0.04) | (0.05) | (0.04) | (0.05) | (0.05) | (0.05) |
| Age Squared | -0.00** | -0.00 | -0.00** | -0.00 | -0.00 | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.03 | 0.03 | 0.03 | 0.04 | 0.14 | 0.12 |
| | (0.14) | (0.14) | (0.14) | (0.14) | (0.19) | (0.19) |
| Children | 0.07 | 0.08 | 0.07 | 0.08 | -0.00 | -0.00 |
| (0 no – 4 four or more kids) | (0.06) | (0.07) | (0.06) | (0.07) | (0.08) | (0.08) |
| Middle Education[a] | 0.08 | 0.04 | 0.08 | 0.05 | 0.33 | 0.30 |
| | (0.19) | (0.20) | (0.19) | (0.20) | (0.23) | (0.22) |
| High Education[a] | 0.01 | -0.03 | 0.00 | -0.03 | 0.25 | 0.25 |
| | (0.18) | (0.20) | (0.18) | (0.20) | (0.23) | (0.22) |
| Middle Individual net Income[b] | 0.45*** | 0.41** | 0.45*** | 0.41** | 0.19 | 0.17 |
| | (0.17) | (0.20) | (0.17) | (0.20) | (0.22) | (0.21) |
| High Individual net Income[b] | 0.53*** | 0.47* | 0.53*** | 0.47* | 0.50* | 0.47 |
| | (0.20) | (0.26) | (0.20) | (0.26) | (0.30) | (0.29) |
| Middle Wealth[c] | 0.54*** | 0.45* | 0.54*** | 0.45* | 0.58** | 0.56** |
| | (0.18) | (0.26) | (0.18) | (0.26) | (0.26) | (0.26) |
| High Wealth[c] | 0.44** | 0.32 | 0.44** | 0.33 | 0.62** | 0.60** |
| | (0.18) | (0.31) | (0.18) | (0.31) | (0.28) | (0.28) |
| Home Equity | 0.29* | 0.26 | 0.29* | 0.25 | 0.34* | 0.35* |
| | (0.15) | (0.17) | (0.15) | (0.17) | (0.20) | (0.19) |
| Blue- or White Collar Worker[d] | 0.45*** | 0.41** | 0.46*** | 0.41** | 0.63** | 0.61** |
| | (0.15) | (0.18) | (0.15) | (0.18) | (0.29) | (0.30) |
| Self-employed[d] | 0.27 | 0.28 | 0.27 | 0.28 | 0.05 | 0.04 |
| | (0.20) | (0.20) | (0.20) | (0.20) | (0.25) | (0.25) |
| Civil Servant[d] | -0.12 | 0.01 | -0.11 | 0.02 | -0.41 | -0.41 |
| | (0.25) | (0.38) | (0.25) | (0.38) | (0.34) | (0.32) |
| Actual Pension Knowledge | 0.28*** | 0.55 | 0.28*** | 0.55 | -0.54 | -0.62 |
| (0 = zero – 6 = six question correct) | (0.08) | (0.55) | (0.08) | (0.55) | (0.70) | (0.63) |
| Future Orientation | 0.18*** | 0.16* | 0.10 | 0.06 | 0.29** | 0.52* |
| (factor1, Table 5) | (0.07) | (0.09) | (0.22) | (0.25) | (0.12) | (0.30) |
| **Procrastinate on Financial Matters** | -0.18*** | -0.19*** | -0.18*** | -0.19*** | -0.27 | -0.25 |
| (1 agree – 4 not agree) | (0.06) | (0.06) | (0.06) | (0.06) | (0.20) | (0.19) |
| Underestimate Knowledge[e] | -0.43*** | -0.65 | -0.43*** | -0.64 | 0.29 | 0.34 |
| | (0.16) | (0.47) | (0.16) | (0.47) | (0.63) | (0.55) |
| Overestimate Knowledge[e] | 0.58*** | 0.81* | 0.59*** | 0.81* | -0.16 | -0.29 |
| | (0.18) | (0.45) | (0.18) | (0.46) | (0.87) | (0.82) |
| Procrastinate*Future Orient. (interaction term) | | | 0.01 | 0.02 | | -0.02 |
| | | | (0.06) | (0.06) | | (0.08) |
| A.P.Knowledge*Future Orie. (interaction term) | | | 0.02 | 0.03 | | -0.09 |
| | | | (0.07) | (0.07) | | (0.10) |
| Constant | -1.38 | -1.52 | -1.39 | -1.53 | -0.11 | 0.11 |
| | (0.90) | (0.95) | (0.91) | (0.96) | (1.36) | (1.35) |
| Wald test[f] | | -0.27 | | -0.26 | 0.84 | 0.94 |
| | | (0.57) | | (0.57) | (0.85) | (0.85) |
| N | 951.00 | 9515.00 | 951.00 | 951.00 | 498.00 | 498.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

