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FROM INFORMATION TO INFORMED DECISION:

FIVE EMPIRICAL ESSAYS ON SAVING AND OLD-AGE PROVISION

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"I'm so grateful and proud. All I want is to sing it out loud."[1]

These two sentences, a quote from an ABBA song, express everything I have to say on this first page of my dissertation. I had the good fortune to work with many excellent researchers and to get limitless and loving support from my family and friends. I would like to take this opportunity to mention some of them.

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Finally, I have saved the last words for Paul. His encouragement, effort and patience helped in every step on the way. Thank you!

[1] ABBA (1983). Thank you for the music.

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1. FROM INFORMATION TO INFORMED DECISION[1]

1.1 GENERAL INTRODUCTION

For many countries, population ageing represents one of the major social and economic challenges of this century. In order to cope with this demographic change, the welfare state of many countries underwent major reforms in the last years which radically changed pension systems[2], health care systems, and labour markets. Income and longevity risks were shifted from the state to the individuals who nowadays have to privately insure against future financial needs. This requires an adaptation of individual savings behaviour, especially in countries that are used to generous social security systems, such as Germany.

About a decade ago, the German single-pillar pay-as-you-go system has been changed to a genuine multi-pillar system.[3] Compared to a situation without reforms, the public pension level will be lower by 14.4% in 2030 (Börsch-Supan and Gasche, 2010). While public pension reforms were accompanied by efforts to strengthen second pillar (occupational) and third pillar (private) pensions, it is of great concern whether individuals have the necessary financial knowledge and skills to understand the relevant pension information in order to save adequately. For instance, many people do not respond to financial incentives in the form of state subsidies for so-called Riester pensions (e.g. Coppola and Reil-Held, 2009; Börsch-Supan et al., 2012; Börsch-Supan et al., 2008). ‘‘In many cases [enrolment patterns] better fit the patterns predicted by the availability of information about the pension system’’ (Börsch-Supan et al., 2008, p. 297). This dissertation focuses on how individuals gather and process pension information in order to make informed savings decisions. The topic is of particular importance when supplementary pensions are voluntary: while institutions can set the availability of information, individuals are free to decide if and how much to invest in supplementary old-age provision.

[1] Gender-specific wording has been omitted in the dissertation for reasons of better readability.
[2] See Barr and Diamond (2010) for an overview of recent pension reforms.
[3] See Börsch-Supan and Wilke (2004) and Wilke (2009) for an overview of German pension reforms.

The usual framework for discussing savings over time is the Life Cycle Hypothesis by Modigliani and Brumberg (1954) and Ando and Modigliani (1963).[4] The central idea is that forward-looking agents maximize their lifetime utility by choosing the optimal consumption (and thus savings) level in each period. The standard model further assumes that individuals are rational, meaning that they form rational perceptions, have rational preferences, and are able to process available information rationally (McFadden, 1999). I hereby introduce to the reader "Economic man", as termed by Simon (1955).[5]

However, the so-called "Economic man" is a threatened species. In his seminal article, Simon (1955) was among the first to recognize that individual choices are not always consistent with the assumption of rational behaviour. Ever since, there is growing evidence that the rationality assumptions fail in real-life scenarios with individuals adopting a variety of problem-solving modes such as rules of thumb (e.g. Winter et al., 2012). Benartzi and Thaler (2007) provide a review of the biases individuals suffer from when deciding about retirement savings. Individuals are confronted with the complicated task to figure out if and how much to save, and which financial instruments to choose. Individuals then face the challenge to adhere to their original decision. In contrast to the "Economic man", "Man", i.e. the average human being, does not realise these tasks easily. Individuals incur costs of information processing (when making the original decision) and self-control (when adhering to it). These costs lead to bounded rational behaviour as described by a range of models such as prospect theory (Kahneman and Tversky 1979; Tversky and Kahnemann, 1992), mental accounting and the behavioural life-cycle hypothesis (Thaler, 1990; Shefrin and Thaler, 1988), and quasi-hyperbolic discounting (Laibson, 1997; Laibson et al., 1998).[6] Several studies have examined how the design of retirement programmes could improve decision-making of bounded rational agents. For instance, Madrian and Shea (2001) as well as Choi et al. (2002) find that automatic enrolment has a substantial impact on participation in savings plans. Similarly, Iyengar et al. (2004) show that an increasing amount of investment options for savings plans can lead to choice overload due to rising

[4] The framework presented in Friedman (1957) is also sometimes referred to as Life Cycle Hypothesis. See Browning and Lusardi (1996) for a short discussion on terminology.

[5] McFadden (1999) uses the term "Chicago man" based on associations with models by Becker (1993) and Lucas (1986).

[6] See Rabin (1998) and Conslik (1996) for more thorough literature reviews.

information cost. This result is confirmed by Agnew and Szykman (2005) who show that asset allocation is significantly influenced by information display and investor experience. The programme "Save more tomorrow" by Thaler and Benartzi (2004) applies many important findings from behavioural economics in order to design savings plans that substantially increase participation of employees and permanently raise savings rates of the participants. Research has also emphasized the role of information and its interactions with social learning in retirement plan decisions. Duflo and Saez (2003) evaluate evidence from a field experiment, offering individuals financial incentives to attend a retirement fair. They find that these incentives increase individuals' willingness to obtain information on retirement plans and to enrol in a programme. Interestingly, this applies to the treated individuals as well as to fellow-workers.

In summary, it has been shown repeatedly that "Man" has trouble handling information and forming perceptions consistently (McFadden, 1999, p. 79). Moreover, there is growing evidence suggesting that savings and long-term planning behaviour depend on financial skills, and on the design of savings programmes which affect the decision costs of bounded rational decision makers. These findings are the starting point for my dissertation, where I ask the following questions: Why are some individuals more able to process pension information than others are? How do individuals gather relevant pension information? What drives pension awareness? What are the possible consequences of wrong information?

The first two papers of the dissertation deal directly with individuals' ability to make financial decisions. The focus on the first paper lies on financial literacy. It discusses how the institutional framework can influence the incentives to invest in financial knowledge by comparing levels of financial literacy in East and West Germany. In the second paper, I concentrate on the role of family background in financial decision-making. I find strong correlations in Riester ownership between siblings, which could be a sign for information sharing among members of one family. However, these correlations could also result from a simple rule of thumb to mimic the behaviour of siblings. In fact, individuals might be tempted to mimic peers with higher means or more knowledge without having the means or knowledge themselves (Georgarakos et al., 2012). Consequently, in the third paper, I turn my attention to the possible consequences of people making their decisions based on wrong or incomplete information. The paper shows that

households expecting to rely on means-tested social security in the old age ("Grundsicherung im Alter") exhibit different savings and labour market behaviour compared to households who do not have this expectation. However, many households seem to misjudge their future eligibility. Wrong or incomplete information entail the risk of saving too little for retirement using all three pension pillars. While the second paper focuses on private pension, I turn my attention to occupational pensions in the fifth paper of the dissertation. The empirical analysis of occupational pensions is complicated by the fact that pension outcomes are determined as the joint product of employees' and employers' decisions. Thus, information on the employer becomes necessary which is typically not included in household surveys. Therefore, the fourth paper of the dissertation is different. It presents a new, multiple-linked data set that combines survey information with administrative records stored at the Federal Employment Agency. In order to link these data sources, the informed consent of the respondent is required. As the willingness to provide consent is not universal, bias might be introduced if individuals who consent differ systematically from those who do not. It is important to understand the patterns of consent as the multiple-linked data set provides the necessary empirical platform for the fifth and final paper of my dissertation. The paper analyses the determinants of access to occupational pensions as perceived by workers. Despite the fact that German workers have the legal right to occupational pensions, many are not aware of their access. Understanding the channels which lead to low pension awareness is important for policy makers in order to correct for erroneous perceptions.

All papers consist of an empirical analysis, which requires high quality data. The second paper relies on data from the SOEP (*Socio-Economic Panel*). The other four papers are based on SAVE data (*Sparen und AltersVorsorgE*), a household panel with a strong focus on savings and old-age provision. I had the great opportunity to include a question on the expectation to rely on "Grundsicherung im Alter" when developing the questionnaire for SAVE 2011. The fourth and fifth papers use – in addition to the SAVE survey – supplementary information coming from administrative records. In cooperation with my colleagues at the Munich Center for the Economics of Aging (MEA), TNS Infratest and the Institute for Employment Research (IAB), we developed the consent question and managed the linkage of the data sources. The data sets are presented in the respective papers in more detail.

I cooperated with several excellent researchers. The first paper is a joint work with Tabea Bucher-Koenen. The third paper was written together with Martin Gasche. The fourth and fifth papers are co-authored with Michela Coppola.

The dissertation is structured as follows. Sections 1.1-1.5 briefly summarize each of the five respective articles. Section 1.6 draws some general conclusions based on my findings. Chapters 2-6 contain the full papers. The appendix includes additional material referred to in the text and is followed by the complete bibliography.

1.2 THE LONG SHADOW OF COMMUNISM: ON EAST-WEST GERMAN DIFFERENCES IN FINANCIAL LITERACY

Joint paper with Tabea Bucher-Koenen

Objective. This paper presents differences in financial literacy in East and West Germany. Historically, the population in the former socialist part of Germany had lower incentives to acquire financial expertise. East Germans nowadays face the same institutional environment as West Germans and thus incentives to invest are similar. Our research questions are: Is there an East-West gap in financial literacy across a variety of financial literacy measures today? Who has closed the financial literacy gap 20 years after reunification? Can the remaining differences be explained by differences in socio-economic characteristics? Do these characteristics translate differently into financial literacy between East and West Germany? And lastly, would the gap be reduced if East Germans had West German characteristics?

Methodology. In the first part of the paper, we relate the literature on financial literacy to the different institutional settings in East and West Germany before 1990. We formulate several hypotheses in which way the communist system can have a feedback on the costs and benefits of investing in financial literacy. In the second part of the paper, we provide an extensive empirical analysis. Based on data from SAVE 2009, we present financial literacy levels in the two German regions and by different socio-economic groups. In a multivariate analysis, we investigate the relationship between these socio-economic characteristics and financial literacy. We split the sample by region in order to investigate if these characteristics translate differently

into financial literacy. Finally, we conduct a Blinder-Oaxaca decomposition, assigning East Germans the characteristics of West Germans.

Main findings. We find fundamental differences between East and West Germans based on three different measures of financial literacy. East Germans know less and this is not only due to their less favourable characteristics in terms of financial literacy. We find that certain groups have mastered to close the gap. For instance, women and those who have migrated from East to West have caught up with their West German counterparts. In addition, we document different "returns" to financial literacy in the two German regions. In East Germany, there is no gender gap, and only a flat income and education gradient. The decomposition shows that most of the gap cannot be explained by observable differences, concluding that convergence in socio-economic characteristics alone will not entirely close the German East-West gap in financial knowledge.

1.3 FAMILY BACKGROUND AND THE DECISION TO PROVIDE FOR THE OLD AGE: A SIBLINGS APPROACH

Objective. The main objective of this paper is to investigate the role of family background in the decision to buy a so-called Riester pension. Families do not only shape the way we make our financial decisions through genetic and social factors, they can also be a source for cost-effective and reliable information. More specifically, in the Riester context, narrow sub-groups might be of special importance as long as scepticism towards Riester products is high.

Methodology. The first part of the paper relates the key features of the Riester legislation to existing literature on the influence of families in financial decision-making. Based on this, three main hypotheses are developed. In order to test these hypotheses empirically, I construct a sample consisting of siblings who are matched by the identification number of their mother, using data from the SOEP. The second part of the paper investigates if there is an association between family characteristics and Riester ownership by subtracting a family-fixed effect and through the inclusion of proxy variables, capturing the level of financial sophistication of parents and siblings. Adding a dynamic element to the analysis, a discrete-time hazard model is estimated which considers sequential correlations in Riester ownership between siblings over time.

Main findings. Individuals with low education and low income seem to find it difficult to make use of the Riester subsidies. Furthermore, family financial sophistication, proxied by parental education as well as ownership of private pensions in the family, has an influence on the decision to take up a Riester pension. The hazard of subscribing to such a pension significantly increased over time, with a steep increase after 2005 when simplifications to eligibility rules and product design were introduced. Sequential correlations in Riester ownership among siblings become weaker over time, which might suggest that the family as a source of cost-effective and reliable information becomes less important as the number of Riester owners in other social circles grows.

This chapter has been published in a revised version: Lamla, Bettina. 2013. "Family background and the decision to provide for old age: A siblings approach." Empirica, 40(3): 483-504. The publication is available at http://link.springer.com/article/10.1007/s10663-013-9212-4. Earlier versions are available at www.mea.mpisoc.mpg.de and www.diw.de.

1.4 ERWARTETER BEZUG VON GRUNDSICHERUNG IM ALTER: VERHALTENSUNTERSCHIEDE UND FEHLEINSCHÄTZUNGEN

Joint paper with Martin Gasche

Objective. Means testing of social security helps with targeting benefits to those in need. However, it might also discourage individual savings and work effort. In Germany, social security in the old age, so called "Grundsicherung im Alter", is means-tested. In our paper, we have the following objectives: we want to quantify how many German households expect to receive "Grundsicherung im Alter", and we investigate if their socio-demographic characteristics, their savings behaviour, and labour supply differ from individuals who do not expect to rely on "Grundsicherung im Alter". Moreover, we want to see if households make their savings decisions based on wrong expectations. In a final step, we explore to what extent expectations on the financial future are correlated with financial knowledge and pessimism.

Methodology. We start with theoretical considerations on the relationship between an individual's expectation of having to rely on means-tested social security in the future and this

person's current savings and labour supply. In the empirical part of the paper, we use data from the SAVE survey. We divide our sample into two groups, based on their self-assessed probability to receive "Grundsicherung im Alter" in the future, in order to perform an extensive descriptive analysis. As to identify households that are likely to misjudge their eligibility, we exploit past survey answers on public pension entitlements.

Main findings. We find that 38% of German households believe that they are very likely to be dependent on "Grundsicherung im Alter" in the future. Those households differ significantly in their socio-economic characteristics from households who do not expect to be dependent on this particular programme. We further observe that the two groups exhibit a different savings and labour market behaviour. Our analysis suggests that half of the households expecting to receive "Grundsicherung im Alter" misjudge their eligibility as they have already accumulated enough public pension rights today to place them above the threshold of the means test. We further show that differences between the two groups exist with respect to their knowledge about the pension system as well as the degree of pessimism that might favour wrong expectations.

This chapter is forthcoming: Lamla, Bettina and Martin Gasche. 2014. "Erwarteter Bezug von Grundsicherung im Alter. Verhaltensunterschiede und Fehleinschätzungen." Schmollers Jahrbuch (forthcoming). An earlier version is available at www.mea.mpisoc.mpg.de.

1.5 PLEASE SIGN HERE: ASKING FOR CONSENT WITHOUT INTERVIEWERS

Joint paper with Michela Coppola

Objective. In order to link survey data with administrative records, the informed consent of the respondent is needed. While there is a large and growing string of literature studying the consent decision in interviewer-based surveys, no evidence exists for self-administered surveys in social sciences. This study fills this gap using data from the SAVE survey. In SAVE 2011 respondents were asked for permission to link their survey responses to administrative records stored at the Federal Employment Agency. The paper has two main goals. First, we ask whether consent rates in self-administered mail surveys, such as SAVE, are comparable to interviewer-

based surveys. Secondly, we study the underlying mechanisms which lead to the consent decision.

Methodology. In the first part of this paper, we give an overview of the data, compare the consent rate in SAVE with interviewer-based surveys, and evaluate the quality of information provided on the consent form. Drawing on insights from research on selectivity in consent on interviewer-administered social surveys, the second part of the paper examines factors that affect selectivity in consent on a self-administered mail survey. We suggest an association between trust attitudes and the social environment shaping them, psychological traits as well as interview resistance and the probability of giving consent. The predicted relationships are then tested empirically using a Probit model.

Main findings. The achieved consent rate in SAVE is similar to consent rates obtained in interviewer-based surveys. We conclude that – at least in stable panels – asking for consent to data linkage in a self-administered survey is feasible. We find only mild evidence that markers for trust and psychological traits affect the consent decision. Apart from income and education, a general interview resistance are the main determinants of consent. Despite the fact that our model significantly extends the set of explanatory variables which are usually considered as relevant, we can explain only a small fraction of the total variance in the probability of giving consent. A better knowledge about the determinants of consent without the influence of interviewers will help to improve data collection in all modes. We understand our paper as a first step in this direction.

1.6 IS IT ALL ABOUT ACCESS? PERCEIVED ACCESS TO OCCUPATIONAL PENSIONS IN GERMANY

Joint paper with Michela Coppola

Objective. This paper provides an empirical analysis of what determines access to occupational pensions as perceived by workers. We investigate this issue in Germany, where workers have the legal right to an occupational pension since 2001, but many might lack the incentive or the ability to gather and process the relevant information to make use of their right. In particular, if

workers rely exclusively on the information available at their firm, employers will continue to regulate access despite workers' rights.

Methodology. We start with presenting the key features of occupational pensions in Germany, and we discuss the role of perceived access to occupational pensions in the participation decision. We propose a simple conceptual framework which explains perceived access of workers by three elements: worker characteristics, outcomes of the employer-employee match as well as characteristics of the firm the worker is employed at. Within our framework, we propose several hypotheses, which we test in an empirical model. The analysis relies on an innovative linked employer-employee data set for which we combine survey answers from SAVE 2011 to administrative records on workers and firms.

Main findings. Our finding suggests that the current regulation in Germany has not resolved the problem of workers' ignorance of their access to occupational pensions. Only about half the workers are aware of having access to an occupational pension. We find that there is important heterogeneity in workers' perceptions, and that this heterogeneity is directly related to worker and firm-side factors as well as outcomes of the employer-employee match. Distorted perceptions have important consequences for workers, policy makers and firms. Workers can only make optimal savings decisions if they are aware of their savings possibilities. Policy makers could help by making information material about occupational pensions mandatory and/or by defining standardised information. A low level of knowledge of employees might also be frustrating for employers, as this would suggest that workers do not appreciate their occupational pension, limiting the power of occupational pension as a Human Resources tool.