**Table 87: "Private Saving for Retirement" (2)**

| Owning "Private Saving for Retirement" | 9.7(165) Probit | 9.7(166) IV-Probit | 9.7(167) Probit | 9.7(168) IV-Probit | 9.7(169) IV-Probit Original Data | 9.7(170) IV-Probit Original Data |
|---|---|---|---|---|---|---|
| Male | 0.01 | -0.09 | 0.02 | -0.08 | 0.33** | 0.26 |
| | (0.13) | (0.22) | (0.13) | (0.22) | (0.16) | (0.27) |
| Age | 0.08* | 0.06 | 0.08* | 0.06 | 0.07 | 0.07 |
| | (0.04) | (0.06) | (0.04) | (0.06) | (0.05) | (0.05) |
| Age Squared | -0.00** | -0.00 | -0.00** | -0.00 | -0.00 | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | 0.02 | 0.03 | 0.04 | 0.05 | 0.08 | 0.11 |
| | (0.14) | (0.14) | (0.14) | (0.14) | (0.18) | (0.19) |
| Children | 0.06 | 0.07 | 0.06 | 0.08 | -0.01 | 0.00 |
| (0 no – 4 four or more kids) | (0.06) | (0.06) | (0.06) | (0.06) | (0.07) | (0.09) |
| Middle Education[a] | 0.09 | 0.03 | 0.07 | 0.02 | 0.33 | 0.29 |
| | (0.19) | (0.21) | (0.19) | (0.20) | (0.21) | (0.23) |
| High Education[a] | -0.01 | -0.07 | -0.03 | -0.09 | 0.33 | 0.18 |
| | (0.19) | (0.21) | (0.19) | (0.21) | (0.20) | (0.31) |
| Middle Individual net Income[b] | 0.45*** | 0.38* | 0.46*** | 0.39* | 0.13 | 0.18 |
| | (0.17) | (0.22) | (0.17) | (0.22) | (0.21) | (0.23) |
| High Individual net Income[b] | 0.54*** | 0.46 | 0.55*** | 0.46 | 0.38 | 0.48 |
| | (0.20) | (0.28) | (0.20) | (0.28) | (0.33) | (0.33) |
| Middle Wealth[c] | 0.55*** | 0.43 | 0.54*** | 0.42 | 0.48 | 0.56** |
| | (0.18) | (0.29) | (0.18) | (0.28) | (0.30) | (0.28) |
| High Wealth[c] | 0.46** | 0.31 | 0.45** | 0.30 | 0.53 | 0.60** |
| | (0.18) | (0.33) | (0.18) | (0.33) | (0.32) | (0.29) |
| Home Equity | 0.28* | 0.23 | 0.27* | 0.23 | 0.29 | 0.33 |
| | (0.15) | (0.18) | (0.15) | (0.17) | (0.20) | (0.20) |
| Blue- or White Collar Worker[d] | 0.42*** | 0.36* | 0.43*** | 0.36* | 0.51 | 0.67** |
| | (0.16) | (0.21) | (0.15) | (0.21) | (0.35) | (0.30) |
| Self-employed[d] | 0.23 | 0.24 | 0.24 | 0.25 | -0.01 | 0.10 |
| | (0.20) | (0.20) | (0.20) | (0.20) | (0.23) | (0.27) |
| Civil Servant[d] | -0.14 | 0.01 | -0.14 | 0.02 | -0.43 | -0.34 |
| | (0.26) | (0.39) | (0.26) | (0.38) | (0.28) | (0.40) |
| Actual Pension Knowledge | 0.29*** | 0.63 | 0.29*** | 0.65 | -0.81 | -0.40 |
| (0 = zero – 6 = six question correct) | (0.08) | (0.61) | (0.08) | (0.58) | (0.57) | (1.02) |
| Underestimate Knowledge[e] | -0.44*** | -0.72 | -0.45*** | -0.73 | 0.53 | 0.16 |
| | (0.16) | (0.51) | (0.16) | (0.48) | (0.54) | (0.90) |
| Overestimate Knowledge[e] | 0.61*** | 0.89* | 0.59*** | 0.89* | -0.50 | -0.05 |
| (1 agree – 4 not agree) | (0.18) | (0.49) | (0.17) | (0.47) | (0.76) | (1.18) |
| Future Orientation | 0.18*** | 0.15 | 0.17** | 0.14 | 0.24* | 0.28** |
| (factor1) | (0.07) | (0.09) | (0.07) | (0.09) | (0.14) | (0.11) |
| **Procrastinate on Finan. Matters** | -0.16** | -0.15** | | | -0.23 | |
| (1 agree – 4 not agree) | (0.06) | (0.07) | | | (0.19) | |
| Like Dealing with Fin.Matters | -0.03 | -0.08 | | | 0.15 | |
| (1 do not like it – 4 like it) | (0.07) | (0.11) | | | (0.11) | |
| Time for Financial Matters | -0.09 | -0.12 | | | 0.01 | |
| (1 not time – 4 yes have time) | (0.07) | (0.08) | | | (0.07) | |
| Procrastination | | | -0.25*** | -0.31*** | | -0.22 |
| (factor2) | | | (0.08) | (0.12) | | (0.36) |
| Constant | -1.11 | -1.08 | -1.85** | -2.03** | -0.22 | -0.96 |
| | (0.94) | (0.94) | (0.89) | (0.93) | (1.06) | (1.97) |
| Wald test[f] | | -0.35 | | -0.37 | 1.24 | 0.69 |
| | | (0.66) | | (0.64) | (1.09) | (1.07) |
| N | 951.00 | 9515.00 | 951.00 | 951.00 | 498.00 | 498.00 |

Source: FNA-Data, 1. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

## 9.8 Joining a Retirement Seminar

The results in Table 88 and Table 89 measuring the probability of joining an intensive and an introductory course respectively indicate that the factor variable which contains four out of six knowledge questions has a slightly lower AIC and BIC than the actual knoweldge variable which can take on seven values, from 0 correct answers to 6 correct answers. The variables which are not part of the factor approximating actual pension knoweldge are the question about the statutory right for deferred contribuitons in the form of a company pension and the question about the amount of retirement pension someone receives who retires today with a working history of 45 contribution years and an average wage.

Furthermore, it has been tested if the variable measuring how often someone stated that he/she does not know the correct answer to the pension literacy question, adds anything in explaining the dependent variable. The likelihood-ratio test, testing the hypothesis that the coefficient of SumDk is zero cannot be rejected in both models.[101] Therefore the variable SumDK will not be considered as explanatory variable.

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[101] Likelyhood-ratio test for sumDK: intensive course p-value 0.74, introductory course p-value 0.69