1.7 GENERAL CONCLUSIONS

"Economic man" is an "endangered species" (McFadden, 1999, p. 99).[7] In real life settings, individuals are unlikely to form rational perceptions, to have rational preferences, and to process information in a rational fashion. If individuals are limited in their rationality when perceiving information, they cannot make optimal savings decisions. In extreme cases, preferences, even if they are rational, become irrelevant as perceptions determine savings decisions (Chan and Stevens, 2008; McFadden, 1999). Consequently, the focus of my

[7] The actual quote from McFadden (1999, p.99) is "Chicago man is an endangered species".

dissertation lies on how people gather and process pension information. While this dissertation uses data from Germany, many of the conclusions are applicable to other countries, in particular to those with voluntary private pensions. An important policy implication is that, while many pension systems have transferred much more responsibility for financial security during retirement to individuals, it is important to develop strategies which increase pension knowledge and awareness, especially in the vulnerable groups of the population. However, as predicted in a theoretical model by Lusardi et al. (2013), educational programmes are not likely to produce large behavioural changes for the least educated. Their consumption needs might be better insured by transfer programmes such as “Grundsicherung im Alter” in Germany.

The retreat of “Economic man” in favour for “Man” also has important implications for modern data collection. Behavioural models are much richer than models assuming fully rational decision makers. Consequently, such models are harder to identify and they require more refined data for identification. Coppola and Lamla (2012, p. 1) propose that the ideal data set would observe on the micro level a reliable and comprehensive measure of wealth, the complete employment history of the respondent, coupled with information about the employers and on the household context. It would collect parameters measuring the concepts of self-control, patience and time preferences, and – due the long adaptation process to changing economic circumstances – the data would be longitudinal. My dissertation uses some of the available German data sources in order to improve the scant empirical evidence on the link between information, institutions, savings behaviour and old-age provision.

2. THE LONG SHADOW OF COMMUNISM: ON EAST-WEST GERMAN DIFFERENCES IN FINANCIAL LITERACY

2.1 INTRODUCTION

The radical changes in the public pension systems in the last decades, the gradual shift of pension plans from defined-benefit towards defined-contribution as well as the recent economic and financial crises, require individuals to master increasingly difficult financial decisions. Consequently, the improvement of financial literacy has evolved to an important policy goal in recent years (Lusardi, 2008; Lusardi and Mitchell, 2013). Existing research has established a strong link between financial literacy and financial decision-making. Financial literacy has been connected to wealth accumulation (e.g. Lusardi and Mitchell, 2007; Lusardi and Mitchell, 2008; van Rooij et al., 2012), retirement planning (e.g. Lusardi and Mitchell, 2007; Lusardi and Mitchell, 2011b; Bucher-Koenen and Lusardi, 2011), and investment behaviour (e.g. Bucher-Koenen and Ziegelmeyer, 2013; van Rooij et al., 2011b). At the same time, literature determining how people acquire financial literacy is limited. Some recent theoretical contributions model the acquisition of financial literacy as a human capital accumulation process (e.g. Delavande et al., 2008; Lusardi et al., 2013). So far, there is a lack of empirical contributions that show how financial literacy accumulation develops in the general population. A first step in this direction is a cross-country study by Jappelli (2010) who finds that the institutional framework and financial market development matter for the level of financial sophistication. In particular, the author shows that in former socialist countries, levels of financial literacy are lower on average.

Usually, institutional determinants of financial market deepening change slowly over time (Jappelli, 2010) so that people can gradually adapt their efforts of financial literacy acquisition. The German case is different: after 41 years of communism in East Germany, reunification of the two German regions occurred rather unexpectedly, changing the institutional setting for East Germans from one day to another. Thus, we are provided with a large-scale natural experiment that allows us to study differences in financial literacy which persist until today –

around 20 years after the "shock" of reunification. In this way, we hope to draw inferences about the accumulation of financial literacy and factors promoting or hindering the accumulation process.

In a previous study, Bucher-Koenen and Lusardi (2011) find fundamental differences in financial literacy between East and West Germans based on three questions of financial literacy. On average, East Germans appear to have lower levels of financial knowledge. We extend their analysis in various dimensions and address the following research questions: First, we would like to know if there are still East-West differences in financial literacy when using a broader set of financial literacy questions. Different financial literacy measures might grasp different aspects of financial knowledge and therefore reduce or widen the gap. Second, some groups in East Germany might have characteristics that allow them to close the gap in financial literacy quickly. Therefore, we examine if the difference in financial literacy between East and West Germany is uniform for all socio-demographic groups. Third, more than two decades after the German reunification, there are still fundamental discrepancies in economic well-being as well as preference parameters between East and West Germany. In particular, average levels of income and wealth are lower in East compared to West Germany (Fuchs-Schündeln et al., 2010). Consequently, we investigate to what extent these persisting differences in socio-economic characteristics and preferences between the two German regions can account for differences in financial literacy which are observed today. For historic reasons, East Germans had lower incentives to invest in financial literacy. This might imply that some characteristics (e.g. income, years of education) translate differently into financial literacy in East Germany compared to West Germany. In a fourth step, we estimate separate regressions of financial literacy for East and West Germany to understand if the "returns" to financial literacy are equal in the two regions. We combine the results from the third and fourth step by conducting a thought experiment which asks: What would happen to the East-West difference in financial literacy if East Germans had the characteristics of West Germans? In other words, we want to know how much of the difference in financial literacy between East and West Germany can be attributed to differences in observable characteristics, and which fraction remains unexplained. This exercise is informative along several lines: it shows if East Germans can close the gap when

convergence of socio-economic characteristics is reached. If the gap cannot be closed by assigning West German attributes to East Germans, this has two implications. The first implication for financial literacy theory is that not all elements contained in models so far are sufficient for explaning the variation of financial literacy observed between East and West Germany. Other mechanisms are at play which contribute to the accumulation of financial literacy and therefore should be investigated. The second implication is political. If the level of financial literacy is not even similar after reaching convergence on other levels, more effort might be necessary in terms of financial literacy education to avoid permanently lower levels of financial literacy in East Germany and its effect on financial decision-making.

Our main results are: there is evidence for a significant financial literacy gap between East and West Germany using three different measures. While some groups, for instance women and those who have migrated from the East to the West, have mastered to catch up with their West German peers, others did not. Differences in financial literacy are present across all educational groups and at the top as well as the bottom of the income distribution. Existing differences in socio-economic characteristics cannot explain the gap in financial knowledge. Our evidence indicates that this might be due to the fact that characteristics translate differently into financial literacy between the two German regions. Most importantly, we do not find a gender gap in East Germany and we find relatively flat education and income gradients in financial literacy. The decomposition of the financial literacy gap reveals that it remains largely unexplained by our empirical models, which take account of the factors commonly integrated in financial literacy theory and which have been analysed in the empirical literature so far. Differences in values and attitudes between East and West Germans might be relevant for the accumulation of financial knowledge and extending the literature in this direction might contribute to our understanding of financial literacy acquisition in the future.

The paper is structured in the following way: in section 2.2, we provide a literature overview, and we formulate our hypotheses. Section 2.3 explains the data set and variables. Results are presented in section 2.4 and discussed in section 2.5. We conclude in section 2.6.

2.2 LITERATURE AND HYPOTHESES

2.2.1 FINANCIAL LITERACY AND FINANCIAL DECISION-MAKING

The literature measuring financial literacy and examining the empirical link between financial literacy and financial decision-making has grown rapidly in recent years.[8] The first central empirical finding is that financial literacy is not widespread. Most studies measure financial knowledge based on quiz-like questions and self-evaluations in the United States (e.g. Bernheim, 1995, 1998; Lusardi and Mitchell, 2007, 2011b). Studies from other countries, such as the Netherlands (van Rooij et al. 2011a) or Germany (Bucher-Koenen and Lusardi, 2011), draw similar conclusions: on average levels of financial literacy low.

The second general finding is that financial literacy influences financial decisions. Those with low levels of financial literacy have difficulties with financial planning, in particular planning for retirement (e.g. Lusardi and Mitchell, 2007, 2011b; Bucher-Koenen and Lusardi, 2011). Furthermore, they accumulate lower levels of wealth and thus are facing lower levels of assets when they retire (e.g. Lusardi and Mitchell, 2007; van Rooij et al., 2012). Less financially savvy persons also face difficulties when making investment decisions. They are less likely to invest in the stock market (e.g. Christiansen et al., 2008; Christelis et al., 2010; van Rooij et al., 2011b), less likely to diversify their assets (e.g. Guiso and Jappelli, 2008; von Gaudecker, 2011), and they are more likely to have incurred substantial financial losses during the recent financial crisis (Bucher-Koenen and Ziegelmeyer 2013). Furthermore, financially illiterate households are more financially fragile and faced with higher levels of (high-cost) debt (e.g. Jappelli et al., 2013; Lusardi and Tufano, 2009). At the country level, LoPrete (2013) finds that higher financial literacy is related to a reduction of income inequality.

Some literature on the acquisition of financial literacy has been established. Most of the recent empirical studies fall into two categories: those describing sub-groups among the population with higher or lower levels of knowledge and those providing evidence of financial education interventions. The first group of studies is purely descriptive. Findings are, for example, that

[8] See Lusardi and Mitchell (2013; 2011a) for an overview of financial literacy around the world using a unified measure of financial sophistication and the papers in the special issue of the Journal of Pensions Economics and Finance (Vol. 104, 2011) as well as a recent extension of country comparisions in Numeracy (Vol. 6, 2013).

women, people with low income, and those with low education tend to be less financially literate. Moreover, young and old individuals tend to be less financially savvy. In these studies, however, no answers are given on why those groups have lower levels of financial literacy compared to others. The second group of studies examines the effects of financial education programmes at school and at the work place as well as programmes targeting specific groups at risk of low literacy. Lusardi and Mitchell (2013) provide an extensive discussion of this literature and its limitations: apart from flaws in the experimental designs, the central point of critique is that many of the studies lack theoretical models and clear hypotheses about who should or should not invest in financial literacy. Most of the time, these evaluation studies only measure the short-term effects of very specific interventions and do not allow for an examination of the long-term outcomes and behavioural changes. Therefore, it seems crucial to look for more natural contexts in which the accumulation of financial literacy can be studied so that inferences about the process can be made.

Compared to the extensive empirical literature, theoretical contributions on financial literacy are rather limited. Peress (2004) provides a purely static model in which available resources and investment experience drive information acquisition. Monticone (2010) adapts this model to the context of financial literacy and wealth accumulation. Dynamic human capital models of financial literacy accumulation are set up by Delavande et al. (2008), Jappelli and Padula (2013), and Lusardi et al. (2013). In these frameworks, financial literacy enables the realisation of higher returns, but requires time and money investments. Thus, individuals will invest in financial literacy until their marginal benefits of acquiring financial knowledge are equal to their marginal costs. While Delevande et al. (2008) and Jappelli and Padula (2013) focus on two period frameworks, Lusardi et al. (2013) model a full life-cycle model with endogenous financial literacy. In their model, the need to smooth consumption at retirement simultaneously drives the savings decision (wealth accumulation) and investment in financial knowledge. There are several key insights from these models. First, there might be individuals for whom it is optimal not to invest in financial literacy. Second, the institutional context matters for investments in financial literacy. Specifically, in model from Lusardi et al. (2013), the prediction is that the greater the gap between income from work and income from retirement, the greater the need

for consumption smoothing, and thus the greater the incentive to acquire relevant knowledge. This is in line with the empirical observation by Jappelli (2010) who shows that financial literacy is higher in countries with less generous social security systems and more resources available for private wealth accumulation. This insight is crucial for the derivation of our hypotheses in the following section.

2.2.2 HYPOTHESES: FINANCIAL LITERACY AND THE INSTITUTIONAL BACKGROUND

From 1945 to 1990, Germany was divided into two parts: the market-based Federal Republic of Germany (West Germany) and the communist German Democratic Republic (GDR) (East Germany). The reunification occurred rather unexpectedly in October 1990. A series of policy reforms followed the reunification.[9] West German institutions were adopted in East Germany, such as the West German pay-as-you-go social security and unemployment insurance (Börsch-Supan and Schmidt, 2001).

A series of institutional factors influencing the costs and benefits of investing in financial literacy were different in East Germany under the socialist system in comparison to West Germany. Most importantly, incentives to invest in financial literacy in order to smooth consumption were negligible during communism. Due to the egalitarian doctrine of the socialist system, the income path was predictable as wages were set centrally and unemployment did not exist (Kohn and Antonczyk, 2013). Consequently, income variations were small in all occupations (Fuchs-Schündeln and Schündeln, 2005). In addition, labour market experience accumulated under the communist system was not rewarded (Hauser et al., 1994) as age-earnings as well as experience-earnings-profiles were quite flat (Kohn and Antonczyk, 2013). In addition, East Germans did not have access to securities under the communist system. Consequently, they had limited possibilities to acquire investment experiences (Sauter 2009) and did not need to invest in financial literacy. Both aspects contribute to the insight that levels of financial literacy were very low among East Germans shortly after the reunification. However, incentives to invest in financial literacy were introduced with the implementation of West German institutions,

[9] See Sinn and Sinn (1992) and Hauser et al. (1994) for an overview of the reform process.

unification of the monetary system and introduction of free markets for labour and consumption goods. The question of interest is how levels of financial literacy have evolved ever since.

We have reasons to expect that even today, East Germans have lower levels of financial literacy compared to their West German counterparts. While massive transfers from the West to the East followed the reunification, economic conditions did not fully converge until today (Fuchs-Schündeln et al., 2010), which might create different incentives to invest in financial literacy. For instance, East Germans have lower wealth levels (Bundesbank, 2013), earn less and have more discontinuous working lives (Geyer and Steiner, 2010). In addition, Sauter (2009) observes that participation rates in the security markets in East Germany are still lower than in West Germany. He argues that habit persistence can explain this behaviour: if East Germans have always used savings accounts as their most important savings vehicle, they might just continue to follow this pattern even when the security market is available to them. Finally, social learning has been shown to be an important tool for improving financial literacy (Lusardi, 2003). With the transition from a communist to a market-based regime, however, social learning from peers was limited for East Germans as the institutions were new to everyone. For these reasons, our first hypothesis reads as follows:

H1: We expect lower levels of financial literacy in East compared to West Germany, even more than 20 years after the reunification.

Zooming in on financial literacy among specific socio-economic groups, we are particularly interested in the question, who among East Germans was able to close the gap in financial literacy after 20 years. Since not all individuals have the same incentives to invest in financial literacy, some groups might be quicker in accumulating knowledge than others. In other words, the returns to financial literacy investments are not uniform in the population and this should be reflected when comparing financial literacy levels among sub-groups. According to Lusardi et al. (2013), individuals with higher income and education have higher incentives to invest in

financial literacy because their income profile is steeper and their consumption drop at retirement tends to be larger. Therefore,

H2a: We expect those with high income and education to be quicker in closing the gap in financial literacy.

Moreover, exposure to communism might matter. We expect that older cohorts, who were exposed to socialism for a longer time, have more difficulties in acquiring financial literacy compared to the young. Consequently, we formulate the following hypothesis:

H2b: We expect younger East Germans to have similar levels of financial literacy compared to their West German peers.

With the introduction of the new institutional settings, East Germans had to adapt to the new incentives. Due to their psychological predisposition, some individuals might be more prone to stick to their habits and learned behaviour while others might be more open to the new environment. We propose that

H2c: Less habit persistent individuals are more likely to close the gap in financial literacy.

In addition, there was extensive migration from East to West Germany in the years after reunification. Between 1991 and 2006, net East-West migration amounted to 1.45 million people, with gross flows of 2.45 million migrating from East to West Germany (Fuchs-Schündeln et al., 2010). Migrants are considered a self-selected group (Fuchs-Schündeln and Schündeln, 2005). In particular, younger people and people with higher education were more likely to move from East to West Germany, which potentially led to a brain drain (Arntz, 2010). Bucher-Koenen and Lusardi (2011) find that individuals who migrated from East to West Germany have higher financial knowledge compared to those who have stayed in the former GDR based on three financial literacy questions. These individuals might be more likely to have closed the gap in

financial literacy for various reasons. First, they have more favourable characteristics (age, education, income) for acquiring financial literacy. Second, they might have learned from their West German peers, and third, they might be more open to changes.

H2d: We expect that East Germans who migrated to the West of Germany have similar levels of financial literacy as their West German peers.

The previous hypotheses describe the existing gap in financial literacy between East and West Germans in total and for specific groups. The following hypotheses will go one step further and focus on how the gap can be explained by differences in background characteristics. Socio-economic characteristics have been found to correlate with financial literacy.[10] 20 years after reunification, there are still fundamental differences in economic circumstances which might be related to the East-West differences in financial literacy. Therefore, we would like to know, how much of the difference in financial literacy can be explained by differences in socio-economic characteristics. We expect that

H3a: Once we control for socio-economic parameters, the East-West gap in financial literacy becomes smaller (composition effect I).

The division of Germany has also created differences in values and attitudes, which might be related to differences in financial knowledge. A recent string of literature has shown that communism has affected individuals' preferences with long-lasting effects (e.g. Alesina and Fuchs-Schündeln, 2007). In the context of financial literacy, investment risk preferences play a crucial role. Jappelli and Padula (2013) argue that risk averse individuals are less interested in investing in risky assets and are therefore less likely to invest in specific financial knowledge. The evidence on risk preferences in East and West Germany is mixed. East Germans are found to be less risk averse by Heineck and Süßmuth (2013) and Bonin et al. (2009). However, Heineck

[10] See Bucher-Koenen and Lusardi (2011) for results on Germany.

and Süssmuth (2013) find that risk preferences mostly converged in recent years. We hypothesize that

H3b: Once we control for preferences (in particular risk preferences), the East-West gap in financial literacy becomes smaller (composition effect II).

Lastly, we propose two hypotheses on the different gradients in financial literacy in East and West Germany. One widely found result is that women tend to have lower levels of financial literacy compared to men (Bucher-Koenen et al., 2012). The driving forces behind the gender difference in financial literacy are not well understood. Comparing the gender gap in the former GDR with the gender gap in West Germany might give additional insights. Ex ante, it is unclear whether or not to expect a gender difference in financial literacy in East Germany. On the one hand, female labour force participation was very high in the GDR. Before the collapse of the communist system, more than 80% of working-age women participated in the labour market (Bonin and Euwals, 2002). After the reunification, participation levels in East Germany declined, but did not completely converge (Geyer and Steiner, 2010). Since East German women are more likely to earn and manage their own income, they might have the same or even higher financial literacy levels compared to West German women and might not be lagging behind East German men. These finding might suggest that

H4a: There is no gender gap in financial literacy in East Germany.

On the other hand, Bonin and Euwals (2002) find that preferences in labour market participation largely explain the East-West gap in participation rates of women, and that East German women adjust their preferences to West German women. Furthermore, patriarchal stereotypes were customary under the communist system (Kohn and Antonczyk, 2013). In particular, women selected themselves into occupations which provided good opportunities to raise a family (Kohn and Antonczyk, 2013). If women in the East were less often responsible for

the household's finances despite their higher labour force participation, there might be a gender gap after all. Consequently, we might also expect that

H4b: There is a gender gap in financial literacy in East Germany.

Moreover, the effects of education might be different in East and West Germany due to differences in the educational system. In the GDR, every student had to attend a so-called polytechnical secondary school (POS) which had a strong focus on the German language, mathematical skills, and natural sciences. Schooling in East Germany was compulsory until the age of 17 (Geißler and Wiegmann, 1995). Furthermore, obtaining a university degree was highly regulated. Only a certain quota of students was allowed to obtain a high school degree and attend university. Additionally, membership in the official GDR youth organization, political views as well as family background were important determinants for a university degree (Fuchs-Schündeln and Schündeln, 2005). In West Germany, the compulsory schooling age varied across states and over time (Pischke and von Wachter, 2008). Most importantly, children in West Germany followed different educational tracks after completing primary education at age 10. The choice of the secondary track used to depend on teachers' recommendations, which might have led to a strong relation to the children's performance in primary school. Moreover, it has been shown that parents' socio-economic status is strongly related to the secondary track the child follows as well as subsequent educational achievements (Dustmann, 2004). Riphahn and Schieferdecker (2010) show that even today the role of parental income for transition to tertiary education is more pronounced in the West in comparison to the East of Germany. Since education was uniform and less performance related in the GDR, we expect the educational gradient in East Germany to be less steep compared to West Germany. Our final hypothesis states that

H4c: The East German educational gradient in financial literacy is less steep compared to West Germany.

In the next section, we will present the data and the sample which we will use to test our hypotheses.

2.3 DATA AND SAMPLE

2.3.1 THE SAVE STUDY

The analysis is based on the German SAVE study, a representative survey of households' financial behaviour with a special focus on savings and old-age provision.[11] The person living in the household who knows most about the household's finances, answers all the questions in the survey. Measures of financial literacy as well as socio-demographic characteristics reported in this paper refer to this person. Information on the financial situation, in particular on income and wealth, refers to the household as a unit.

Our analysis is based on data from SAVE 2009, which includes the broadest set of questions on financial literacy. We drop all observations for which one or more answers on the financial literacy task are missing (see section 2.3.2). Moreover, we drop observations if information on the educational attainment remains unspecified. Missing values for all other variables are imputed using a multiple imputation procedure based on a Markov Chain Monte Carlo simulation (Schunk 2008; Ziegelmeyer 2009, 2013).[12] Thus, we are left with 973 observations in total: 353 (36%) of the respondents currently live in East Germany and 620 (64%) live in West Germany.

Sample specific weights with respect to age and income are constructed based on the German Microcensus. They are used for the descriptive analysis. Regressions reported in the paper are not weighted. Appendix A.1 displays the construction of all variables and appendix A.2 contains summary statistics for respondents in East and West Germany.

[11] SAVE was initiated in 2001 by the Mannheim Research Institute (since 2011 Munich Center) for the Economics of Aging (MEA) and is run on an annual base since 2005. The following analysis will focus on a Random Sample which was drawn from the community-based population registers in a multistage procedure.

[12] Results in the paper are based on the first of five implicates. Our results do not change when using the alternative data sets (imputation 2 to 5). Additional analyses can be obtained upon request.

2.3.2 MEASURING FINANCIAL LITERACY

There are various ways to define and measure financial literacy. Lusardi and Mitchell (2011a) develop three quiz-like questions in order to measure objective – as opposed to subjective or self-assessed – financial literacy. The questions cover the understanding of inflation, interest rates as well as risk diversification. They have been added to a series of surveys around the world and allow for an international comparison of financial literacy. The focus of these questions is on measuring actual knowledge rather than decision-making skills or financial experience (Bucher-Koenen, 2011). A larger set of up to 21 financial literacy questions has been used in the Dutch Household Panel (van Rooij et al., 2011a) as well as the RAND American Life Panel (Lusardi and Mitchell, 2007). A subset of these questions was also added to the SAVE survey.[13] Appendix A.4 reports the answering behaviour for eight of the questions for the complete sample (including respondents with missing answers), and separated by region.[14] As mentioned previously, we drop respondents with at least one missing answer on the financial literacy tasks for the following analyses. Therefore, our sample is reduced from 1,076 to 973 observations.[15]

Van Rooij et al. (2011a) conduct a factor analysis to categorize the questions and aggregate them into measures of basic and advanced financial literacy. We follow this categorization and aggregate the answers from the eight questions into three different measures of financial literacy, which have been used in the literature before. The “three questions task” contains the interest, the inflation and the risk question. It is the measure previously used by the Flat World (Financial Literacy around the world) project. We construct a dummy variable which takes the value 1 if all three questions are answered correctly and 0 otherwise. Additionally, we construct a dummy for “basic financial literacy” if all four questions labelled as “basic” by van Rooij et al. (2011a) are answered correctly and a dummy for “advanced financial literacy” if all four questions labelled “advanced” are answered correctly. Since the three questions are part of the

[13] The wording of all questions is reported in appendix A.3.

[14] The share of missing answers ranges between 2.4% and 4.0% for each of the eight questions. The overall share of observations with missing answers is not significantly different between respondents in West and East Germany.

[15] As a robustness check we treated missing values as a zero in the financial literacy indicators. This does not affect our results. Additional analyses are available upon request.

other two measures, there is some overlap. We choose this approach to be comparable to previous results presented by Bucher-Koenen and Lusardi (2011).

2.4 EMPIRICAL EVIDENCE

This chapter presents our empirical findings. Section 2.4.1 answers if there is an East-West gap in financial literacy using a broad set of financial literacy questions. In section 2.4.2, we examine financial literacy by socio-economic groups in West and East Germany, analysing which groups have mastered to close the financial literacy gap. Section 2.4.3 investigates if we can explain the East-West gap in financial literacy by differences in socio-economic characteristics and preference parameters. In section 2.4.4, we consider different returns to financial literacy in East and West Germany. We combine the composition and the return effects in section 2.4.5: we conduct a Blinder-Oaxaca decomposition which is equivalent to a thought experiment asking: What would happen if East Germans had the same characteristics as West Germans?

2.4.1 THE GERMAN EAST-WEST GAP IN FINANCIAL LITERACY

Irrespective of the measure, West Germans are on average more financially literate than East Germans (table 1). The raw gap ranges between 11 and 13 percentage points.[16] Specifically in the three-question task, 58% of the West Germans and 45% of the East Germans are classified as financially literate. The basic financial literacy questions are correctly answered by 43% of the West German sample and by 32% of the East Germans. Questions on advanced financial literacy appear to be particularly difficult. They are answered correctly by 33% of the West and 19% of the East Germans. All differences are statistically significant. Summing up, we find robust evidence in support of our first hypothesis. Even 20 years after the reunification, there is a gap in financial knowledge between East and West Germany.[17]

[16] As a robustness check, we have excluded potential migrants from East to West and West to East as well as young East Germans who did not complete their education in the GDR (168 observations) from our analysis. We find that the East-West gap decreases to 4 to 9 percentage points, but remains highly significant for all three measures of financial literacy.

[17] Throughout the paper, we will only consider mean differences. Results might change in the tails of the financial literacy distribution.

Table 1: Financial literacy in West and East Germany

	All	West	East	West vs. East
3 Questions	54%	58%	45%	***
Basic financial literacy	39%	43%	32%	***
Advanced financial literacy	28%	33%	19%	***
N	973	620	353	-

Source: SAVE 2009. Own calculations.

Notes: Stars indicate significant differences based on a one-sided t- test. H_0: West-East>0. * p<0.1; ** p<0.05; ***p<0.01. Data is weighted.

2.4.2 WHO CLOSED THE GAP?

There are various reasons to assume that the differences in financial literacy between East and West Germany are not uniform across socio-economic groups. Our hypotheses state that those with higher education and income, younger individuals, those who characterize themselves as being open to change, individuals who migrated from East to West Germany, and women should be better in closing the gap to their West German peers. In table 2, we report mean levels of financial literacy by region and socio-demographic group. We also indicate if differences between East and West Germany are significant. Some of the comparisons have to be treated with care since the cells contain very small numbers of observations.

Education. In hypothesis 2a, we propose that those with high levels of income and education in East Germany are more likely to have similar levels of financial literacy compared to their West German counterparts. However, table 2 shows significant differences in financial literacy between East and West Germany for all levels of education. Contrary to our hypothesis, the differences in financial literacy between East and West Germany are particularly high for respondents with a university degree. Thus, education alone does not seem to help individuals to accumulate financial knowledge.

Income. Comparing levels of financial literacy by income quartiles in East and West Germany reveals that the levels of financial knowledge are very similar in the middle of the income distribution. However, we find substantial differences in the tails. There is a large and significant gap in financial literacy between East and West Germany at the bottom of the income distribution for the three question task as well as for advanced financial literacy. At the top of

the income distribution, the East-West gap is present for all three financial literacy measures, which again is in contrast to our initial hypothesis.

Age. The age pattern observed for basic and advanced financial literacy turns out to be as expected (hypothesis 2b). We find significantly higher financial literacy among older cohorts living in West Germany compared to older cohorts living in East Germany. The differences are much smaller and insignificant for the younger cohorts. This suggests that the East-West gap in financial literacy might close for the next generation as individuals grow up under the same regime. Interestingly, this pattern is different for the three question task, which is driven largely by differences in the percentage of young respondents answering the inflation question correctly, with young West Germans performing better than young East Germans. This does not seem surprising since there was no inflation during the GDR and very low inflation in the post-unification period for the united Germany. Thus, young East Germans have no own inflation experience.

Openness. We do not find evidence supporting hypothesis 2c, which proposes that openness to change as opposed to habit persistence might help in closing the gap. In fact, we find fundamental differences in financial literacy between East and West Germans, irrespective of their self-assessed openness to change.

Migration. Using the SAVE data, we cannot explicitly measure when individuals migrated from East to West Germany. We know, however, where individuals are currently living and whether or not they completed their education in the GDR.[18] Thus, if they completed the education in the GDR and are currently living in West Germany, we assume that those individuals are migrants. In order to test hypothesis 2d, we compare these individuals to those who completed their education in West Germany and are still living in the region. Moreover, we can compare the migrants to those who have been eduated and have stayed in the former GDR. While migrants have significantly higher levels of financial literacy according to the three questions in comparison to those who stayed in East Germany, the gap decreases in the case of basic

[18] 9% of the respondents currently living in West Germany and 69% of the respondents in East Germany indicate they went to school in the GDR. The remaining 31% East German respondents who were not educated in the GDR can be migrants from West to East Germany as well as old people who completed school before 1948 and young people who started school after the reunification.

financial literacy and it completely vanishes when considering advanced financial literacy. In addition, migrants appear to have closed the gap between them and their West German peers in the case of basic and advanced financial literacy. They perform even better in financial literacy when considering the three question task.[19] Overall, the results seem to support our hypothesis 2d.

Gender. In hypothesis 4a, we argue that women in the GDR had higher incentives to invest in financial literacy than West German women. Our results in table 2 indicate that East and West German women have indeed quite similar levels of financial literacy. The gap ranges between 2 and 7 percentage points, but it is not statistically significant. In contrast to that, West German men have higher financial literacy than East German men. The gap varies between 18 and 20 percentage points depending on the definition.

In summary, we find rather heterogeneous patterns of financial literacy levels across socio-economic groups. Contrary to our expectations, a financial literacy gap between West and East Germany persists across all educational groups, among high-income earners, and among those who describe themselves as being open to change. In support of our hypotheses, the gap disappears for younger generations, migrants, and women.

[19] We have conducted t-tests, testing whether the coefficients in the column West are different for those who have been educated in the GDR and those who have not been educated in the GDR. Only in the case of the three question task, the difference is significant.

Table 2: Financial literacy in West and East Germany by socio-economic groups

	3 Questions			Basic financial literacy			Advanced financial literacy		
variable	West	East	West vs. East	West	East	West vs. East	West	East	West vs. East
education									
low secondary degree	40%	22%	***	28%	19%	*	19%	4%	***
intermediate secondary degree	64%	48%	***	51%	33%	***	33%	24%	*
high secondary degree	82%	65%	***	57%	43%	**	55%	28%	***
no university degree	55%	40%	***	39%	29%	***	29%	18%	***
university degree	81%	64%	**	66%	44%	***	60%	25%	***
income									
income: 1st quartile	48%	31%	**	31%	27%		24%	13%	*
income: 2nd quartile	45%	46%		28%	26%		23%	16%	
income: 3rd quartile	56%	60%		45%	41%		27%	26%	
income: 4th quartile	74%	56%	**	56%	40%	**	49%	33%	**
age									
35 and younger	63%	37%	***	44%	37%		31%	19%	
36-50	66%	52%	**	43%	36%		38%	27%	*
51-65	57%	48%		43%	30%	**	37%	21%	***
66 and older	45%	40%		41%	27%	***	24%	10%	***
openness									
not open to change	56%	46%	**	43%	32%	**	32%	23%	**
open to change	60%	45%	***	43%	31%	***	33%	17%	***
migration									
educated in GDR	69%	54%	**	43%	36%		24%	24%	
not educated in GDR	57%	29%	***	43%	23%	***	33%	10%	***
gender									
men	67%	49%	***	50%	30%	***	41%	20%	***
women	49%	43%		36%	33%		24%	19%	

Source: SAVE 2009. Own calculations.

Notes: Stars indicate significant differences based on a one-sided t-test. H_0: West-East>0. * p<0.1; ** p<0.05; ***p<0.01. Data is weighted.

2.4.3 COMPOSITION EFFECTS

The gap in financial literacy between the two German regions might result simply due to the different situations of East and West German households. In order to investigate how much of the East-West differences in financial literacy can be explained by accounting for differences in characteristics, we estimate the following Linear Probability Model using Ordinary Least Squares.[20]

$$Y = \alpha + X'\beta + \gamma East + \varepsilon \text{ with } E(\varepsilon) = 0 \qquad (2.1)$$

The dependent variable *Y* is a binary variable indicating if an individual is considered financially literate. As mentioned above, we employ three different measures of financial literacy. In order to investigate composition effects, we sequentially add more covariates captured under the vector *X.* We have four different blocks of explanatory variables which have been shown to be relevant for financial literacy in the previous literature: background characteristics (age, gender, education and living in a rural area), employment characteristics (employment situation and the logarithm of income), preference parameters (risk preferences and self-assessed openness), and log financial wealth. The main variable of interest is a dummy equal to 1 if the individual is currently living in the East of Germany.

Estimation results are summarized in table 3.[21] We find that living in East Germany is negatively correlated with financial literacy. The first columns of each measure reflect the raw gap in financial literacy presented previously. It ranges from around 12 to 13 percentage points. This gap is only slightly reduced by 1 to 2 percentage points and remains statistically significant even after controlling for the full set of covariates (see last column for each measure). Neither the differences in socio-economic characteristics nor differences in selected preference parameters can explain the East-West gap in financial literacy. If at all, there is only a small composition effect, as postulated by our hypotheses 3a and 3b. All other covariates are related to financial literacy as expected. The full models including the complete set of explanatory variables account for between 13% (in the case of basic financial

[20] Since the dependent variables are binary, we also conducted Probit regressions and results are very similar. Here we focus on OLS regressions for consistency with the results of the instrumental variable regressions (appendix A.6) and decomposition (section 2.4.5). See Wooldridge (2002) and Greene (2002b) for a discussion of advantages and disadvantages of Linear Probability Models. See Farilie (2005) for an example of how to decompose non-linear models.

[21] The full regressions results are displayed in appendix A.5.

literacy) and 20% (in the case of the three question task) of the variation in the respective financial literacy measure (see appendix A.5).

We are aware that adding financial wealth as a control in our final regressions is problematic for different reasons. First, financial literacy might affect financial wealth rather than the other way around: it has been shown that those who are financially literate are able to accumulate more financial wealth (e.g. Lusardi and Mitchell, 2007). Second, omitted variable bias might occur due to missing information on cognitive ability or interest in financial topics. Third, there can be measurement error. This might bias all estimated coefficients. In order to understand the size and direction of the bias on the effect of the main variable of interest (East dummy), we have resorted to an instrumental variable strategy related to the approach taken by Monticone (2010).[22] The results are presented in appendix A.6. The main outcome is that even when we account for the endogeneity of financial wealth, the East-West gap remains almost unchanged.