**Table 88: AIC and BIC for Choosing Actual Knowledge Variable (Intensive Course)**

| Intensive Course | 9.8 (1) | 9.6(2) | 9.6(3) | 9.6(4) | 9.6(5) |
|---|---|---|---|---|---|
| Male | -0.02 | -0.02 | -0.02 | -0.01 | -0.01 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Age | 0.18** | 0.18** | 0.18** | 0.18** | 0.18** |
| | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) |
| Age Squared | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | -0.10 | -0.10 | -0.10 | -0.10 | -0.12 |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) |
| Children | -0.04 | -0.04 | -0.04 | -0.04 | -0.06 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | 0.17 | 0.17 | 0.17 | 0.17 | 0.13 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| High Education[a] | 0.48* | 0.49* | 0.48* | 0.48* | 0.45 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| Middle Individual net Income[b] | 0.08 | 0.08 | 0.08 | 0.08 | 0.07 |
| | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) |
| High Individual net Income[b] | -0.17 | -0.16 | -0.17 | -0.15 | -0.12 |
| | (0.26) | (0.26) | (0.26) | (0.26) | (0.26) |
| Wealth[c] | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) |
| Underestimate Knowledge[e] | 0.17 | 0.19 | 0.17 | 0.18 | 0.20 |
| | (0.22) | (0.21) | (0.21) | (0.21) | (0.21) |
| Overestimate Knowledge[e] | 0.16 | 0.12 | 0.15 | 0.14 | 0.10 |
| | (0.20) | (0.20) | (0.20) | (0.18) | (0.20) |
| Future Orientation | -0.02 | -0.02 | -0.02 | -0.02 | -0.01 |
| (factor1, Table 5) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| **Procrastinate on Finan. Matters** | -0.14* | -0.14* | -0.14* | -0.15* | -0.13 |
| (1 agree – 4 not agree) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) |
| Experience Fin. Matters | 0.07 | 0.08 | 0.07 | 0.07 | 0.08 |
| (no. of different assests) | (0.10) | (0.10) | (0.10) | (0.10) | (0.10) |
| Actual Savings Suffice | -0.20 | -0.20 | -0.20 | -0.20 | -0.18 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.19) |
| Blue- or White Collar Worker[d] | 0.29 | 0.30 | 0.30 | 0.31 | 0.30 |
| | (0.24) | (0.24) | (0.24) | (0.24) | (0.24) |
| Self-employed[d] | -0.65** | -0.65** | -0.65** | -0.63** | -0.64** |
| | (0.31) | (0.31) | (0.31) | (0.31) | (0.31) |
| Civil Servant[d] | -0.20 | -0.21 | -0.20 | -0.19 | -0.20 |
| | (0.36) | (0.36) | (0.36) | (0.36) | (0.37) |
| Actual Pension Knowledge | -0.02 | | | | |
| (0 = low – 2 = high) | (0.13) | | | | |
| Actual Pension Knowledge | | -0.05 | | | |
| (0 = zero – 6 = six question correct) | | (0.09) | | | |
| Factor Actual Knowledge | | | -0.05 | | |
| | | | (0.16) | | |
| Actual Pension Knowledge | | | | -0.06 | |
| (0=low – 2= high, equal space) | | | | (0.09) | |
| Pension Reduction | | | | | -0.32 |
| (question correct) | | | | | (0.22) |
| Company Pension | | | | | 0.05 |
| (question correct) | | | | | (0.17) |
| Riester | | | | | 0.13 |
| (question correct) | | | | | (0.17) |
| Interest | | | | | -0.14 |
| (question correct) | | | | | (0.17) |
| Contribution Rate | | | | | -0.01 |
| (question correct) | | | | | (0.22) |
| Statutory Pension | | | | | 0.00 |
| (question correct) | | | | | (0.21) |
| Constant | -3.81** | -3.83** | -3.77** | -3.90** | -3.83** |
| | (1.54) | (1.54) | (1.55) | (1.55) | (1.56) |
| N | 314.00 | 314.00 | 314.00 | 314.00 | 314.00 |
| AIC | 419.06 | 418.76 | 419.01 | 418.61 | 425.11 |
| BIC | 497.80 | 497.50 | 497.74 | 497.35 | 522.59 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

**Table 89: AIC and BIC for Choosing Actual Knowledge Variable (Intro. Course)**

| Introductory Course | 9.6(6) | 9.6(7) | 9.6(8) | 9.6(9) | 9.6(10) |
|---|---|---|---|---|---|
| Male | -0.24 | -0.22 | -0.23 | -0.22 | -0.24 |
| | (0.17) | (0.17) | (0.17) | (0.17) | (0.18) |
| Age | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 |
| | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) |
| Age Squared | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | -0.30 | -0.30 | -0.31* | -0.32* | -0.30 |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) |
| Children | 0.09 | 0.09 | 0.09 | 0.09 | 0.05 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | 0.05 | 0.05 | 0.05 | 0.06 | -0.01 |
| | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) |
| High Education[a] | 0.42 | 0.45 | 0.43 | 0.42 | 0.36 |
| | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) |
| Middle Individual net Income[b] | -0.38* | -0.38* | -0.39* | -0.40* | -0.39* |
| | (0.22) | (0.22) | (0.22) | (0.22) | (0.22) |
| High Individual net Income[b] | -0.51** | -0.51** | -0.52** | -0.49* | -0.45* |
| | (0.25) | (0.26) | (0.26) | (0.26) | (0.26) |
| Wealth[c] | 0.09 | 0.10 | 0.09 | 0.10 | 0.09 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) |
| Underestimate Knowledge[e] | 0.16 | 0.20 | 0.11 | 0.16 | 0.20 |
| | (0.22) | (0.21) | (0.20) | (0.20) | (0.21) |
| Overestimate Knowledge[e] | -0.10 | -0.19 | -0.09 | -0.11 | -0.19 |
| | (0.20) | (0.20) | (0.20) | (0.18) | (0.20) |
| Future Orientation | -0.04 | -0.03 | -0.05 | -0.03 | -0.02 |
| (factor1, Table 5) | (0.07) | (0.08) | (0.07) | (0.08) | (0.08) |
| Procrastinate on Financial Matters | -0.25*** | -0.25*** | -0.25*** | -0.26*** | -0.24*** |
| (1 agree – 4 not agree) | (0.08) | (0.08) | (0.08) | (0.08) | (0.09) |
| Experience Fin. Matters | -0.02 | 0.01 | -0.02 | -0.01 | -0.01 |
| (no. of different assests) | (0.09) | (0.10) | (0.09) | (0.09) | (0.10) |
| Actual Savings Suffice | 0.13 | 0.14 | 0.12 | 0.14 | 0.19 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Blue- or White Collar Worker[d] | 0.51** | 0.53** | 0.52** | 0.55** | 0.52** |
| | (0.24) | (0.24) | (0.24) | (0.24) | (0.24) |
| Self-employed[d] | -0.00 | -0.01 | 0.00 | 0.06 | 0.01 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.30) |
| Civil Servant[d] | -0.06 | -0.10 | -0.05 | -0.01 | -0.10 |
| | (0.35) | (0.35) | (0.35) | (0.35) | (0.36) |
| Actual Pension Knowledge | -0.16 | | | | |
| (0 = low – 2 = high) | (0.13) | | | | |
| Actual Pension Knowledge | | -0.20** | | | |
| (0 = zero – 6 = six question correct) | | (0.09) | | | |
| Factor Actual Knowledge | | | -0.18 | | |
| | | | (0.16) | | |
| Actual Pension Knowledge | | | | -0.20** | |
| (0=low – 2= high, equal space) | | | | (0.09) | |
| Pension Reduction | | | | | -0.56*** |
| (question correct) | | | | | (0.21) |
| Company Pension | | | | | -0.15 |
| (question correct) | | | | | (0.17) |
| Riester | | | | | 0.25 |
| (question correct) | | | | | (0.17) |
| Interest | | | | | -0.14 |
| (question correct) | | | | | (0.17) |
| Contribution Rate | | | | | -0.21 |
| (question correct) | | | | | (0.21) |
| Statutory Pension | | | | | -0.05 |
| (question correct) | | | | | (0.20) |
| Constant | 2.12 | 2.01 | 2.21 | 1.80 | 1.96 |
| | (1.49) | (1.49) | (1.50) | (1.50) | (1.52) |
| N | 314.00 | 314.00 | 314.00 | 314.00 | 314.00 |
| AIC | 437.50 | 434.10 | 437.55 | 433.74 | 437.34 |
| BIC | 516.24 | 512.84 | 516.28 | 512.48 | 534.83 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge.

The following tables show the estimations whith variing variables measuring time preferneces and procrastination. On theoretical grounds it would be necessary to include a variable approximating procrastination of retirement saving decisions and a variable measuring time preferences with respect to future orientation. The two factors approximating time preferences are factor1 and factor3 and the other two factors, factor2 and factor4 approximate procrastination. Deciding on behalf of the AIC and BIC, the model estimating the probability to join the introductory course favors factor3 over factor1 and the model estimating the probability to join the intensive course favors factor1 over factor3. In order to make the results of both models comparable, it is necessary to choose the same variable for both models. Since factor1 was the variable of choice in most of the previous models, this variable will also be chosen here. The variable approximating procrastination is in both models factor2.

As described before, using a factor which is composed of the information from several variables measuring procrastination is, however, problematic, when testing hypothesis 3. For this hypothesis the variable needs to indicate if individuals are aware of their procrastination behavior or not. This requirement is only fulfilled by the variable procrastination. From the other two variables, measuring if someone likes dealing with financial matters or if someone has time to deal with financial matters it is not possible to deduce if someone knows that he/she procrastinates on financial decisions or not. Hence it is important to consider both variables, on the one hand that of factor and on the other hand the variable of procrastination.

The estimation results in chapter 6.5 will only consider the variable procrastination because the main purpose is to test the hypothesis. In this Appendix, however, the models have been estimated twice, on the one hand with the factor2 variable for procrastination and on the other hand by including each of the variables into the estimation which are part of factor2. The results in Table 59 show that the only variable which is significant is the variable measuring how much an individual likes dealing with financial matters in the instrument variable estimation. This variable has a positive influence on changing retirement savings behavior.

**Table 90: AIC and BIC for Choosing Time Preference and Procrastination Variable (Intensive Course 1)**

| Intensive Course | 9.6(11) | 9.6(12) | 9.6(13) | 9.6(14) | 9.6(15) | 9.6(16) |
|---|---|---|---|---|---|---|
| Male | -0.00 | -0.01 | -0.02 | -0.03 | -0.04 | -0.05 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Age | 0.18** | 0.19*** | 0.18** | 0.18** | 0.18** | 0.18** |
| | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) |
| Age Squared | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | -0.07 | -0.05 | -0.06 | -0.05 | -0.12 | -0.12 |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.18) | (0.18) |
| Children | -0.07 | -0.08 | -0.08 | -0.08 | -0.04 | -0.05 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.09) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | 0.12 | 0.12 | 0.11 | 0.09 | 0.13 | 0.11 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| High Education[a] | 0.45 | 0.42 | 0.43 | 0.42 | 0.48* | 0.47* |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| Middle Individual net Income[b] | 0.10 | 0.12 | 0.11 | 0.11 | 0.09 | 0.09 |
| | (0.22) | (0.22) | (0.22) | (0.22) | (0.21) | (0.21) |
| High Individual net Income[b] | -0.13 | -0.13 | -0.13 | -0.13 | -0.16 | -0.17 |
| | (0.26) | (0.26) | (0.26) | (0.26) | (0.26) | (0.26) |
| Wealth | 0.05 | 0.06 | 0.05 | 0.06 | 0.06 | 0.05 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) |
| Underestimate Knowledge[e] | 0.17 | 0.14 | 0.16 | 0.16 | 0.18 | 0.18 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| Overestimate Knowledge[e] | 0.07 | 0.13 | 0.11 | 0.11 | 0.07 | 0.06 |
| | (0.20) | (0.20) | (0.20) | (0.20) | (0.20) | (0.20) |
| Experience Fin. Matters | -0.20 | -0.17 | -0.20 | -0.19 | -0.24 | -0.23 |
| (no. of different assests) | (0.18) | (0.19) | (0.18) | (0.19) | (0.18) | (0.18) |
| Blue- or White Collar Worker[d] | 0.30 | 0.28 | 0.29 | 0.30 | 0.35 | 0.34 |
| | (0.24) | (0.24) | (0.24) | (0.24) | (0.24) | (0.24) |
| Self-employed[d] | -0.61** | -0.61** | -0.61** | -0.60* | -0.56* | -0.54* |
| | (0.31) | (0.31) | (0.31) | (0.31) | (0.30) | (0.30) |
| Civil Servant[d] | -0.25 | -0.25 | -0.25 | -0.26 | -0.21 | -0.21 |
| | (0.36) | (0.36) | (0.36) | (0.36) | (0.36) | (0.36) |
| Actual Pension Knowledge | -0.04 | -0.01 | -0.03 | -0.03 | -0.06 | -0.06 |
| (0 = zero – 6 = six question correct) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) |
| Future Orientation | 0.07 | | | | | |
| (factor1 Table 5) | (0.10) | | | | | |
| Procrastination | | -0.13 | | | | |
| (factor2 Table 5) | | (0.12) | | | | |
| Future Orientation | | | 0.00 | | | |
| (factor3 Table 5) | | | (0.11) | | | |
| Procrastination | | | | -0.05 | | |
| (factor4 Table 5) | | | | (0.12) | | |
| Timepreference Urgent | | | | | -0.00 | |
| (Table 5) | | | | | (0.03) | |
| Timepreference Results | | | | | | -0.01 |
| (Table 5) | | | | | | (0.03) |
| Constant | -4.01*** | -4.15*** | -4.00*** | -4.05*** | -3.90*** | -3.94*** |
| | (1.48) | (1.49) | (1.48) | (1.48) | (1.48) | (1.47) |
| N | 310.00 | 310.00 | 310.00 | 310.00 | 316.00 | 315.00 |
| AIC | 412.77 | 411.96 | 413.23 | 413.08 | 421.14 | 420.26 |
| BIC | 483.76 | 482.95 | 484.23 | 484.07 | 492.50 | 491.56 |
| N[1] | | | | | 310.00 | 310.00 |
| AIC[1] | | | | | 413.23 | 413.19 |
| BIC[1] | | | | | 484.22 | 484.19 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 91: AIC and BIC for Choosing Time Preference and Procrastination Variable (Intensive Course 2)**