Table 3: Determinants of financial literacy – Results after OLS regressions

added controls	raw gap	background characteristics	employment characteristics	preferences	financial wealth
dep. var			*3 Questions*		
East dummy	-0.115	-0.147	-0.114	-0.116	-0.100
	[0.033]***	[0.032]***	[0.033]***	[0.033]***	[0.032]***
dep. var			*Basic financial literacy*		
East dummy	-0.119	-0.156	-0.125	-0.122	-0.108
	[0.032]***	[0.032]***	[0.033]***	[0.033]***	[0.033]***
dep. var			*Advanced financial literacy*		
East dummy	-0.133	-0.151	-0.125	-0.123	-0.108
	[0.030]***	[0.029]***	[0.030]***	[0.030]***	[0.030]***

Source: SAVE 2009. Own calculations.
Notes: Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

2.4.4 FINANCIAL LITERACY IN EAST AND WEST GERMANY

For various reasons, returns to financial literacy might be different in the two German regions. We argue in section 2.2.2 that gender might be related differently in East and West Germany. Moreover, educational gradients might differ due to different educational systems

[22] To our current knowledge, there is no other study using instruments in regressions explaining the determinants of financial literacy which we could use to compare our results.

prior to reunification. The income gradient might also be different due to flatter income profiles in East Germany. Accordingly, we estimate separate equations for the East and the West German sample using the Linear Probability Model introduced in the previous section. The vector X contains the set of controls with the exception of financial wealth due to the endogeneity problems outlined above.[23]

$$Y_l = \alpha_l + X_l^{'}\beta_l + \varepsilon_l \ \textit{with} \ E(\varepsilon_l) = 0; l \in (East, West) \qquad (2.2)$$

Table 4 presents our results. The most striking difference in coefficients is that, in contrast to West Germany, we do not find a gender gap in East Germany for any of the financial literacy measures. This is in line with the arguments which led to hypothesis 4a. Women in the East of Germany were better integrated in the labour market under the communist regime and afterwards. Consequently, they had similar incentives to accumulate financial knowledge compared to East German men.

Education is correlated with financial literacy in both regions. Individuals with higher education are more likely to give correct answers to the questions included in the three question task as well as to the questions subsumed under advanced financial literacy. However, we find important differences in the way education translates into basic financial literacy between West and East Germany, supporting hypothesis 4c. While there are no differences in basic financial literacy by educational groups in East Germany, we find a strong educational gradient for the West German sample. Due to the egalitarian doctrine of the socialist system, students in the GDR received the same basic education while the West German system used performance-related measures to decide about the secondary schooling track, which might have induced different educational gradients in basic financial literacy. Educational opportunities are still different between East and West Germany (Riphahn and Schieferdecker, 2010). Even today, East German students perform better in mathematical tasks than their West German counterparts (Pant et al., 2013). Therefore, it is difficult to predict how the educational gradient will evolve in the future.

The employment status is not systematically associated with financial literacy with one exception: self-employed in the East of Germany have significantly higher advanced financial literacy in comparison to people who are not employed. Income is positively correlated with all three financial literacy measures in the Western part of Germany. In the East, however,

[23] Due to the small sample size when splitting our sample by regions, we do not present the IV estimates. Results remain similar if we include financial wealth.

income does not seem to matter for basic and advanced financial literacy. As mentioned above, the need for consumption smoothing was low under the communist regime due to low life cycle variations in income. Therefore, all income groups had similar incentives to invest in financial literacy in the East. Interestingly, we seem to find a feedback effect as indicated by the arguments which resulted in hypothesis 2a even today.

Considering preference parameters, we find that risk parameters are associated with basic financial literacy in East Germany. The direction of the effect, however, is not clear. In comparison to risk neutral respondents, both risk averse and risk seeking respondents are more likely to have basic financial literacy. In addition, risk averse respondents in the West of Germany are less likely to have advanced financial literacy while the indicator is not significant in the East German case.

Due to the low number of observations when splitting the samples, our coefficients can only be estimated quite imprecisely. Nevertheless, we find different patterns of financial literacy across individual-specific characteristics in East and West Germany. The evidence supports hypotheses 4a and 4c. Namely, there is no gender gap in financial literacy in East Germany and the educational gradient appears less steep in the East compared to the West of Germany. In order to test whether the estimated coefficients for the East German sample are equal to the estimated coefficients for the West German sample, we compute a Chow test (Chow, 1960). The test does not reject the Nullhypothesis which states that coefficients are equal for the three question task (P value 0.198). In contrast, the test suggests that we have two different sets of coefficients for West and East Germany when explaining basic (P value 0.031) as well as advanced financial literacy (P value 0.000). In the next section, we will use a decomposition in order to account for the fact that East and West Germans have different characteristics as well as different coefficients.[24]

[24] Despite the fact that the Chow test did not reject the hypothesis of equality of coefficients for the three question task, we will perform the decomposition for all three financial literacy measures to be consistent with our previous results.

Table 4: Determinants of financial literacy in West and East Germany – Results after OLS regressions

dep. var.	3 Questions		Basic financial literacy		Advanced financial literacy	
	West	East	West	East	West	East
female	-0.153	-0.065	-0.103	0.034	-0.153	-0.030
	[0.038]***	[0.051]	[0.040]***	[0.050]	[0.037]***	[0.042]
age <35	ref.	ref.	ref.	ref.	ref.	ref.
age 36-50	0.047	0.118	-0.043	-0.039	0.071	0.034
	[0.064]	[0.092]	[0.066]	[0.090]	[0.061]	[0.075]
age 51-65	-0.018	0.109	-0.010	-0.064	0.102	0.007
	[0.070]	[0.093]	[0.072]	[0.091]	[0.067]	[0.076]
age 66 +	-0.083	0.062	0.053	-0.034	-0.007	0.008
	[0.093]	[0.127]	[0.096]	[0.124]	[0.089]	[0.103]
living in rural area	0.017	-0.084	-0.029	0.021	-0.061	0.010
	[0.054]	[0.065]	[0.056]	[0.064]	[0.052]	[0.053]
low secondary degree	ref.	ref.	ref.	ref.	ref.	ref.
intermediate sec. degree	0.214	0.230	0.223	0.091	0.124	0.131
	[0.046]***	[0.068]***	[0.047]***	[0.066]	[0.044]***	[0.055]**
high secondary degree	0.345	0.383	0.210	0.138	0.264	0.219
	[0.058]***	[0.089]***	[0.060]***	[0.087]	[0.055]***	[0.073]***
university degree	0.032	0.045	0.137	0.084	0.051	-0.048
	[0.065]	[0.085]	[0.068]**	[0.083]	[0.063]	[0.069]
not employed	ref.	ref.	ref.	ref.	ref.	ref.
employed	0.040	0.064	-0.047	0.009	-0.057	0.074
	[0.059]	[0.077]	[0.061]	[0.075]	[0.056]	[0.062]
self-employed	-0.043	-0.032	-0.181	-0.113	-0.145	0.228
	[0.113]	[0.131]	[0.117]	[0.128]	[0.108]	[0.107]**
retired	0.036	0.078	-0.076	-0.077	-0.050	-0.021
	[0.081]	[0.103]	[0.084]	[0.100]	[0.077]	[0.084]
log(income)	0.058	0.088	0.087	0.057	0.066	0.034
	[0.026]**	[0.040]**	[0.026]***	[0.039]	[0.024]***	[0.032]
risk averse	0.002	0.021	-0.001	0.164	-0.113	0.039
	[0.050]	[0.070]	[0.051]	[0.068]**	[0.048]**	[0.057]
risk neutral	ref.	ref.	ref.	ref.	ref.	ref.
risk loving	-0.022	-0.034	0.047	0.264	-0.004	-0.042
	[0.074]	[0.123]	[0.076]	[0.120]**	[0.071]	[0.100]
open to change	0.028	-0.007	0.000	-0.002	0.004	-0.066
	[0.037]	[0.052]	[0.038]	[0.050]	[0.036]	[0.042]
constant	0.024	-0.487	-0.267	-0.289	-0.122	-0.180
	[0.190]	[0.288]*	[0.197]	[0.281]	[0.182]	[0.235]
R2	0.17	0.15	0.12	0.07	0.15	0.10
N	620	353	620	353	620	353

Source: SAVE 2009. Own calculations.

Notes: Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

2.4.5 DECOMPOSING THE FINANCIAL LITERACY GAP

In the next step, we will conduct a thought experiment. We decompose the mean difference in financial literacy between East and West Germany in a counterfactual manner, asking what would happen to the level of financial literacy of the East German respondents if they had the same characteristics as the West German respondents. For this purpose, we use a Blinder-Oaxaca decomposition (Jann, 2008; Blinder, 1973; Oaxaca, 1973). The basic idea is to express the difference in average financial literacy *(R)* in terms of the difference in predicted financial literacy resulting from equation 2.2:

$$R = E(Y_{East}) - E(Y_{West}) = (\alpha_{East} - \alpha_{West}) + \{E(X_{East})'\beta_{East} - E(X_{West})'\beta_{West}\} \quad (2.3)$$

In order to identify the contribution of differences in coefficients to the overall difference in financial literacy between East and West Germany, equation 2.3 can be rearranged in the following way (Jones and Kelley, 1984):

$$\begin{aligned} R = {} & (\alpha_{East} - \alpha_{West}) + E(X_{West})'(\beta_{East} - \beta_{West}) + \\ & \{E(X_{East}) - E(X_{West})\}'\beta_{West} + \{E(X_{East}) - E(X_{West})\}'(\beta_{East} - \beta_{West}) \end{aligned} \quad (2.4)$$

Following Jones and Kelley (1984), we have chosen a three-fold decomposition, as we believe that there is no unambiguous way of allocating the interaction term to either coefficients or returns.[25] Thus, we decompose the mean difference in financial literacy into a part that is explained by differences in coefficients evaluated in terms of the endowments of West Germans, including differences in intercepts ("unexplained part"), a part that is caused by differences in observable characteristics ("endowment effect") valued at the rates of return under which West German accumulate financial literacy, and an interaction term that accounts for the fact that the differences in endowments and coefficients exist at the same time.[26] The same problems as presented in the previous sections might bias the results of the decomposition. In particular, it should be noted that differences in unobservables lead to biased results which are captured in all three decomposition terms (Jones and Kelley, 1984). The presented results do not include financial wealth. However, including financial wealth in the decomposition has no effect on the results of the decomposition.

[25] Results remain the same when using a two-fold decomposition.

[26] Standard errors are computed using the delta method (Oaxaca and Ramson, 1998) as implemented in the STATA command *oaxaca* by Jann (2008).

Table 5 displays the results of the decomposition.[27] In the top panel of table 5, the mean predictions by groups and their difference are shown. In the bottom panel of the table, the mean difference in financial literacy is divided into three parts. Neither the endowment effect nor the interaction term significantly account for the gap in any of the three financial literacy measures. Almost the entire gap is attributed to the unexplained part, which subsumes the effect of differences in observable and unobservable predictors.[28] Our thought experiment shows that convergence in socio-economic characteristics alone will not close the gap in financial literacy. The division of Germany has created differences in values and attitudes which might feed differences in financial knowledge, but which are not part of our models.

Table 5: Decomposition of the financial literacy gap between East and West Germany

dep. var.	3 Questions	Basic financial literacy	Advanced financial literacy
West	0.574	0.434	0.326
	[0.020]***	[0.020]***	[0.019]***
East	0.459	0.314	0.193
	[0.027]***	[0.025]***	[0.021]***
difference	0.115	0.119	0.133
	[0.034]***	[0.032]***	[0.029]***
endowments	-0.001	-0.001	-0.005
	[0.025]	[0.022]	[0.019]
coefficients	0.114	0.121	0.118
("unexplained part")	[0.035]***	[0.035]***	[0.032]***
interaction	0.002	-0.001	0.020
	[0.027]	[0.027]	[0.025]
N	973	973	973

Source: SAVE 2009. Own calculations.
Notes: West Germans are the reference group. Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

2.5 DISCUSSION

As we conclude that convergence in socio-economic characteristics between East and West Germany will not close the gap in financial literacy, there must be other factors that differ between East and West Germans and that are simultaneously relevant for financial literacy acquisition. One example of such a difference is the willingness to take responsibility for

[27] The decomposition is sensitive to the choice of the reference group. Therefore, we display results using East Germans as the reference group in appendix A.7.
[28] This finding is robust to different model specifications.

one's own financial future. Alesina and Fuchs-Schündeln (2007) find that East Germans are more in favour of state interventions. This perception might lower the incentive to invest in financial literacy if social conditions instead of individual effort are perceived to influence individual well-being. Moreover, differences in trust might play a role. A series of papers has related trust to stock market participation (Hong et al., 2004; Gusio et al., 2004; Brown et al., 2008), showing that households that are marked by higher levels of trust are more likely to invest in stocks. Accordingly, trust could influence the likelihood to invest in financial literacy. In general, people who experienced an economic transition are found to have low levels of trust. For instance, Gächter and Herrmann (2006) find that there is a lack of trust in institutions among young Russians. Similarly, there are historic reasons why East Germans might be characterised by lower levels of trust. The East German regime undermined personal freedom with the help of the State Security Service ("Stasi"). The Stasi monitored the GDR citizens and built a network of civilian informants who were supposed to report politically incorrect behaviour (Rainer and Siedler, 2008). Due to this lack of positive experiences of cooperation, East Germans are still less inclined to see others as fair and are characterised by a high level of social distrust (Heineck and Süssmuth, 2013). Since we cannot sufficiently control for (dis)trust in our analysis, its role for the financial literacy gap remains unclear and should be examined in the future.

Furthermore, Stix (2012) argues that economic transitions affect savings behaviour. In particular, he shows that for people in former socialist countries, cash represents an important savings instrument and that cash preferences are driven by a lack of trust in banks. Indeed, Fuchs-Schündeln and Schündeln (2005) show that East Germans have different savings motives compared to West Germans. In their paper, the authors argue that precautionary savings are much more important to people living in the former GDR. Using the SAVE data, we have tested if East and West Germans declare different saving motives as important, which might in turn require different levels of financial literacy. We find significant differences in the share of respondents who save to buy a house, make large purchases, support their children, and for precautionary reasons, with West Germans assigning higher importance to all these savings motives. We do not find differences in the share of respondents that consider saving for retirement important. Resulting from their different savings motives, people in East and West Germany might continue to use financial markets differently, which should affect their incentives in a way that favours investing in

financial literacy accumulation. All these factors are likely to drive differences in financial literacy, but are very difficult to measure in a survey and are not explicitly captured by our analysis. Thus, the question of how long it will take until East Germans reach West German levels of financial literacy, has to remain unanswered.

2.6 CONCLUSION

Low levels of financial literacy in East Germany might threaten the on-going economic convergence process between the two German regions, a goal that seems politically and socially desirable. In our paper, we show that even 20 years after German reunification, there are fundamental differences in financial knowledge between East and West Germans. These differences can neither be explained by differences in socio-economic characteristics (including income, employment status and financial wealth), by different risk preferences nor by a measure for openness to change. Furthermore, we find that certain groups have mastered to close the gap in financial literacy. For instance, women and those who have migrated from East to West have caught up with their West German peers. On the other hand, a gap in financial literacy between East and West Germany persists across all educational groups, among high-income earners and those who describe themselves as being open to change. In addition, we find different patterns of financial literacy in the two German regions: in East Germany there is no gender gap and only a flat education and income gradient. Moreover, we conduct a thought experiment by assigning West German characteristics to East Germans. We find that most of the financial literacy gap cannot be explained by observable differences. Therefore, convergence in those characteristics will most likely not entirely close the gap in financial knowledge. The division of Germany has created differences in preferences which are not captured by our empirical models. In particular, there are differences in preferences for state interventions, trust, and savings motives which might nourish differences in financial literacy. Similar feedback effects have been found for other post-communist countries (e.g. Corneo and Grüner, 2002; Stix, 2012) and might help to explain the low levels of financial literacy in countries such as Russia (Klappner and Panos, 2011) or Romania (Beckmann, 2013). We conclude that common factors considered in financial literacy research so far do not seem to be sufficient to explain how convergence can be achieved. It might take a long time until former socialist countries have the same levels of financial sophistication as Western countries.

An important caveat of our study is that we have no measurement of financial literacy directly after the "shock" in the early 1990's and thus, our hypotheses are based on the assumption that financial literacy was significantly lower in East Germany compared to West Germany at the time of reunification. However, the incentives to invest in financial literacy have also changed for West Germans in recent years. The welfare state underwent major reforms in the last years, which radically changed pension systems, health care systems, and labour markets. Income and longevity risks were shifted from the state to the individuals who nowadays have to privately insure for future financial needs. That requires West Germans to adjust their savings behaviour just as much as East Germans. Since financial literacy is a crucial determinant of retirement preparation, it might be important to improve skills in East and West Germany. Our results indicate that more targeted efforts are required in West Germany while in East Germany programmes for a broader part of the population are needed to secure adequate living standards during retirement.

3. FAMILY BACKGROUND AND THE DECISION TO PROVIDE FOR THE OLD AGE: A SIBLINGS APPROACH

3.1 INTRODUCTION

The world is facing the new challenges of population ageing. To support the elderly with adequate living standards without imposing a severe burden on the young, far-reaching economic reforms have been introduced to pension systems (as well as health care systems and labour markets). These reforms have in common that they shift income risks from the state to the individual and therefore require individuals to take on greater responsibility.

In Germany, concerns are rising on the adequacy of savings after profound social reforms in 2001 and 2004.[29] Compared to a situation without reforms, the public pension level will be lower by 14.4% in 2030 (Börsch-Supan and Gasche, 2010). With the objective to promote the take-up of supplementary pensions to fill the emerging pension gap, Riester pensions were introduced in 2001. Riester pensions are state subsidised private saving plans with a (largely) annuitised payout plan. 1.4 million Riester contracts were taken up in 2001. However, after the initial high demand, uptake rates flattened in 2003 and 2004. These disappointing initial results led to a lively discussion about modifications of the law (e.g. Fehr et al., 2003) and eventually, some of them were implemented in another reform in 2005.[30] Administrative data show that after 2005 the number of new subscriptions increased steeply (see appendix B.1).