| Intensive Course | 9.6(17) | 9.6(18) | 9.6(19) | 9.6(20) | 9.6(21) | 9.6(22) | 9.6(23) |
|---|---|---|---|---|---|---|---|
| Male | -0.03 | -0.01 | -0.04 | -0.04 | -0.03 | -0.02 | -0.03 |
| | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Age | 0.18** | 0.18** | 0.19*** | 0.18** | 0.18** | 0.18** | 0.18** |
| | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) |
| Age Squared | -0.00** | -0.00** | -0.00*** | -0.00*** | -0.00*** | -0.00*** | -0.00*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | -0.12 | -0.13 | -0.16 | -0.12 | -0.08 | -0.10 | -0.11 |
| | (0.18) | (0.19) | (0.19) | (0.18) | (0.19) | (0.18) | (0.19) |
| Children | -0.04 | -0.04 | -0.04 | -0.04 | -0.07 | -0.04 | -0.05 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | 0.13 | 0.14 | 0.17 | 0.12 | 0.11 | 0.16 | 0.13 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| High Education[a] | 0.47* | 0.49* | 0.50* | 0.48* | 0.47 | 0.48* | 0.47 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| Middle Individual net Income[b] | 0.08 | 0.10 | 0.06 | 0.09 | 0.11 | 0.10 | 0.08 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.22) |
| High Individual net Income[b] | -0.16 | -0.15 | -0.19 | -0.16 | -0.15 | -0.15 | -0.16 |
| | (0.26) | (0.26) | (0.26) | (0.25) | (0.26) | (0.26) | (0.26) |
| Wealth | 0.05 | 0.06 | 0.08 | 0.06 | 0.06 | 0.07 | 0.06 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) | (0.11) |
| Underestimate Knowledge[e] | 0.19 | 0.18 | 0.18 | 0.18 | 0.16 | 0.17 | 0.19 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| Overestimate Knowledge[e] | 0.09 | 0.03 | 0.09 | 0.07 | 0.08 | 0.11 | 0.09 |
| | (0.20) | (0.20) | (0.20) | (0.20) | (0.20) | (0.20) | (0.20) |
| Experience Fin. Matters | -0.25 | -0.22 | -0.21 | -0.23 | -0.23 | -0.21 | -0.23 |
| (no. of different assests) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Blue- or White Collar Worker[d] | 0.34 | 0.35 | 0.29 | 0.34 | 0.32 | 0.33 | 0.32 |
| | (0.24) | (0.24) | (0.24) | (0.24) | (0.24) | (0.24) | (0.24) |
| Self-employed[d] | -0.55* | -0.59* | -0.63** | -0.56* | -0.58* | -0.57* | -0.62** |
| | (0.30) | (0.30) | (0.31) | (0.30) | (0.31) | (0.30) | (0.31) |
| Civil Servant[d] | -0.20 | -0.24 | -0.24 | -0.21 | -0.24 | -0.19 | -0.23 |
| | (0.36) | (0.36) | (0.36) | (0.36) | (0.36) | (0.36) | (0.36) |
| Actual Pension Knowledge | -0.05 | -0.07 | -0.04 | -0.06 | -0.04 | -0.05 | -0.06 |
| (0 = zero – 6 = six question correct) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) |
| Timepreference Old Age | -0.00 | | | | | | |
| (Table 5) | (0.04) | | | | | | |
| Timepreference Old Age | | 0.03 | | | | | |
| (Table 5) | | (0.03) | | | | | |
| Time Deal. Fin. Matters | | | -0.16* | | | | |
| (Table 5) | | | (0.09) | | | | |
| Retire Disuse | | | | -0.03 | | | |
| (Table 5) | | | | (0.10) | | | |
| Retire Illness | | | | | 0.01 | | |
| (Table 5) | | | | | (0.08) | | |
| Procrastination | | | | | | -0.13 | |
| (Table 5) | | | | | | (0.08) | |
| Like Deal. Fin. Matters | | | | | | | 0.04 |
| (Table 5) | | | | | | | (0.09) |
| Constant | -3.84** | -4.07*** | -3.67** | -3.82** | -4.04*** | -3.72** | -4.01*** |
| | (1.51) | (1.48) | (1.48) | (1.49) | (1.48) | (1.48) | (1.49) |
| N | 315.00 | 315.00 | 316.00 | 316.00 | 314.00 | 316.00 | 314.00 |
| AIC | 420.13 | 419.23 | 417.80 | 421.04 | 418.46 | 418.77 | 417.63 |
| BIC | 491.43 | 490.53 | 489.16 | 492.40 | 489.70 | 490.13 | 488.87 |
| N[1] | 310.00 | 310.00 | 310.00 | 310.00 | 310.00 | 310.00 | 310.00 |
| AIC[1] | 413.23 | 412.14 | 410.55 | 412.97 | 413.15 | 411.14 | 413.11 |
| BIC[1] | 484.23 | 483.14 | 481.55 | 483.96 | 484.15 | 482.14 | 484.10 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 92: AIC and BIC for Choosing Time Preference and Procrastination Variable (Intro. Course 1)**