Several authors have analysed which social groups adapted their savings behaviour to the new institutional settings by buying one of these private pension plans. This follows research in the U.S. that shows that participation rates in similar plans are very heterogeneous, especially by income classes (e.g. Venti and Wise, 1990; Feenberg and Skinner 1989; Gale and Scholz 1994). Germany appears to be no exception: in general, individuals with low income and low levels of educational attainment are less likely to make use of the Riester subsidies (e.g. Coppola and Reil-Held, 2009; Börsch-Supan et al. 2008; 2012; Pfarr and

[29] See Börsch-Supan and Wilke (2004) and Wilke (2009) on the pension reform process in Germany.

[30] The reform included an easier application procedure for subsidies, a reduced number of certification criteria, a standardised minimum own contribution, improved transparency of products, and a different cost structure. See Börsch-Supan et al. (2012) for more details.

Schneider, 2011). Yet, there is a continuous increase in the uptake rate of Riester pensions among low-income households (see appendix B.2).

This paper adds to the discussion on why individuals respond differently to the subsidies by stressing the role of families. Parental education as well as experience in financial matters and attitude towards savings are strong determinants of their children's preferences and level of financial sophistication (e.g. Lusardi et al., 2010; Ashby et al., 2011). Beyond that, families can be a source of cost-effective and reliable information. While other forms of long-term savings plans (e.g. life insurances[31]) are well known by the population, Riester pensions are relatively new and their financial advantages might be hard to grasp. Given the public debate on the opacity of the cost structure of Riester contracts (Hagen and Reisch, 2010; Gasche et al., 2013), reliable information from a trusted person might be of particular importance in overcoming possible entry barriers to the Riester market. More specifically, the contribution investigates whether there is an association between family characteristics and Riester ownership by subtracting a family-fixed effect and through the inclusion of proxy variables capturing the level of financial sophistication of parents and of siblings. Furthermore, the paper considers the sequence of Riester market entry of siblings and investigates if intragenerational correlations in Riester ownership change over time.

The paper is organized as follows. Section 3.2 presents some key features of Riester pensions and gives an overview of the relevant literature regarding the importance of families in financial decision-making. Based on the existing literature, three main hypotheses are formulated. Section 3.3 describes the identification strategy, including the data and sample used as well as the model specifications. Estimation results are reported in section 3.4 and section 3.5 concludes.

3.2 RELATED LITERATURE AND HYPOTHESES

3.2.1 RIESTER PENSIONS: THE KEY FEATURES

Retirement savings decisions are complex. Individuals are confronted with the complicated task of finding out how much to save and which financial instruments to choose. In contrast to the traditional economic perspective, this is not realised easily: individuals incur costs of

[31] Sauter and Winter (2010) analyse the importance of tax incentives for the take-up of life insurances.

processing information (when making the original decision) and self-control (when adhering to it). The design of Riester products can add to this complexity.

To start with, subsidies are bound to eligibility criteria. Basically everyone who is affected by the decreasing statutory pensions is eligible for subsidies, yet the concrete eligibility rules are rather complicated (Börsch-Supan et al., 2012). A distinction is made between direct and indirect eligibility. Directly eligible are employees paying mandatory contributions to social insurance, unemployed and recipients of other wage compensation benefits, self-employed who are mandatory members of the public pension system, farmers as well as civil servants. Indirect eligibility is derived from eligibility of the spouse. Coppola and Gasche (2011) demonstrate that especially low-income households are ignorant of their eligibility for subsidies under the Riester scheme. Moreover, the authors find that low knowledge of the pension system is associated with a higher probability to misreport the household's eligibility for the Riester subsidies.

For certified Riester products, subsidies exist in two forms: a basic benefit matching the own contribution and a tax deduction which depends on the amount contributed to the contract and the marginal tax rate of the owner of the contract. Furthermore, there is an additional subsidy for each child. Table 6 provides an overview of the state subsidies for Riester products as applicable from 2008 onwards.

Table 6: State subsidies for Riester products (as of 2008)

Min. percentage of income required to be saved to obtain full subsidies	4
Min. own contribution in € per year	60
per capita subsidy in € per year	154
subsidies for children in € per year:	
children born before 01.01.2008	185
children born 01.01.2008 and after	300
one-time bonus if the subsidized individual is younger than 25 years in €	200
Max. tax deductible amount in € per year	2,100

Source: Bucher-Koenen (2011).

The financial advantages of Riester pension plans are not immediately obvious to everyone and their quantification requires some mathematical skills (Börsch-Supan et al., 2012). Low-income individuals receive a relatively high subsidy due to the matching mechanism while higher income individuals benefit from tax deductions (Börsch-Supan and Gasche, 2010). On

average, the subsidies amount to about 45% of contributions, depending on income and number of children (see appendix B.3). While subsidies are particularly generous for low-income individuals, there is widespread misperception of the generosity of the state-subsidy in this group (Coppola and Gasche, 2011). However, individuals can only respond to incentives they know about (Chan and Stevens, 2008).

Riester pensions might not be advantageous for everyone. For instance, basic security in the old age ("Grundsicherung im Alter") is means-tested with Riester pensions being fully deductible. Thus, if an individual expects to rely on basic security in future, he will not benefit from his retirement savings (Lamla and Gasche, 2014).

When an individual wants to buy a Riester pension, he might find it difficult to decide which product to pick. Savings possibilities are diverse with more than 5,000 different certified products (Ziegelmeyer and Nick, 2013). The decision might be further impeded by the on-going public debate about opacity of the costs related to the contracts (e.g. Gasche et al., 2013). Hagen and Reisch (2010, p.5) point out that consumers are unable to assess the value of the contract – even after the subscription. Ziegelmeyer and Nick (2013) analyse the reasons behind the termination of Riester pensions. They find that in about one third of the cases miscounseling or bad products were the only cause for terminating or stopping to pay contributions in Riester contracts. This finding stresses the need for a more transparent market and a simplification in the design of Riester pensions.

To sum up, an individual has to manage a series of tasks until he can make the decision to subscribe to a Riester pension. First, he needs to identify the need to save for retirement. Then, in order to make an informed savings decision, the individual needs to gather information on other relevant pension products as well as Riester-specific information on eligibility and subsidies. Afterwards, the individual has to decide if a Riester pension suits best to his personal circumstances, and he has to pick one of the many contracts available on the market. The next section discusses to what extent families are important in this complex decision-making process.

3.2.2 HYPOTHESES: THE ROLE OF FAMILIES

Families shape the way we handle investment decisions to a large extent. Lusardi et al. (2010) examine financial literacy among the young and find that it is strongly related to socio-demographics and the mother's education which is – among other variables –

interpreted as a proxy for "family financial sophistication". The mother's educational attainment also proves to be an important determinant for thinking about retirement (Lusardi et al., 2010; Lusardi, 2003). Beyond genetic predisposition and the shared social environment during childhood (e.g. Barnea et al., 2010), social learning from family members can help improve financial decision-making. Van Rooij et al. (2011a) claim that parents are among the most important sources of advice on financial decisions. Moreover, Lusardi (2003, p.8) argues that the knowledge and experience of family members can reduce the "search and psychological costs of planning". She shows empirically that respondents who do not think about retirement are less likely to have older siblings who could provide advice on preparation for retirement. Individuals are required to handle a lot of information in order to make an informed decision whether or not to participate in the Riester market. Depending on the level of family financial sophistication, individuals will find these tasks more or less challenging. Therefore, my first hypothesis states that

H1: Individuals with higher family financial sophistication are more likely to own a Riester pension.

The way in which social learning from peers affects financial decision-making has been studied intensively with respect to the decision to participate in the stock market (e.g. Hong et al., 2004; Guiso et al., 2004; Brown et al., 2008). A link between individual participation and the participation of peers can be explained by information sharing which lowers participation costs (e.g. Hong et al., 2004) and the desire to belong to the social group (e.g. Gali, 1994). Guiso et al. (2004) argue that especially in low social capital areas narrow subgroups are considered a valuable source of information due to the high interpersonal level of trust. Li (2013) studies information sharing among family members. He finds that the likelihood of entering the stock market is higher if parents or children had entered the stock market during the previous five years. Given the public debate on the opacity of the cost structure of Riester contracts (Hagen and Reisch, 2010; Gasche et al., 2013), reliable information from a trusted person such as a family member, might be of particular importance in overcoming possible entry barriers and in encouraging participation. For these reasons, I propose that

H2: The likelihood of a family member to enter the Riester market is higher if someone within the family already owns a Riester pension.

Positive externalities affecting participation costs can create a social multiplier once a critical mass has been reached (Becker and Murphy, 2000; Glaeser et al., 2003; Hong et al., 2004). The relative importance of the family as a source of information might decrease as soon as the group of Riester owners in the population is large enough and information on eligibility and subsidies is widely dispersed. I hypothesize that

H3: Correlations in Riester ownership among family members decrease over time as the number of Riester contracts in the eligible population increases.

The next section presents the data and empirical models used in order to test the three hypotheses.

3.3 IDENTIFICATION STRATEGY

3.3.1 DATA AND SAMPLE

The Socio-Economic Panel (SOEP) is an annually conducted, representative household survey, which started in 1984.[32] Its structure is very similar to the American Panel Study of Income Dynamics (PSID) with an individual questionnaire for each household member containing questions about e.g. education, occupation, earnings, and a complementing biography questionnaire, which covers information on the life course (e.g. marital history, social background, employment biography). In addition, there is a questionnaire containing questions on the situation of the household as a unit, which is answered by only one person. A question on Riester ownership was part of the individual questionnaires in the years 2004, 2006, 2007 and 2010. The wording is as follows: "Did you subscribe to a Riester contract since 31st December 2001?" Unfortunately, the SOEP does not provide information on how much individuals save in their contract, whether they qualify for the full subsidy, or whether they pay contributions at all.[33] Moreover, I have only limited information on the portfolio of

[32] See Wagner et al. (2007) for a detailed description of the SOEP.
[33] See Ziegelmeyer and Nick (2013) for an analysis of contribution-free Riester contracts.

the individuals as detailed questions on the financial balance sheet of the household are only asked in 5-year intervals. Consequently, the data is not suited to investigate the optimality of the Riester decision and the research question is restricted to asking if there is an association between family characteristics and Riester ownership.

SOEP has a wide tracing rule, namely to follow everyone living in an original sample household.[34] Persons leaving original sample households form new households, consisting of grown children and separated spouses. These newly formed households are added to the SOEP population, including all non-original sample household members. Due to this feature, I am able to construct a sample consisting of siblings, defined as persons having the same mother and matched using her never-changing identification number. Information on the father is associated with each sibling also using his identification number.[35] In summary, the sample only considers individuals who have at least one sibling participating in the SOEP and whose mother is already part of the SOEP population.[36] As pointed out in section 3.2.1, in order to be eligible for subsidies, certain criteria have to be fulfilled. Because all persons in a household answer the individual questionnaire, eligibility of the spouse, which in turn leads to indirect eligibility for the individual under observation, can be accounted for. The analysis is restricted to individuals with German nationality as foreigners might have a limited opportunity to learn about public and private old-age provision in Germany from their relatives. For the first part of the analysis, I use a cross-section from the wave in 2010. The longitudinal character of SOEP is used in the second part of the analysis, when sequential correlations in the ownership of Riester contracts are analysed. To this scope, the waves 2004, 2006, 2007, and 2010 were used. The final sample consists of 1,228 siblings in year 2010.

While the special tracing rules – in combination with the length of the panel – allow the construction of such a complex sample, attrition is a potential weakness.[37] The attrition rate in SOEP is quite high in comparison to other panel studies, such as the PSID (Schonlau et al., 2010). That might be problematic as most of the variables affecting attrition are likely to affect financial decision-making. For instance, low-income and low-educated groups are

[34] See Schonlau et al. (2010) for a discussion of different tracing rules in household surveys.

[35] In principle, even richer family relationships could be established by matching grandparents and own children. That would result in a rather small sample size.

[36] Data was extracted using PanelWhiz (Haisken-DeNew and Hahn, 2010).

[37] See Kroh (2011) for an analysis of attrition in the SOEP.

usually found to exhibit lower cooperation rates in surveys (Uhrig, 2008). At the same time, many studies (e.g. Coppola and Reil-Held, 2009; Börsch-Supan et al., 2012) show that these groups are also less likely to subscribe to a Riester pension. The sample requires the observation of at least two siblings as adults, which adds to the scope of the attrition problem (Fitzgerald, 2011). For instance, if children with a financial education similar to their parents' are less likely to attrite, the intergenerational coefficients will be overestimated. Spieß et al. (2008) compare sample members and their descendants. Favourably, the authors find no evidence that one group is more volatile in participation behaviour than the other one is. Fitzgerald et al. (1998) investigate whether attrition leads to biased estimates of intergenerational correlations in earnings, education and welfare participation based on data from the PSID. The authors show that intergenerational correlations are slightly stronger for a subsample of children who did not drop out from the PSID and whose parents were already part of the PSID sample.

The models presented in the next section do not correct for attrition which might bias the results. Appendix B.4 reports descriptive statistics for the Siblings Sample as well as for a sample of all individuals in the SOEP who are eligible for subsidies under the Riester scheme. Given that the siblings are rather young in comparison to the overall SOEP population, the influence of parents on their children could be more pronounced than in the overall population. Moreover, the parents in the Siblings Sample are on the average better educated than the parents of the overall SOEP population.[38]

3.3.2 MODEL SPECIFICATIONS

The influence of individual and family characteristics

Hypothesis 1 argues that family background is correlated with the decision to subscribe to a Riester pension. In order to control for its influence, I (1) estimate a family-fixed effects model and (2) include proxy variables for family background. To allow for a comparison of the results across specifications – including the family-fixed effects model – the models are estimated using Ordinary Least Squares.[39] Both proposed strategies have their advantages

[38] In appendix B.4, the information on parental education for the overall population comes from the reports of the children. It might be more prone to measurement error in comparison to the information in the Siblings Sample where parents themselves have reported their educational degree.

[39] See Greene (2002a) for a discussion on the behaviour of the fixed effects estimator in non-linear models and see Wooldridge (2002) and Greene (2002b) for a discussion on the advantages and drawback of linear

and allow for different interpretations: the family-fixed effects model exploits the idea that (at least part of) the unobserved heterogeneity is common to members of one family. Under this assumption, the difference in unobserved characteristics should be lower within than between families. Index *s* identifies a sibling, while *f* denotes the family (equation 3.1). The error term is split into two components, α_f and ε_{sf}. Explanatory variables captured under X_{sf} are assumed to be correlated with the family-specific component α_f , but not with the idiosyncratic error ε_{sf}. The idiosyncratic error needs to be strictly exogenous after taking out α_f. This assumption must hold for all included regressors (Wooldridge, 2002). The fixed effects transformation will eliminate all effects that do not vary within the same family by subtracting the family averages (equation 3.2).[40] It should be noted that by taking differences, measurement errors are amplified which might lead to attenuation bias (Griliches, 1977).

$$Riester_{sf} = X_{sf}\delta + \alpha_f + \varepsilon_{sf} \qquad (3.1)$$

$$Riester_{sf} - \overline{Riester_s} = (X_{sf} - \overline{X_s}) * \delta + (\varepsilon_{sf} - \bar{\varepsilon}_s) \qquad (3.2)$$

The family-fixed effects model disentangles genetic influences and shared preferences that are constant over time from individual characteristics. However, the model treats the family-fixed effect as a nuisance parameter (Durlauf and Ioannides, 2010, p. 465). It is interesting to study the influence of the family in a more direct way. In an attempt to capture unobserved components relating to family background in the error term, I start with a baseline model[41] and gradually nest it in richer models, capturing the level of family financial sophistication.

More specifically, in the extended models controls for the educational attainment of the mother and the father are introduced. Loehlin (2005) finds that across studies the correlations in different characteristics between mothers and their children are on average higher than the correlations between fathers and their children. However, the still prevalent male breadwinner model in Germany (e.g. Gottschall and Bird, 2003) might make fathers the financial decision maker of the household and thus the role models in investment decisions. The fact that men are usually found to be financially more literate than women might

probability models. For robustness, logistic regressions have been estimated for the models including proxy variables and are available upon request.

[40] The notation is analogous to Schnabel and Schnabel (2002). For ease of exposition, the constant term is not explicitly mentioned.

[41] The baseline model includes a dummy indicating the gender, age as well as age squared, a dummy if the respondent is living in East Germany, whether he is married, has children under 16 years living in the household, his educational attainment, and household net income divided into quintiles.

reinforce their position (Lusardi and Mitchell, 2008). Consequently, whether a father's or a mother's characteristics matter more for the Riester decision remains an empirical matter.

Furthermore, I add a variable that indicates if the parents own a life insurance contract. Until recently, there were tax incentives for life insurances which have been shown to influence life insurance demand (Sauter and Winter, 2010). Thus, if parents consider monetary incentives as an important savings motive, they might motivate their children to make use of the Riester subsidies. For instance, Börsch-Supan et al. (2008) demonstrate that individuals for whom state subsidies represent an important savings motive are more likely to take up a Riester pension. An association might further arise if life insurance ownership of parents reflects savings preferences related to time and self-commitment which are shared by all family members.

Family members could provide specific information on eligibility, subsidies and on the design of a particular Riester product, which should lower the individual's participation costs. Therefore, a dummy variable is included which indicates whether at least one sibling owns a Riester contract.[42] An additional variable indicates the number of siblings observed in the sample. All standard errors need to be adjusted for heteroskedasticity (Cameron and Trivedi, 2009), allowing for clustering at the level of the mother.

When adding the Riester ownership of siblings to the model, I might run into trouble due to endogneity problems coming from reverse causality, omitted variables and measurement error. In particular, there might be bias due to missing information on cognitive abilities or interest in financial topics shared by family members.[43] That might bias all estimated coefficients. One solution to overcome the endogeneity problem would be to find an instrument for family financial sophistication. A valid instrument would be correlated with the financial knowledge of parents/siblings, but not with Riester ownership of the individual. Poor instrumental variables can result in a large asymptotic bias, even when the instrument and the endogenous variable are only weakly correlated (Wooldridge, 2002). The large string of literature on financial literacy shows that finding suitable instruments is not an easy task. Van Rooij et al. (2011a) suggest using the financial situation of siblings and knowledge of parents as instruments for financial literacy. Obviously, this does not constitute a valid

[42] I do not consider whether parents own a Riester pension as I do not account for their eligibility. Some of the parents have never been eligible as they were already retired when the product was introduced. This would reduce the sample size even further.

[43] See Mansik (1993) on the "reflection problem".

instrument in the study at hand, as the level of family financial sophistication is supposed to have a direct impact on Riester ownership. Others look for instruments on the community level (e.g. Bucher-Koenen and Lusardi, 2011). However, it is unclear whose social environment is relevant for the level of financial sophistication of the family (observed individual, his siblings or parents). Within the framework of this study, I was not able to find an instrument which would allow investigating the nexus of causality and results need to be interpreted with caution.

Sequential correlations in Riester ownership between siblings

In order to test hypotheses 2 and 3, I estimate sequential correlations in Riester ownership between siblings over time. The underlying theoretical consideration is that in *t=0* no family member owns a Riester contract. For some exogenous reasons the first family member buys a Riester contract in the period between *t=0* and *t=1*.[44] During the next period, information sharing takes place, lowering the entry barriers for the other siblings. In *t=2* the next sibling buys a Riester contract. In order to account for the dynamic nature of the processs, a proportional hazard model is estimated.

The underlying continuous time model can be summarized by the proportional hazard rate,

$$h(t \mid x) = h_0(t)\exp(x'\beta) \qquad (3.3)$$

The proportional hazard rate satisfies an important separability assumption (Cameron and Trivedi, 2005, p.591). It can be factored into separate functions of what is the called the baseline hazard $h_0(t)$ which is a function of time *t* alone and a function $\exp(x'\beta)$ which is independent of *t* and depends on the individual and family characteristics captured under *x* alone (here the function has an exponential form). Variation in the covariates acts to shift the entire baseline hazard function up and down. The shift is assumed proportional, i.e. the shift in the hazard rate per unit difference in the predictor is the same in every year (Singer and Willet, 1993).

The data does not record the exact time when a Riester pension was subscribed, but subscriptions can be observed in time intervals. Consequently, a discrete-time hazard model

[44] Corneo et al. (2009; 2010) consider the introduction of Riester pensions a natural experiment as by law, certain groups are eligible while others are not. Apart from the introduction itself, individuals can become eligible due to marriage or when entering the labour market after graduation which should be exogenous to the decision to subscribe a Riester pension.

is chosen. The hazard function at interval *j* [$j \in (a_{j-1}, a_j]$, *j=0,1,…,L*, with $a_0 = 0$ and $a_L = \infty$] is given by

$$h(j \mid x) = 1 - \exp\left[-\exp\left(\gamma_j + x'\beta\right)\right] \qquad (3.4)$$

The discrete-time proportional hazard model is known as the complementary log-log model, a form of generalized linear model with the link function (e.g. Kalbfleisch and Prentice, 2002). It is the discrete time representation of the popular Cox regression model (Cox, 1972). The model is estimated using maximum likelihood.

$$\log\{-\log[1 - h(j \mid x)]\} = \gamma_j + x'\beta \qquad (3.5)$$

The discrete-time hazard is the conditional probability that an individual will subscribe a Riester pension, given that he did not have a Riester pension before. The higher the hazard, the greater the risk to buy a Riester pension in a given year. The baseline hazard, which characterizes the form of duration dependence, is modelled quite flexibly using a piecewise-constant specification. In a piecewise-constant model, the hazard rate is allowed to vary within pre-defined time intervals, but it is assumed constant within these intervals (Blossfeld, 2007). In this case, the baseline hazard is a step function. This pattern should be empirically relevant as the time intervals between the SOEP interviews are quite short and people are not likely to adapt their savings behaviour and preferences within these few months, but they might change their preferences over the whole observation period from 2004 until 2010.

First, I estimate a model including only time dummies in order to compare the estimated hazard rate with actual uptake rates. In the second specification, the control variables which are presented in the previous section are added to the model, excluding Riester ownership of siblings. In particular, I condition on the level of family financial sophistication as proxied by parental education and life insurance ownership. The goal is to determine the effect of siblings subscribing a Riester pension on the probability to purchase a Riester pension in the following periods. Consequently, the main variable of interest is the one-period lag of whether a sibling has bought a Riester pension. As proposed in hypothesis 3, the family as a source of information might have a time-varying effect. Therefore, interaction terms with time are included in a final step. Again, all standard errors need to be adjusted for heteroskedasticity on the level of the mother.

If sequential correlations were only due to information sharing, the identification assumption would require that the factors influencing the decision of one sibling between *t* and *t+1* are not correlated with the decision of the other siblings made after *t+1* (Li, 2013). However, this assumption is not likely to hold in a real-life setting and shared preferences still play a role. The same endogeneity problems apply as above.

Furthermore, the model assumes that every individual will eventually subscribe to a Riester pension. As pointed out above, not everyone benefits from a Riester pension. Yet, a sequential correlation in Riester ownership between siblings could also result from a sub-optimal savings decision. Rather than solving inter-temporal optimisation models as postulated by standard economic theory, individuals might find it desirable to employ easy decision rules based on heuristics or rules of thumb (e.g. Winter et al., 2012). If individuals are tempted to mimic the behaviour of siblings who have more financial means or knowledge without having the means or knowledge themselves (Georgarakos et al., 2012), this might result in a sub-optimal savings decisions. Nevertheless, such behaviour would also generate significant correlations in Riester ownership between siblings. Evidently, the advice of the siblings could also be not to buy a Riester pension. However, this cannot be explicitly modelled using the SOEP data. The results are presented in the next section.

3.4 ESTIMATION RESULTS

3.4.1 THE INFLUENCE OF INDIVIDUAL AND FAMILY CHARACTERISTICS

Table 7 displays regression results for the baseline model (column 1), the family-fixed effects model (column 2), as well as a model including parental education (column 3), and whether the parents own a life insurance (column 4). Column 5 extends the latter model by controlling for contemporaneous correlations in Riester ownership between siblings.

Individual characteristics

Similar to Coppola and Reil-Held (2009), I do not find significant differences between men and women in the likelihood to subscribe to a Riester pension. There is no evidence for a significant age effect, which can be (partially) ascribed to the lower variation in age in comparison to the overall SOEP population and to the low average age.

Only the family-fixed effect model is in line with existing literature findings, which states that individuals in East Germany have a higher probability to buy Riester pensions (Coppola and Reil-Held, 2009; Pfarr and Schneider, 2011). One of the reasons named for the usually positive relationship between living in the Eastern Germany and Riester ownership is the lower coverage with occupational pensions in East Germany (Kriete-Dodds, 2008).

While married individuals are significantly more likely to subscribe to a Riester pension, individuals with children are not. That is contrary to the incentive scheme which offers additional subsidies for each child (see section 3.2.1), underlining the notion that the regulatory framework is not well understood.

Education and income are usually found to be among the most important determinants for Riester ownership (Blank, 2011). Especially individuals with an intermediate secondary degree (Realschule) as well as respondents who have post-secondary training are more likely to subscribe to a Riester pension. Similar to the results of Barnea et al. (2010), the effect of education turns insignificant in the family-fixed effect model and decreases when adding controls for parental education. Using a sample of twins, Barnea et al. (2010) find that education is relevant for stock market participation, but it is mainly the genetic factor of education that is important. Additionally, it should be noted that education does not fully capture the ability of the individual to handle financial decisions. For instance, Bucher-Koenen (2011) argues that higher levels of financial literacy are correlated with a higher probability to subscribe to a Riester contract, a concept that is not measured in the data at hand.

Bucher-Koenen (2011) proposes using income as a proxy for the size of the subsidy. Contrary to the incentive scheme, however, results show that individuals who are at the tails of the income distribution are least likely to subscribe to a Riester pension. This common result might not be directly linked to the subsidies as incentives depend on gross earnings with contributions to Riester contracts being deductible from taxes and most existing studies include net income in their models (e.g. Bucher-Koenen, 2011; Pfarr and Schneier, 2011; Coppola and Reil-Held, 2009). However, household net income can capture a different aspect, namely the effect of financial constraints preventing individuals from saving for retirement. Asking for the reason why individuals do not own a Riester pension, Lamla and Gasche (2014) find that a considerable share of households claims not to have enough money left. The results in table 7 also indicate that individuals at the top of the income

distribution are not more likely to buy a Riester pensions relative to those from the first income quintile. Riester pensions as a form of old-age provision might not be relevant for those high-income earners, given that there is a maximum contribution rate (see section 3.2.1).

Family characteristics

While education and income can be considered as proxies for individual financial education (Börsch-Supan et al., 2008), parental education and life insurance ownership of parents are supposed to measure family financial sophistication. The results in table 7 confirm that parental education is positively and significantly correlated with the decision to save for retirement in the form of a Riester pension. The usual finding is that the characteristics of the mother are stronger determinants for the behaviour of their children (Loehlin, 2005). However, the fact that fathers are still the main earners in families might make them role models in financial decisions. Results show that while secondary education of the mother is significantly correlated with Riester ownership, it is the fathers' post-secondary education that matters.

An indicator measuring if the parents own a life insurance is added in column 4. The variable has a significant and positive effect on Riester ownership of the children. On the one hand, the variable accounts for the parents' preferences for savings, especially as most of the people coming from older cohorts did not have to save privately to sustain adequate living standards after retirement because they could rely on generous public pensions. On the other hand, it influences the extent to which parents consider monetary subsidies as an important savings motive and advise their children to do the same.

Intra-generational correlations between siblings might be of even more importance as siblings are usually in the same stage of the life cycle and therefore have similar preferences and needs. In addition, Börsch-Supan et al. (2008) show that knowledge about the pension system is correlated with Riester ownership. While other savings plans (e.g. life insurances) are well known by the population (Corneo et al., 2010; Sauter and Winter, 2010), special knowledge about Riester pensions might be necessary to overcome scepticism and a general lack of knowledge. The added variables in column 5 reveal that Riester ownership between siblings is significantly correlated while the size of the network has a negative effect on the probability to purchase a Riester pension.

Summing up, I find evidence in support of hypothesis 1. The level of family financial sophistication is positively correlated to Riester ownership. However, the model fit is rather unsatisfactory: only around 6% to 7% of the variation in Riester ownership can be explained by the models using all proxy variables (column 5) and respectively by the family-fixed effects model (column 2). Savings decisions are complex and may involve psychological aspects that can neither be captured by the proxy variables included nor explained by an effect common to all family members. For instance, Coppola and Reil-Held (2009) show that savings motives are important determinants for Riester ownership. These motives can even change over the life cycle (Schunk, 2009). A static consideration of the determinants for Riester ownership might therefore not be appropriate.

Table 7: Determinants of Riester ownership – Results after OLS and Fixed-Effects regressions

dep. var: Have Riester pension (1/0)	(1)	(2)	(3)	(4)	(5)
			individual characteristics		
male	-0.029	-0.042	-0.030	-0.031	-0.032
	[0.028]	[0.040]	[0.028]	[0.028]	[0.028]
age	-0.016	-0.005	-0.016	-0.018	-0.020
	[0.014]	[0.025]	[0.014]	[0.014]	[0.013]
age squared	0.000	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
living in East Germany	-0.016	0.292	-0.040	-0.028	-0.013
	[0.035]	[0.113]***	[0.036]	[0.036]	[0.033]
married	0.082	0.113	0.083	0.093	0.091
	[0.042]*	[0.059]*	[0.042]**	[0.042]**	[0.041]**
children living in household	0.043	0.039	0.046	0.048	0.046
	[0.036]	[0.055]	[0.037]	[0.036]	[0.035]
no degree/					
low secondary degree	ref.	ref.	ref.	ref.	ref.
intermediate secondary degree	0.096	0.089	0.077	0.071	0.066
	[0.033]***	[0.054]	[0.034]**	[0.034]**	[0.033]**
high secondary degree	-0.002	0.098	-0.021	-0.028	-0.015
	[0.044]	[0.081]	[0.047]	[0.047]	[0.046]
post-secondary degree	0.102	0.035	0.101	0.100	0.089
	[0.049]**	[0.083]	[0.049]**	[0.049]**	[0.048]*

Table 7: Determinants of Riester ownership – Results after OLS and Fixed-Effects Regressions (continued)

dep. var: Have Riester pension (1/0)	(1)	(2)	(3)	(4)	(5)
			individual characteristics		
income: 1st quintile	ref.	ref.	ref.	ref.	ref.
income: 2nd quintile	0.108	0.105	0.110	0.107	0.100
	[0.047]**	[0.070]	[0.046]**	[0.046]**	[0.046]**
income: 3rd quintile	0.089	0.129	0.086	0.078	0.074
	[0.044]**	[0.072]*	[0.044]*	[0.044]*	[0.044]*
income: 4 quintile	0.117	0.162	0.109	0.095	0.091
	[0.043]***	[0.078]**	[0.043]**	[0.043]**	[0.042]**
income: 5th quintile	0.037	-0.005	0.030	0.017	0.014
	[0.042]	[0.077]	[0.042]	[0.042]	[0.040]
			family characteristics		
mother: no degree/					
low sec. degree			ref.	ref.	ref.
mother: intermediate sec. degree			0.064	0.063	0.057
			[0.036]*	[0.036]*	[0.032]*
mother: high sec. degree			0.047	0.045	0.048
			[0.055]	[0.054]	[0.049]
mother: post-sec. degree			0.018	0.014	0.010
			[0.039]	[0.038]	[0.035]
father: no degree/					
low sec. degree			ref.	ref.	ref.
father: intermediate sec. degree			-0.024	-0.032	-0.035
			[0.040]	[0.040]	[0.036]
father: high sec. degree			-0.067	-0.070	-0.060
			[0.045]	[0.045]	[0.041]
father: post-sec. degree			0.108	0.100	0.096
			[0.040]***	[0.040]**	[0.037]***
parents own life insurance				0.079	0.072
				[0.031]**	[0.028]***
sibling(s) own(s) Riester					0.130
					[0.041]***
# observed siblings					-0.030
					[0.018]*
constant	0.442	0.200	0.334	0.331	0.409
	[0.213]**	[0.403]	[0.215]	[0.214]	[0.206]**
R2	0.040	0.060	0.050	0.050	0.070
Wald test					
Prob > F	-	-	0.031	0.010	0.004
N	1,228	1,228	1,228	1,228	1,228

Source: SOEP. Own calculations.

Notes: Cluster-robust standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01. Specifications 1, 3, 4 and 5 are estimated by OLS. In specification 2 a family fixed-effect is subtracted. Wald test tests the hypothesis that the coefficients on the additional covariates are jointly zero.

3.4.2 SEQUENTIAL CORRELATIONS IN RIESTER OWNERSHIP BETWEEN SIBLINGS

Adding dynamic elements to the analysis, table 8 displays results after complementary log-log regressions. In order to identify time trends in uptake rates, the model in column 1 includes time dummies only. Column 2 extends the previous model by adding a lagged dummy indicating if a sibling has bought a Riester pension in the previous period. As to account for non-proportionality in the effect of this indicator, interaction terms with time are included in column 3.

Official statistics display a dramatic increase in Riester subscriptions after the legislative changes in 2005 (appendix B.1). The estimated models display similar patterns, confirming that the risk of subscribing to a Riester pension is not independent of time. The hazard of buying a Riester pension significantly increases with time during the period between 2004 and 2010 (column 1). There is a large increase in the hazard rate between 2004 and 2006, which is probably the result of simplification reforms that take effect.

Provided that a sibling has bought a Riester contract in the previous period, the likelihood of subscribing to a Riester pension is significantly elevated (column 2). The results support my second hypothesis. Once someone within the family has acquired knowledge of Riester pensions, he might communicate this information to the rest of the family and could influence their decision-making process.

Confirming hypothesis 3, sequential correlations in Riester ownership between siblings become weaker over time (column 3). The findings might suggest that shortly after the introduction of Riester pensions, reliable information from a trusted person, such as a sibling, was crucial in order to overcome entry barriers. This appears to be particularly true when taking into account that the product was new and already publically criticized. As the absolute number of Riester owners increases in the population, the family might become less important as a source of trusted advice.

Table 8: Determinants of Riester ownership (Hazard ratios) – Results after complementary log-log regressions

dep. var: Have Riester pension (1/0)	(1)	(2)	(3)
2004	0.096		
	[0.009]***		
2006	0.169	0.047	0.051
	[0.013]***	[0.040]***	[0.043]***
2007	0.237	0.059	0.064
	[0.015]***	[0.050]***	[0.055]***
2010	0.396	0.099	0.124
	[0.021]***	[0.084]***	[0.108]*
sibling(s) own(s) Riester at t-1		1.738	
		[0.235]***	
sibling(s) own(s) Riester at t-1 * 2006			2.345
			[0.493]***
sibling(s) own(s) Riester at t-1 * 2007			2.171
			[0.356]***
sibling(s) own(s) Riester at t-1 * 2010			1.268
			[0.200]
Further controls	NO	YES	YES
Wald test			
Prob > F	-	0.000	0.000
N	5,908	3,035	3,035

Source: SOEP. Own calculations.

Notes: Exponentiated coefficients. Cluster-robust standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01. Specifications 2 and 3 control further for the gender, age as well as age squared, a dummy if the respondent is living in East Germany, whether he is married, has children under 16 years living in the household, his educational attainment, and household net income divided into quintiles. As family characteristics the educational attainment of the mother and father as well as a dummy indicating whether the parents own a life insurance and the number of siblings are included. Wald test tests the hypothesis that the coefficients on the additional covariates are jointly zero.

3.5 CONCLUSION

The Riester pensions in Germany provide helpful evidence to better understand the determinants of and the barriers to the demand for old-age provision products. Existing evidence shows that generous subsidies alone do not appear to provide strong enough incentives (Börsch-Supan et al., 2012). This paper argues that families are of key importance in the decision-making process to buy private pensions. Not only do families influence the way we make our financial decisions due to genetics and social factors, they can also be a source of cost-effective and reliable information. Apart from individual characteristics, in particular education and income, family characteristics are correlated with Riester

ownership. Parental education as well as ownership of life insurances of parents appear to shape their children's decision to buy a Riester contract. The hazard of buying a Riester contract significantly increased with time during the period from 2004 to 2010. Sequential correlations in Riester ownership between siblings exist, but become weaker over time.