| Introductory Course | 9.6(24) | 9.6(25) | 9.6(26) | 9.6(27) | 9.6(28) | 9.6(29) |
|---|---|---|---|---|---|---|
| Male | -0.25 | -0.24 | -0.26 | -0.29* | -0.24 | -0.27 |
| | (0.18) | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) |
| Age | -0.02 | -0.02 | -0.02 | -0.02 | -0.04 | -0.04 |
| | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) |
| Age Squared | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | -0.33* | -0.29 | -0.32* | -0.30 | -0.35* | -0.36* |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) |
| Children | 0.06 | 0.06 | 0.06 | 0.06 | 0.08 | 0.08 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | -0.03 | 0.02 | -0.02 | -0.13 | -0.00 | 0.00 |
| | (0.27) | (0.28) | (0.27) | (0.28) | (0.27) | (0.27) |
| High Education[a] | 0.44 | 0.42 | 0.44 | 0.39 | 0.44 | 0.46* |
| | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) |
| Middle Individual net Income[b] | -0.34 | -0.32 | -0.33 | -0.33 | -0.37* | -0.35* |
| | (0.22) | (0.22) | (0.22) | (0.22) | (0.21) | (0.21) |
| High Individual net Income[b] | -0.51** | -0.50** | -0.50** | -0.51** | -0.50** | -0.51** |
| | (0.25) | (0.26) | (0.25) | (0.25) | (0.25) | (0.25) |
| Wealth | 0.08 | 0.11 | 0.08 | 0.10 | 0.08 | 0.07 |
| | (0.11) | (0.11) | (0.11) | (0.11) | (0.10) | (0.10) |
| Underestimate Knowledge[e] | 0.19 | 0.14 | 0.17 | 0.20 | 0.21 | 0.19 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| Overestimate Knowledge[e] | -0.31 | -0.22 | -0.29 | -0.28 | -0.26 | -0.29 |
| | (0.20) | (0.20) | (0.20) | (0.20) | (0.19) | (0.20) |
| Experience Fin. Matters | 0.14 | 0.18 | 0.15 | 0.20 | 0.08 | 0.12 |
| (no. of different assests) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Blue- or White Collar Worker[d] | 0.54** | 0.50** | 0.53** | 0.56** | 0.55** | 0.55** |
| | (0.24) | (0.24) | (0.24) | (0.24) | (0.23) | (0.23) |
| Self-employed[d] | 0.02 | 0.01 | 0.03 | 0.07 | 0.04 | 0.07 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| Civil Servant[d] | -0.17 | -0.16 | -0.17 | -0.17 | -0.14 | -0.14 |
| | (0.35) | (0.35) | (0.35) | (0.35) | (0.35) | (0.35) |
| Actual Pension Knowledge | -0.22** | -0.17* | -0.22** | -0.21** | -0.22** | -0.23** |
| (0 = zero – 6 = six question correct) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) |
| Future Orientation | 0.04 | | | | | |
| (factor1 Table 5) | (0.10) | | | | | |
| Procrastination | | -0.32*** | | | | |
| (factor2 Table 5) | | (0.12) | | | | |
| Future Orientation | | | 0.10 | | | |
| (factor3 Table 5) | | | (0.11) | | | |
| Procrastination | | | | -0.20* | | |
| (factor4 Table 5) | | | | (0.11) | | |
| Timepreference Urgent | | | | | 0.01 | |
| (Table 5) | | | | | (0.03) | |
| Timepreference Results | | | | | | 0.03 |
| (Table 5) | | | | | | (0.03) |
| Constant | 1.24 | 0.98 | 1.25 | 1.03 | 1.38 | 1.37 |
| | (1.41) | (1.43) | (1.41) | (1.42) | (1.42) | (1.41) |
| N | 310.00 | 310.00 | 310.00 | 310.00 | 316.00 | 315.00 |
| AIC | 433.51 | 426.08 | 432.84 | 430.61 | 440.63 | 437.61 |
| BIC | 504.50 | 497.07 | 503.84 | 501.61 | 511.99 | 508.91 |
| N[1] | | | | | 310.00 | 310.00 |
| AIC[1] | | | | | 433.40 | 432.86 |
| BIC[1] | | | | | 504.40 | 503.76 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 93: AIC and BIC for Choosing Time Preference and Procrastination Variable (Intro. Course 2)**