Models deviating from the fully rational decision-making paradigm are much richer and as a consequence, much harder to identify. Endogeneity of Riester ownership of siblings does not allow for a causal interpretation. Moreover, attrition might threaten the validity of the results. Without a cleanly designed experiment, the identification strategy cannot isolate the pure effect coming from social interactions. In addition, the data does not allow an evaluation of the quality of the financial decision-making as more detailed information on the Riester contract itself as well as the financial balance sheet of the household, including assets owned by the spouse, would be required. Targeting success of Riester subsidies also depends on the question if subsidised savings contracts represent new savings or if they become substitutes for other forms of savings. Recent finding by Corneo et al. (2009; 2010) indicate that Riester pensions do not increase savings. In contrast, Börsch-Supan et al. (2012) argue that there is currently no credible evidence which provides causal effects of Riester subsidies on savings. However, the evidence the authors provide hints to a "crowding-in" effect.

This paper cannot identify if the development of Riester pensions is due to the product design, to the incentives or to the availability of information. Nevertheless, the following conclusions can be drawn. Riester pension have a complex design which is not easily understood (Börsch-Supan et al., 2008; Gasche et al., 2013) and – depending on certain individual and family characteristics – some individuals can process the relevant information more easily. Positive externalities might help overcome entry barriers to the Riester market by dispersing information on eligibility and the generosity of subsidies. If a social multiplier exists, coverage rates will increase the more time elapses since pension reforms. Such a development is indicated by administrative data on Riester uptakes. However, if only certain groups, depending e.g. on their family backround, get in touch with information on private pensions and hence engage in voluntary old-age provision, wealth inequality might rise in the future. While lowering the entry barriers through further simplifications and more transparency in the Riester market certainly is a promising way, public policy needs to help

people identify the need to save for retirement. Raising awareness through better information and educational programmes is therefore of utmost priority.

4. ERWARTETER BEZUG VON GRUNDSICHERUNG IM ALTER: VERHALTENSUNTERSCHIEDE UND FEHLEINSCHÄTZUNGEN

4.1 EINLEITUNG

Derzeit ist in Deutschland das Armutsrisiko (weniger als 60% des Medianeinkommens) für Rentner nicht größer als für andere Bevölkerungsgruppen (Statistisches Bundesamt, 2012). Nur rund 2,7% der Menschen im Alter von über 65 Jahren sind auf Grundsicherungsleistungen angewiesen (Statistisches Bundesamt, 2013). Gleichwohl wird seit längerem vor einer Zunahme der Altersarmut gewarnt. Als Gründe hierfür werden genannt: die Rentenreformen der letzten Jahre, die mit der Zeit zu einem sinkenden Rentenniveau führen, längere Zeiten der Arbeitslosigkeit und geringfügiger Beschäftigung in den Erwerbsbiographien, eine Zunahme des Anteils der niedrig entlohnten Beschäftigten und neue Erwerbsformen wie die sogenannte Soloselbstständigkeit (Börsch-Supan et al., 2013). Zur Frage, in welchem Ausmaß die Altersarmut in Zukunft tatsächlich zunehmen könnte, gibt es derzeit noch wenig belastbare Evidenz.[45]

Bisher unbeachtet geblieben ist die Frage, ob deutsche Haushalte selbst erwarten, im Alter arm zu sein und ob sich diese Erwartung soweit konkretisiert, dass die Haushalte denken, in Zukunft selbst auf Grundsicherung im Alter angewiesen zu sein. Diesen Fragen wird im Folgenden anhand einer Auswertung der SAVE-Studie nachgegangen. SAVE (Sparen und AltersVorsorgE in Deutschland) ist eine seit 2001 erhobene repräsentative Längsschnittstudie, welche sich auf das Vermögen sowie das Spar- und Vorsorgeverhalten von Haushalten in Deutschland konzentriert. In SAVE 2011 wurden die Haushalte konkret nach ihren Erwartungen hinsichtlich des Bezugs von Grundsicherung im Alter gefragt. Grundsicherung im Alter wurde im Jahr 2003 als bedarfsgeprüfte Fürsorgeleistung eingeführt. Anspruch auf Grundsicherung im Alter haben Personen, die das gesetzliche Renteneintrittsalter erreicht haben und hilfebedürftig sind, also ihren Lebensunterhalt nicht aus eigenem Einkommen und Vermögen bestreiten können.

Die Grundsicherungserwartung kann im ökonomischen Entscheidungskalkül der Individuen eine bedeutende Rolle spielen. So kann es vor allem für Bezieher niedriger Einkommen, die

[45] Zum Beispiel versuchen Arent und Nagl (2010), Geyer und Steiner (2010) sowie Kumpmann et al. (2012) in Mikrosimulationsstudien die zukünftige Altersarmut abzuschätzen.

aufgrund geringer gesetzlicher Rentenansprüche den Grundsicherungsbezug erwarten, durchaus rational sein, nicht zusätzlich für ihr Alter vorzusorgen, da Alterseinkommen eins zu eins auf die Grundsicherung angerechnet werden. Ferner kann sich diese Erwartung auf ihr Arbeitsmarkverhalten auswirken, indem weniger gearbeitet bzw. die Rentenversicherungspflicht vermieden wird.

Die vorliegende Analyse wird sich zunächst mit der Frage beschäftigen, wie stark die Grundsicherungserwartung ausgeprägt ist und von welchen sozio-ökonomischen Eigenschaften diese Erwartung abhängt. Im zweiten Schritt wird dann untersucht, ob die Gruppe, die erwartet, Grundsicherung im Alter zu beziehen, sich auch im Sparverhalten und Arbeitsmarktverhalten von der Gruppe ohne Grundsicherungserwartung unterscheidet.

Geht die Grundsicherungserwartung mit einem geringeren Altersvorsorgesparen einher, ist dies immer dann problematisch, wenn man hinsichtlich der Grundsicherungserwartung einer Fehleinschätzung unterliegt. Denn dann kann es zu einem geringeren Auskommen im Alter im Vergleich zu einer Situation kommen, in der man diese Fehleinschätzung nicht gehabt hätte. Deshalb wird untersucht, ob bei den Haushalten, die angeben, Grundsicherung im Alter zu erwarten, diese Erwartungen tatsächlich berechtigt sind. Dies geschieht, indem die Angaben zu den gesetzlichen Rentenansprüchen aus früheren SAVE-Befragungen ausgewertet werden.

Wird der Grundsicherungsbezug in bedeutendem Maße falsch eingeschätzt, muss nach den Gründen der Fehleinschätzung gefragt werden, da von diesen Gründen mögliche politische Handlungsoptionen abgeleitet werden können. Zum Beispiel können ein zu geringes Wissen über Grundsicherung und über das Rentensystem sowie eine pessimistische Einstellung, die zu negativen – aber falschen – Erwartungen führen, die Fehleinschätzung begünstigen. Somit wird im letzten Schritt untersucht, ob die Haushalte, die mit Grundsicherung rechnen, ein geringeres Wissen und eine pessimistischere Einstellung haben als die Haushalte, die keine Grundsicherung erwarten.

Das Papier ist wie folgt gegliedert: Kapitel 4.2 stellt die gesetzlichen Rahmenbedingungen von Grundsicherung im Alter vor und stellt diese in Bezug zu möglichen Anreizproblemen. Dem folgt in Kapitel 4.3 die Datengrundlage, auf welcher die hier vorgestellten Analysen basieren. Kapitel 4.4 zeigt, wie verbreitet die Erwartung ist, Grundsicherung im Alter zu beziehen und inwiefern sich Haushalte mit Grundsicherungserwartung von Haushalten, die dieser Erwartung nicht unterliegen, hinsichtlich ihrer sozio-ökonomischen Merkmale

unterscheiden. Kapitel 4.5 stellt diese Vergleiche bezüglich Sparverhalten und Arbeitsangebotsverhalten an. Das Ausmaß der Fehleinschätzungen hinsichtlich des Grundsicherungsbezugs wird in Kapitel 4.6 quantifiziert, während Kapitel 4.7 nach möglichen Gründen für Fehleinschätzungen sucht. Kapitel 4.8 schließt die Studie mit einem Fazit und sozialpolitischen Schlussfolgerungen ab.

4.2 GRUNDSICHERUNG IM ALTER UND ANREIZEFFEKTE BEDARFSGEPRÜFTER LEISTUNGEN

Die Grundsicherung im Alter wurde im Jahr 2003 als bedarfsgeprüfte Fürsorgeleistung eingeführt. Anspruch auf Grundsicherung im Alter haben Personen, die das gesetzliche Renteneintrittsalter erreicht haben und hilfebedürftig sind, also ihren Lebensunterhalt nicht aus eigenem Einkommen und Vermögen bestreiten können. Die im Rahmen der Grundsicherung hauptsächlich gewährten Leistungen sind der Regelsatz der Sozialhilfe (zum 01.01.2012: 374 Euro für alleinstehende Personen) sowie angemessene Aufwendungen für Unterkunft und Heizung. Die Bedarfsprüfung erstreckt sich auf die Einkommens- und Vermögenssituation des Hilfebedürftigen und auf die Einkommens- und Vermögenssituation des im Haushalt lebenden Partners (Ehegatte, Lebenspartner oder Partner einer eheähnlichen Gemeinschaft). Bei der Bestimmung der Hilfebedürftigkeit zählen als Einkommen alle zufließenden finanziellen Mittel (z. B. die gesetzliche Rente, Riester-Renten, aber auch kostenlose Unterkunft und Verpflegung). Sie werden vollständig angerechnet, die Grundsicherungsleistungen also um diese Beträge gekürzt. Ende 2011 bezogen 71% der Empfänger von Grundsicherung im Alter anrechenbares Einkommen in Form einer Altersrente (Duschek und Lemmer, 2013). Anders als bei der Sozialhilfe wird nicht auf Eltern und Kinder zurückgegriffen, soweit deren Einkommen jeweils einen Betrag von 100.000 Euro jährlich nicht überschreitet.

Ein wichtiger Untersuchungsgegenstand zur Beurteilung von bedarfsgeprüften Leistungen ist neben der Erreichung des Primärziels, also der Vermeidung von Armut, eine Analyse von Verhaltensunterschieden, die mit einer solchen Regelung verbunden sind. Denn aus Verhaltensreaktionen können Verzerrungen im Sparverhalten und in der Folge Wohlfahrtsverluste resultieren (Feldstein, 1987). Theoretische Grundlage für die nachfolgende Analyse ist die Annahme, dass Individuen die Existenz einer bedarfsgeprüften Grundsicherung im Alter in ihrem Entscheidungskalkül berücksichtigen. Deshalb ist es für die

Entscheidungen der Individuen von großer Bedeutung, ob sie den Grundsicherungsbezug für sich erwarten oder nicht. So ergibt sich die erste Forschungsfrage: *Wie groß ist die Gruppe, die Grundsicherung im Alter erwartet, und welche sozio-ökonomischen Eigenschaften hat sie?*

Theoretische Arbeiten von Hubbard et al. (1995) und Sefton et al. (2008) zeigen, dass soziale Wohlfahrtsprogramme, die einer Bedürftigkeitsprüfung auf Basis des Vermögens unterliegen, dazu führen können, dass Haushalte weniger sparen. Bedürftigkeitsprüfungen reduzieren das Sparen insbesondere von ärmeren Haushalten infolge von zwei Effekten (Feldstein, 1987). Zum einem verliert das Vorsorgesparen an Bedeutung aufgrund der Versicherungsfunktion von Sozialleistungen. Dieser Effekt ist unabhängig von der Bedürftigkeitsprüfung. Zum anderen führt die Bedürftigkeitsprüfung zu einer hohen impliziten Steuer auf Einkommen und Vermögen, sobald Ansprüche geltend gemacht werden. Auch die aktuellen Regelungen bei Grundsicherung im Alter könnten zu solchen Fehlanreizen führen. So könnte jemand deshalb nicht oder wenig sparen bzw. weniger für das Alter vorsorgen, weil er erwartet, im Alter mit seinem Einkommen nicht über das Grundsicherungsniveau hinaus zu kommen. In der Tat wäre Altersvorsorgesparen im Falle eines sicher erwarteten Grundsicherungsbezugs nicht rational im Sinne einer Nutzenmaximierung, da unter der heutigen Regelung Alterseinkommen aus privater Vorsorge in vollem Umfang auf die Grundsicherung angerechnet werden und das Gesamteinkommen nicht erhöhen.

Des Weiteren kann ein erwarteter Grundsicherungsbezug das Arbeitsangebotsverhalten beeinflussen. So lohnt sich z.B. in der Gesetzlichen Rentenversicherung (GRV) der Erwerb zusätzlicher Entgeltpunkte durch eine sozialversicherungspflichtige Beschäftigung nicht, wenn die erwartete gesetzliche Rente weit unterhalb des Grundsicherungsniveaus liegt, das auch ohne Beiträge zur GRV staatlich garantiert ist. Beitragszahlungen zur GRV sind dann zu 100% Steuern und das Arbeitsangebot könnte in Richtung Teilzeitarbeit oder in Richtung nicht sozialversicherungspflichtiger Erwerbstätigkeit wie Selbständigkeit, Mini-Job oder Schwarzarbeit gelenkt werden. Im Rahmen der zweiten Forschungsfrage beschäftigen wir uns deshalb damit, *ob Verhaltensunterschiede beim Sparverhalten und Arbeitsangebotsverhalten je nach der Erwartung, Grundsicherung im Alter zu beziehen, festzustellen sind*.

Da der mögliche Grundsicherungsbezug meist weit in der Zukunft liegt, besteht die Gefahr, dass die Individuen bei ihrem Kalkül einer Fehleinschätzung unterliegen. Schätzt jemand den zukünftigen Grundsicherungsbezug falsch ein und spart aufgrund des erwarteten Grundsicherungsbezugs nicht genügend, ergibt sich im Alter ein geringeres Einkommen als ohne die Fehleinschätzung. Letztlich kann jemand zwar nicht auf Grundsicherung angewiesen sein, aber aus subjektivem Empfinden trotzdem arm sein. Die Fehleinschätzung des Grundsicherungsbezugs kann auch zu einer nicht optimalen Arbeitsangebotsentscheidung führen, die dann wiederum die Altersvorsorge beeinträchtigt und zu einem geringeren Einkommen im Alter beiträgt. Daher versuchen wir in einem weiteren Schritt *Fehleinschätzer zu identifizieren*. Weiterhin werden wir z*wei mögliche Gründe für diese Fehleinschätzungen* herauszustellen.

Für Deutschland liegen im Rahmen der Grundsicherung im Alter keine belastbaren Antworten auf die oben genannten Forschungsfragen vor. Nachfolgend werden diese Fragen bearbeitet. Vorab muss einschränkend darauf hingewiesen werden, dass die Identifikation eindeutiger kausaler Effekte von Grundsicherungserwartung oder deren Fehleinschätzung auf das Spar- und Arbeitsangebotsverhalten nicht möglich ist. Das fundamentale Problem der Kausalanalyse bezieht sich auf die Tatsache, dass es sich um konterfaktische Situationen, also „Was wäre wenn?“ Ergebnisse handelt, die naturgemäß nicht beobachtbar sind. Zur Lösung dieses Problems liegt weder eine glaubhafte Vergleichsgruppe vor, noch beobachten wir ein Experiment, welches die Grundsicherungsbezugswahrscheinlichkeit exogen und zufällig den Individuen zuweist.[46] Stattdessen untersuchen wir die selbsteingeschätzte Wahrscheinlichkeit von Individuen, Grundsicherung im Alter zu beziehen. Gleichwohl können die nachfolgenden Analysen eine Auskunft darüber geben, ob die Erwartung des Grundsicherungsbezugs mit einem anderen Verhalten einhergeht. Dazu wird die Gruppe, die Grundsicherung erwartet, hinsichtlich ihrer Eigenschaften und hinsichtlich ihres Verhaltens mit der Gruppe verglichen, die für sich keine Grundsicherung erwartet.

[46] Neumark und Powers (1998) nutzen die Variation der Vermögensgrenzen bei der Bedürftigkeitsprüfung zwischen U.S. Staaten zur Identifikation bedarfsgeprüfter Leistungen auf das Spar- und Arbeitsangebotsverhalten.

4.3 DATENGRUNDLAGE

Für die Analyse wird der SAVE-Datensatz verwendet. Die seit 2001 erhobene und ab 2005 auf jährlicher Basis durchgeführte SAVE-Befragung ist als Längsschnittstudie konzipiert mit dem Ziel, das Spar- und Anlageverhalten deutscher Privathaushalte zu analysieren. Sie erhebt detaillierte quantitative Informationen zu ökonomischen Variablen (wie z.B. Einkommen, Spareinlagen und Vermögenshöhe) sowie zu relevanten sozio-psychologischen Aspekten auf Basis einer repräsentativen Stichprobe.[47] Als Untersuchungseinheit werden hier und im Folgenden Haushalte betrachtet, d.h. die Befragungsperson und sein Partner. Für die Analyse von erwarteter Altersarmut werden nur Haushalte herangezogen, die nicht angegeben haben, bereits Grundsicherung im Alter zu beziehen (1.560 Beobachtungen).

Der SAVE-Datensatz wurde ferner durch ein multiples Imputationsverfahren imputiert, um Verzerrungen durch Item-Nonresponse zu vermeiden.[48] Während dies für die Kernfrage dieser Untersuchung nicht nötig war, da alle Befragten eine Einschätzung zu der Wahrscheinlichkeit, Grundsicherung im Alter zu beziehen, gegeben haben, hilft das Imputationsverfahren Verzerrungen bei anderen Variablen, insbesondere den Vermögensangaben, zu vermeiden. Alle Ergebnisse sind unter Verwendung von auf dem Mikrozensus basierenden Gewichten berechnet. Obwohl die Ergebnisse gewichtet sind, kann es sein, dass bestimmte Gruppen in den Daten nicht repräsentiert werden. Insbesondere könnten die Ergebnisse verzerrt sein, wenn Personen in den untersten (obersten) Perzentilen der Vermögensverteilung nicht befragt wurden. Das würde dazu führen, dass wir das Ausmaß von Grundsicherungserwartungen unterschätzen (überschätzen).