| Introductory Course | 9.6(30) | 9.6(31) | 9.6(32) | 9.6(34) | 9.6(35) | 9.6(36) | 9.6(37) |
|---|---|---|---|---|---|---|---|
| Male | -0.25 | -0.25 | -0.25 | -0.27 | -0.25 | -0.22 | -0.23 |
| | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) | (0.17) |
| Age | -0.03 | -0.04 | -0.03 | -0.03 | -0.03 | -0.03 | -0.04 |
| | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) |
| Age Squared | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | -0.35* | -0.35* | -0.39** | -0.33* | -0.32* | -0.31* | -0.33* |
| | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) | (0.19) |
| Children | 0.08 | 0.07 | 0.08 | 0.08 | 0.06 | 0.09 | 0.07 |
| (0 no – 4 four or more kids) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) | (0.08) |
| Middle Education[a] | -0.01 | -0.01 | 0.06 | -0.08 | -0.05 | 0.06 | -0.01 |
| | (0.27) | (0.27) | (0.27) | (0.28) | (0.28) | (0.28) | (0.27) |
| High Education[a] | 0.46* | 0.44 | 0.48* | 0.40 | 0.42 | 0.46 | 0.42 |
| | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) | (0.28) |
| Middle Individual net Income[b] | -0.36* | -0.36* | -0.41* | -0.35 | -0.36* | -0.38* | -0.36* |
| | (0.21) | (0.21) | (0.22) | (0.21) | (0.21) | (0.22) | (0.21) |
| High Individual net Income[b] | -0.51** | -0.50** | -0.53** | -0.51** | -0.49* | -0.50** | -0.48* |
| | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.26) | (0.25) |
| Wealth | 0.09 | 0.08 | 0.11 | 0.09 | 0.08 | 0.10 | 0.08 |
| | (0.11) | (0.10) | (0.11) | (0.11) | (0.10) | (0.11) | (0.10) |
| Underestimate Knowledge[e] | 0.21 | 0.21 | 0.20 | 0.22 | 0.20 | 0.19 | 0.20 |
| | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) | (0.21) |
| Overestimate Knowledge[e] | -0.30 | -0.26 | -0.24 | -0.27 | -0.25 | -0.20 | -0.24 |
| | (0.20) | (0.20) | (0.20) | (0.19) | (0.19) | (0.20) | (0.20) |
| Experience Fin. Matters | 0.09 | 0.08 | 0.10 | 0.13 | 0.10 | 0.13 | 0.09 |
| (no. of different assests) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) | (0.18) |
| Blue- or White Collar Worker[d] | 0.56** | 0.54** | 0.49** | 0.56** | 0.55** | 0.54** | 0.54** |
| | (0.23) | (0.23) | (0.24) | (0.23) | (0.24) | (0.24) | (0.23) |
| Self-employed[d] | 0.02 | 0.03 | -0.06 | 0.04 | 0.05 | 0.03 | 0.01 |
| | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) | (0.29) |
| Civil Servant[d] | -0.14 | -0.14 | -0.16 | -0.15 | -0.14 | -0.09 | -0.15 |
| | (0.35) | (0.35) | (0.35) | (0.35) | (0.35) | (0.35) | (0.35) |
| Actual Pension Knowledge | -0.23** | -0.22** | -0.20** | -0.22** | -0.21** | -0.21** | -0.21** |
| (0 = zero – 6 = six question correct) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) | (0.09) |
| Timepreference Old Age | 0.01 | | | | | | |
| (Table 5) | (0.04) | | | | | | |
| Timepreference Old Age | | -0.00 | | | | | |
| (Table 5) | | (0.03) | | | | | |
| Time Deal. Fin. Matters | | | -0.19** | | | | |
| (Table 5) | | | (0.09) | | | | |
| Retire Disuse | | | | -0.19* | | | |
| (Table 5) | | | | (0.10) | | | |
| Retire Illness | | | | | -0.05 | | |
| (Table 5) | | | | | (0.08) | | |
| Procrastination | | | | | | -0.24*** | |
| (Table 5) | | | | | | (0.08) | |
| Like Deal. Fin. Matters | | | | | | | -0.05 |
| (Table 5) | | | | | | | (0.09) |
| Constant | 1.27 | 1.48 | 1.84 | 1.95 | 1.47 | 1.92 | 1.62 |
| | (1.44) | (1.41) | (1.43) | (1.44) | (1.41) | (1.43) | (1.43) |
| N | 315.00 | 315.00 | 316.00 | 316.00 | 314.00 | 316.00 | 314.00 |
| AIC | 438.03 | 440.52 | 436.00 | 437.15 | 439.48 | 431.49 | 439.14 |
| BIC | 509.33 | 511.82 | 507.36 | 508.51 | 510.71 | 502.85 | 510.38 |
| N[1] | 310.00 | 310.00 | 310.00 | 310.00 | 310.00 | 310.00 | 310.00 |
| AIC[1] | 433.52 | 433.64 | 428.14 | 429.94 | 433.05 | 424.62 | 432.98 |
| BIC[1] | 504.52 | 504.63 | 499.14 | 500.93 | 504.05 | 495.62 | 503.98 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. N[1], AIC[1] and BIC[1] shows that basing the estimations on a similar number of observations does not lead to a different conclusion.

**Table 94: Factor Variable "Procrastination" vs Orignial Variables (Intensive Course)**

| Joining Intensive Course | 9.6(38) Probit | 9.6(39) IV-Probit | 9.6(40) Probit Interaction | 9.6(41) IV-Probit Interaction |
|---|---|---|---|---|
| Male | -0.05 | -0.08 | -0.05 | -0.08 |
| | (0.14) | (0.20) | (0.14) | (0.18) |
| Age | 0.13** | 0.12* | 0.13** | 0.12* |
| | (0.05) | (0.07) | (0.05) | (0.06) |
| Age Squared | -0.00** | -0.00 | -0.00** | -0.00* |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | -0.29* | -0.28* | -0.21 | -0.21 |
| | (0.15) | (0.16) | (0.15) | (0.16) |
| Children | 0.01 | 0.02 | -0.02 | -0.00 |
| (0 no – 4 four or more kids) | (0.06) | (0.09) | (0.06) | (0.08) |
| Middle Education[a] | -0.01 | -0.04 | -0.08 | -0.10 |
| | (0.20) | (0.24) | (0.21) | (0.22) |
| High Education[a] | 0.25 | 0.20 | 0.14 | 0.10 |
| | (0.20) | (0.33) | (0.20) | (0.26) |
| Middle Individual net Income[b] | 0.13 | 0.11 | 0.24 | 0.22 |
| | (0.17) | (0.20) | (0.17) | (0.21) |
| High Individual net Income[b] | -0.15 | -0.18 | -0.05 | -0.09 |
| | (0.21) | (0.28) | (0.21) | (0.27) |
| Middle Wealth[c] | -0.22 | -0.25 | -0.23 | -0.26 |
| | (0.20) | (0.25) | (0.21) | (0.23) |
| High Wealth[c] | -0.11 | -0.15 | -0.10 | -0.16 |
| | (0.21) | (0.28) | (0.21) | (0.29) |
| Home Equity | 0.07 | 0.05 | 0.11 | 0.09 |
| | (0.17) | (0.20) | (0.18) | (0.20) |
| Blue- or White Collar Worker[d] | 0.19 | 0.17 | 0.14 | 0.11 |
| | (0.17) | (0.22) | (0.17) | (0.21) |
| Self-employed[d] | -0.63*** | -0.60* | -0.60*** | -0.57** |
| | (0.22) | (0.34) | (0.22) | (0.27) |
| Civil Servant[d] | 0.09 | 0.17 | 0.03 | 0.13 |
| | (0.27) | (0.50) | (0.27) | (0.45) |
| Actual Pension Knowledge | 0.04 | 0.22 | 0.06 | 0.29 |
| (0 = zero – 6 = six question correct) | (0.07) | (0.96) | (0.08) | (0.81) |
| Underestimate Knowledge[e] | -0.03 | -0.17 | -0.07 | -0.24 |
| | (0.16) | (0.73) | (0.17) | (0.63) |
| Overestimate Knowledge[e] | 0.13 | 0.32 | 0.12 | 0.35 |
| | (0.16) | (1.00) | (0.16) | (0.87) |
| Savings Suffice | -0.19 | -0.19 | -0.17 | -0.18 |
| | (0.15) | (0.15) | (0.15) | (0.15) |
| Future Orientation | 0.13* | 0.11 | 0.13* | 0.10 |
| (factor1, Table 5) | (0.08) | (0.14) | (0.08) | (0.13) |
| Procrastinate on Financial Matters | -0.15** | -0.15** | | |
| (1 agree – 4 not agree) | (0.06) | (0.07) | | |
| Like Deal. Fin. Matters | 0.15* | 0.11 | | |
| (Table 5) | (0.07) | (0.23) | | |
| Time Deal. Fin. Matters | -0.12* | -0.13 | | |
| (Table 5) | (0.07) | (0.08) | | |
| Procrastinate on Financial Matters | | | -0.10 | -0.15 |
| (1 agree – 4 not agree) | | | (0.09) | (0.20) |
| Constant | -2.54** | -2.56** | -2.93*** | -3.17** |
| | (1.11) | (1.20) | (1.11) | (1.34) |
| Wald test[f] | | -0.17 | | -0.20 |
| | | (0.91) | | (0.75) |
| N | 542.00 | 542.00 | 522.00 | 522.00 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

# Table 95: Factor Variable "Procrastination" vs Orignial Variables (Introductory Course)

| Would you join the Introductory Course (1:yes, 0:no) | 9.6(42) Probit | 9.6(43) IV-Probit | 9.6(44) Probit Interaction | 9.6(45) IV-Probit Interaction |
|---|---|---|---|---|
| Male | -0.23* | 0.01 | -0.26* | -0.01 |
| | (0.14) | (0.19) | (0.14) | (0.19) |
| Age | 0.00 | 0.02 | 0.01 | 0.02 |
| | (0.05) | (0.05) | (0.05) | (0.05) |
| Age Squared | -0.00 | -0.00 | -0.00 | -0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00) |
| Married/Cohabiting | -0.15 | -0.05 | -0.14 | -0.08 |
| | (0.14) | (0.15) | (0.15) | (0.14) |
| Children | 0.06 | -0.03 | 0.04 | -0.03 |
| (0 no – 4 four or more kids) | (0.06) | (0.07) | (0.06) | (0.06) |
| Middle Education[a] | 0.00 | 0.12 | -0.04 | 0.06 |
| | (0.20) | (0.19) | (0.20) | (0.19) |
| High Education[a] | 0.28 | 0.34* | 0.25 | 0.29 |
| | (0.20) | (0.19) | (0.20) | (0.19) |
| Middle Individual net Income[b] | -0.16 | -0.04 | -0.08 | 0.04 |
| | (0.18) | (0.20) | (0.17) | (0.18) |
| High Individual net Income[b] | -0.33 | -0.03 | -0.29 | 0.02 |
| | (0.22) | (0.30) | (0.22) | (0.27) |
| Middle Wealth[c] | -0.07 | 0.12 | -0.03 | 0.13 |
| | (0.18) | (0.20) | (0.19) | (0.19) |
| High Wealth[c] | 0.06 | 0.22 | 0.14 | 0.31* |
| | (0.20) | (0.18) | (0.20) | (0.19) |
| Home Equity | -0.04 | 0.07 | -0.06 | 0.05 |
| | (0.17) | (0.16) | (0.17) | (0.16) |
| Blue- or White Collar Worker[d] | 0.27 | 0.25 | 0.26 | 0.27* |
| | (0.17) | (0.17) | (0.17) | (0.16) |
| Self-employed[d] | -0.18 | -0.21 | -0.15 | -0.14 |
| | (0.21) | (0.20) | (0.21) | (0.20) |
| Civil Servant[d] | -0.07 | -0.46 | -0.11 | -0.49* |
| | (0.27) | (0.29) | (0.28) | (0.28) |
| Actual Pension Knowledge | -0.14** | -1.00*** | -0.12* | -1.02*** |
| (0 = zero – 6 = six question correct) | (0.07) | (0.32) | (0.07) | (0.27) |
| Underestimate Knowledge[e] | 0.07 | 0.72** | 0.03 | 0.73*** |
| | (0.16) | (0.29) | (0.17) | (0.27) |
| Overestimate Knowledge[e] | -0.11 | -1.02*** | -0.14 | -1.10*** |
| | (0.16) | (0.37) | (0.16) | (0.31) |
| Savings Suffice | 0.09 | 0.10 | 0.11 | 0.11 |
| | (0.14) | (0.13) | (0.15) | (0.13) |
| Future Orientation | 0.05 | 0.11* | 0.05 | 0.12* |
| (factor1, Table 5) | (0.07) | (0.07) | (0.07) | (0.06) |
| Procrastinate on Financial Matters | -0.22*** | -0.12 | | |
| (1 agree – 4 not agree) | (0.06) | (0.11) | | |
| Like Deal. Fin. Matters | 0.02 | 0.19** | | |
| (Table 5) | (0.07) | (0.09) | | |
| Time Deal. Fin. Matters | -0.12* | -0.02 | | |
| (Table 5) | (0.07) | (0.09) | | |
| Procrastinate on Financial Matters | | | -0.29*** | 0.06 |
| (1 agree – 4 not agree) | | | (0.08) | (0.20) |
| Constant | 1.47 | 1.38 | 0.33 | 1.53 |
| | (1.09) | (1.03) | (1.07) | (0.99) |
| Wald test[f] | | 1.13 | | 1.17 |
| | | (0.96) | | (0.85) |
| N | 542.00 | 542.00 | 522.00 | 522.00 |

Source: FNA-Data, 2. Telephone Interview.

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. [a]) Reference group is low education, [b]) reference group is low income, [c]) reference group is low wealth, [d]) reference group is not employed/unemployed and [e]) reference group is correct estimation of pension knowledge. [f]) Wald test of exogeneity, tesing the null hypothesis $H_0: \rho = 0$.

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In Germany the ageing population, an increasing number of temporary work contracts and more individuals who work part-time or in jobs not subject to social insurance contributions have led to several reforms of the German pension system.

Individuals now have to decide if they start to provide for retirement privately, how much they are going to save and where to invest. Such decisions require a sound knowledge of the German pension system and general financial knowledge in order to approximate retirement needs and to compare financial products. In this Book survey data from 1016 individuals sheds light on the knowledge and savings decisions of these individuals.

Several findings from behavioral economics have been supported by the German data. Using heuristics was widespread among individuals owning a "Riester-Pension" and providing information about retirement provision was found not to be sufficient to induce people think about an appropriate retirement income. Time constraints and procrastination are often reasons for individuals not to start any activity concerning retirement provision. However, individuals who are aware of their procrastination behavior are more likely to state that they would participate in a retirement seminar - may be to overcome their procrastination.