In SAVE 2011 wurde die Frage gestellt, mit welcher Wahrscheinlichkeit die Befragten für sich selbst und gegebenenfalls deren Partner erwarten, im Alter über so wenige Mittel zu verfügen, dass sie auf Grundsicherungsleistungen angewiesen sein werden.[49] Im Folgenden wird die Gruppe von Haushalten näher betrachtet, die mit einer hohen Wahrscheinlichkeit erwartet, Grundsicherung zu beziehen und damit in diesem Sinne altersarm zu sein. Für die Analyse wird eine Dichotomisierung der Beobachtungen vorgenommen. Die Haushalte, die mit einer Wahrscheinlichkeit von weniger als 70% mit Grundsicherung rechnen, werden mit

[47] Siehe Börsch-Supan et al. (2009) sowie Coppola und Lamla (2013) für eine ausführliche Beschreibung der SAVE-Daten.

[48] Siehe Schunk (2008) sowie Ziegelmeyer (2009; 2013) für eine ausführliche Beschreibung des Imputationsverfahrens.

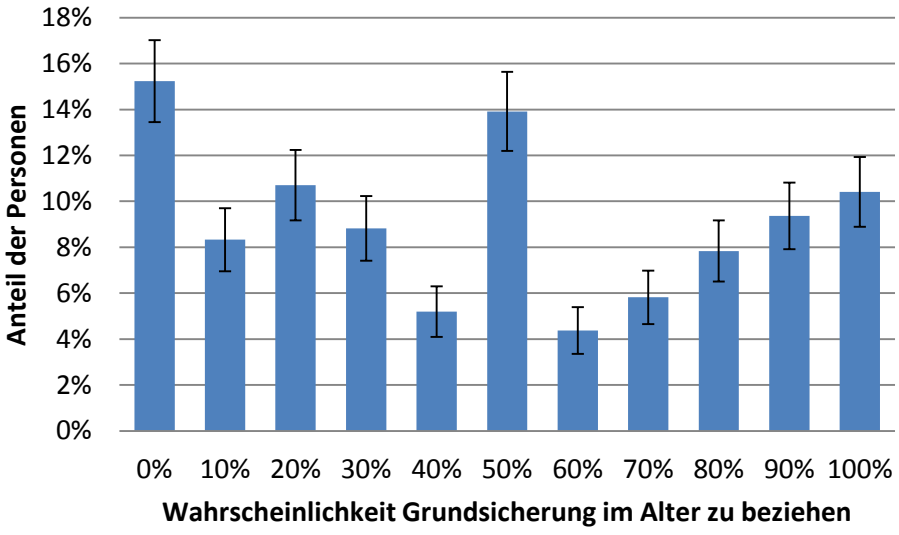
[49] Der genaue Wortlaut der Frage befindet sich im Anhang (C.1).

„GS nicht erwartet“ bezeichnet. Diejenigen Haushalte hingegen, die mit einer Wahrscheinlichkeit von 70% und mehr angeben, einen Grundsicherungsbezug zu erwarten, werden mit der Bezeichnung „GS erwartet“ versehen.[50] Eine Untersuchung auf Haushaltsebene ist sinnvoll, da das Haushaltseinkommen und -vermögen bei der Bedürftigkeitsprüfung für Grundsicherung im Alter mit einbezogen werden. Auch lässt SAVE eine Messung des Finanz- und Realvermögens auf Individualebene nicht zu.

4.4 ERWARTETER GRUNDSICHERUNGSBEZUG

Die Auswertung der SAVE-Frage nach dem erwarteten Grundsicherungsbezug zeigt, dass ein Großteil der Befragten für sich selbst nicht erwartet, Grundsicherung im Alter zu beziehen. Der am häufigsten angegebene Wahrscheinlichkeitswert ist 0% (vgl. Figure 1). Weiterhin gibt ein Anteil von knapp 14% an, mit einer Wahrscheinlichkeit von 50% Grundsicherung im Alter zu beziehen. Dies reflektiert die Unsicherheit vieler Befragter hinsichtlich ihrer finanziellen Zukunft. Fast 35% der Befragten antworten, mit einer Wahrscheinlichkeit von 70% und mehr in Zukunft auf Grundsicherungsleistungen angewiesen zu sein. Auf Haushaltsebene, also unter Einbeziehung der Antwort für den Partner, sind es sogar 38% der Haushalte, die Grundsicherungsbezug für wahrscheinlich halten.[51]

Figure 1: Verteilung der persönlichen Grundsicherungserwartung

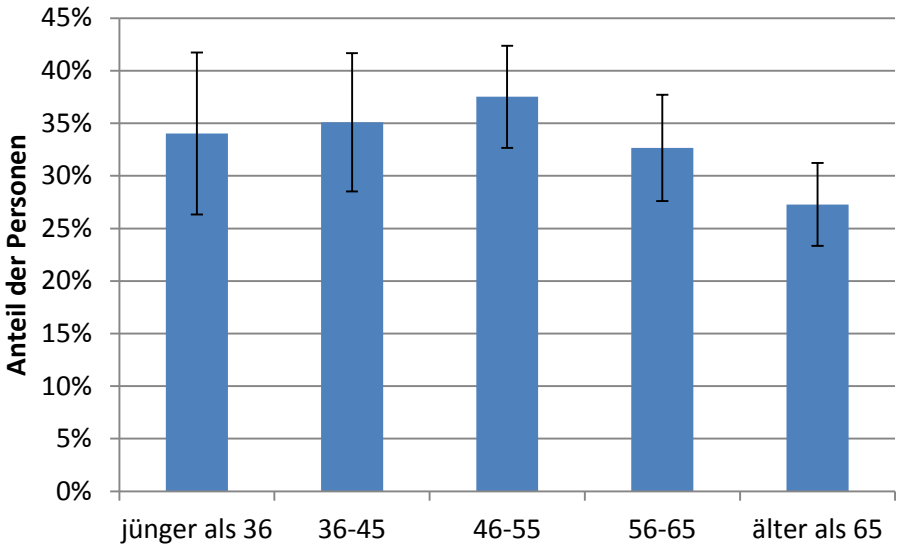


Quelle: SAVE 2011. Eigene Berechnungen.
Notiz: Ergebnisse sind gewichtet.

[50] Die Aussagen ändern sich qualitativ nicht, wenn der Grenzwert auf 60% bzw. 80% verschoben wird.
[51] Diese Definition lässt daher zu, dass die Erwartung bzgl. Grundsicherung im Alter für die Partner unterschiedlich sein könnten.

Differenziert nach Alter wird die Wahrscheinlichkeit, Grundsicherung im Alter zu beziehen, insbesondere unter den bis 55-Jährigen als hoch angesehen (vgl. Figure 2). Für Ältere ist zum einen der Renteneintritt zeitlich nicht mehr so weit entfernt und zum anderen liegt der Erwerbseintritt weiter zurück. Somit spielt bei den Älteren die Unsicherheit bezüglich der eigenen zukünftigen Entwicklung bei der Einschätzung eine geringere Rolle. Jüngere müssen dagegen auf Basis eines mit starker Unsicherheit behafteten Lebenseinkommens kalkulieren. Zudem sind jüngere Generationen eher von den Gründen für eine mögliche Zunahme der Altersarmut, wie z.B. unterbrochene Erwerbsbiographien, betroffen. Die Unterschiede zwischen den Altersgruppen sind allerdings nicht statistisch signifikant.

Figure 2: Erwarteter Grundsicherungsbezug nach Altersklassen



Quelle: SAVE 2011. Eigene Berechnungen.
Notiz: Ergebnisse sind gewichtet.

Grundsicherung wird vor allem in Haushalten in denen die Hauptbefragten weiblich sind, sowie in ostdeutschen Haushalten erwartet (vgl.Table 9). Sowohl das Einkommen – gemessen als Durchschnittseinkommen der letzten fünf Jahre – als auch die Vermögenswerte sind bei den Haushalten, die Grundsicherung erwarten, sind geringer als bei denen, die die Wahrscheinlichkeit Grundsicherung im Alter zu beziehen, als gering einschätzen. Insoweit ergibt sich zunächst das plausible Resultat, dass Haushalte, die Grundsicherung befürchten, finanziell schlechter gestellt sind als die Vergleichsgruppe. Genauso wie das durchschnittliche Einkommen der letzten fünf Jahre kann man auch den Bildungsstatus als ein Maß für das permanente Einkommen verwenden (Browning und

Lusardi, 1996). Zudem lässt sich Bildung als entscheidender Faktor für die Höhe der gesetzlichen Rente ausmachen (Arent und Nagl, 2012). Unter den Hauptbefragten, die Grundsicherung erwarten, ist der Anteil mit Abitur deutlich geringer und der Anteil mit Hauptschulabschluss bedeutend höher als unter denen, die keine Grundsicherung erwarten. Die empirische Evidenz zeigt auch, dass Personen mit niedrigen Bildungsabschlüssen weniger sparen (Browning und Lusardi, 1996), seltener „riestern“ (Börsch-Supan et al., 2012) und im Allgemeinen weniger häufig über die Altersvorsorge nachdenken (Lusardi und Mitchell, 2011). Entsprechend groß ist die Diskrepanz zwischen den beiden Gruppen beim Altersvorsorgevermögen. Hierbei handelt es sich um die Summe der angesparten Vermögen aus privater Altersvorsorge (insbesondere Riester-Verträge, Lebensversicherungen und sonstige nicht-geförderte private Vorsorgeverträgen sowie betriebliche Altersvorsorge). Haushalte, die Grundsicherung erwarten, bilden im Durchschnitt deutlich weniger Vermögen und haben daher in der Rentenphase weniger Kapital, von welchem sie zehren können. Diese Unterschiede werden nicht durch andere Vermögensarten, wie z.B. Immobilien kompensiert. Insgesamt finden wir einen sehr hohen Anteil von Haushalten, die Grundsicherungsbezug im Alter für wahrscheinlich halten. Die Grundsicherungserwartung ist in den Gruppen besonders ausgeprägt, denen man tatsächlich ein höheres Altersarmutsrisiko zuschreibt.

Table 9: Sozio-demographische Merkmale – „GS nicht erwartet" im Vergleich zu „GS erwartet"

	Grundsicherung wird…	
	nicht erwartet	*erwartet*
weiblich	0.508	0.592
	[0.016]	[0.021]
Alter	50.873	49.471
	[0.504]	[0.641]
Haushalt in Ostdeutschland	0.248	0.382
	[0.014]	[0.021]
Partner lebt in Haushalt	0.656	0.585
	[0.015]	[0.021]
Kinder leben in Haushalt	0.380	0.415
	[0.015]	[0.021]
Hauptschule/kein Abschluss	0.293	0.355
	[0.014]	[0.021]
Realschule	0.355	0.438
	[0.015]	[0.021]
Abitur	0.352	0.207
	[0.015]	[0.017]
durchschn. Einkommen (2005-2010) in €[1]	1513.813	1177.418
	[25.853]	[29.915]
Finanzvermögen (Ende 2009) in €	30580.880	10853.830
	[2720.315]	[1229.741]
Realvermögen nach Abzug von Schulden (Ende 2009) in €	157813.100	101636.500
	[13460.490]	[20523.240]
Altersvorsorge (Ende 2009) in €	16107.740	8818.826
	[1067.132]	[947.999]
N	1021	539

[1] äquivalenzgewichtet, Gewichtung gemäß OECD-Skala

Quelle: SAVE 2005-2011. Eigene Berechnungen.
Notiz: Standardfehler in Klammern. Ergebnisse sind gewichtet.

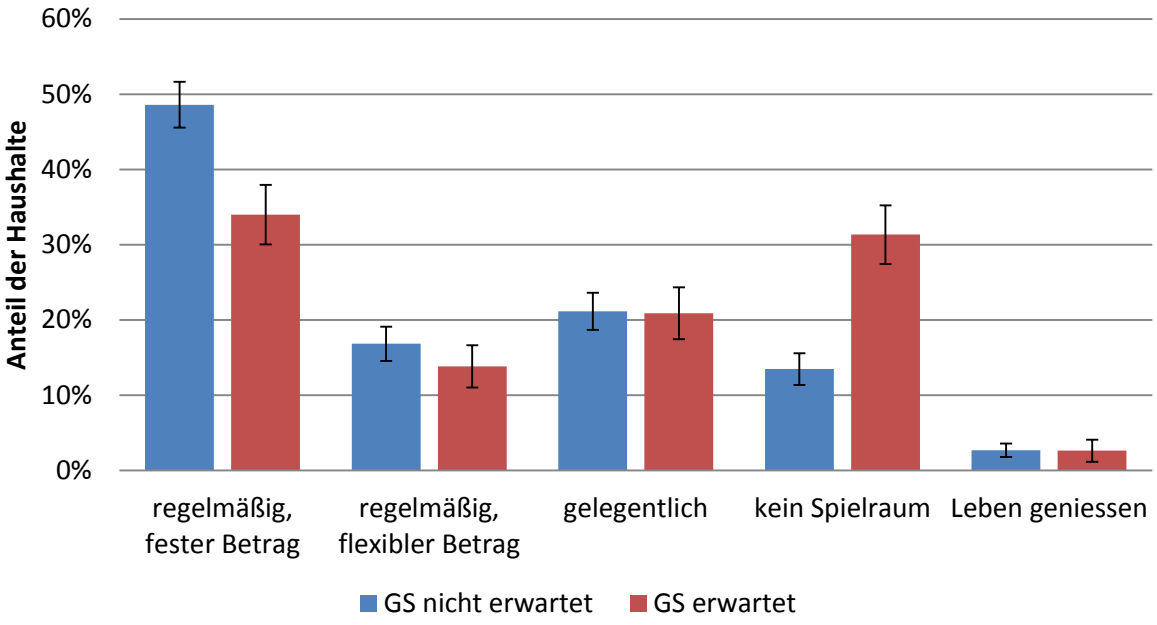
4.5 GIBT ES VERHALTENSUNTERSCHIEDE JE NACH GRUNDSICHERUNGSERWARTUNG?

Es stellt sich die Frage, ob die Personen, die Grundsicherung erwarten, im Vergleich zur Gruppe, die keine Grundsicherung erwartet, ein anderes Spar- und Arbeitsmarktverhalten aufweisen. Während ein solches „anderes Verhalten" für diejenigen Personen, die tatsächlich Grundsicherung zu erwarten haben, rational und optimal sein kann, kann es für diejenigen, die Grundsicherung nur deshalb erwarten, weil sie einer Fehleinschätzung unterliegen, zu falschen Entscheidungen führen.

Sparverhalten

Wir haben bereits gezeigt, dass Vermögensunterschiede je nach Grundsicherungserwartung bestehen. Dies kann sowohl auf eine geringere Sparfähigkeit als auch eine geringere Sparbereitschaft derjenigen zurückzuführen sein, die es für wahrscheinlich halten, dass sie Grundsicherung beziehen werden. Wir finden, dass ein signifikant größerer Teil derjenigen, die Grundsicherung nicht erwarten, regelmäßig den gleichen Betrag spart (49% der Gruppe „GS nicht erwartet“ im Vergleich zu 34% der Gruppe „GS erwartet“). Zugleich geben 31% der Personen, die Grundsicherung erwarten, an, dass sie zum Sparen kein Geld übrig hätten. Aus der Gruppe „GS nicht erwartet“ sind dies nur 13% (vgl. Figure 3). Dabei sind die Unterschiede nicht allein auf unterschiedliche Einkommen zurückzuführen. Teilt man die Gruppen in Einkommensquintile ein, bleibt der Unterschied zwischen den Gruppen in den jeweiligen Einkommensklassen bestehen.

Figure 3: Beschreibung des persönlichen Sparverhaltens – „GS nicht erwartet“ im Vergleich zu „GS erwartet“

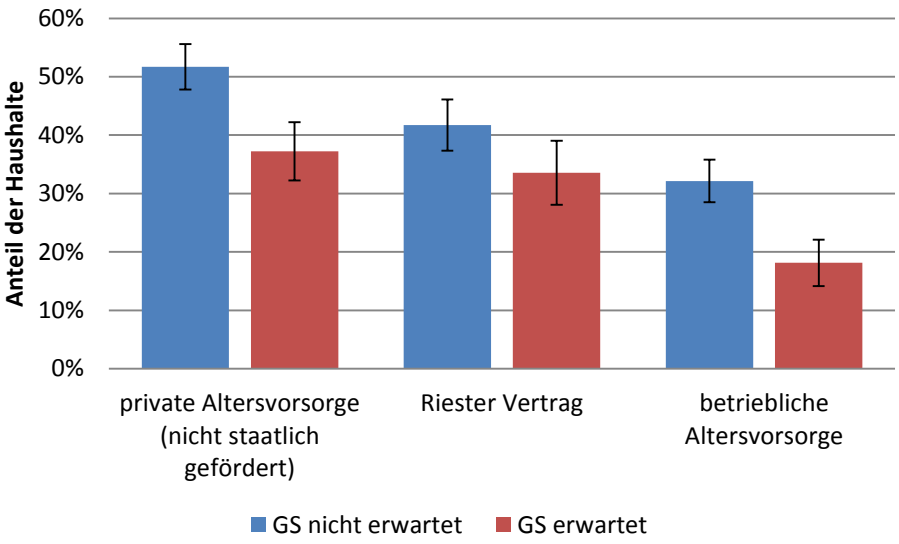


Quelle: SAVE 2011. Eigene Berechnungen.
Notiz: Ergebnisse sind gewichtet.

Die (empfundene) geringere Vorsorgefähigkeit bei Grundsicherungserwartung spiegelt sich auch in der Nutzung verschiedener Altersvorsorgeprodukte wider. Die Unterschiede zwischen den Gruppen bleiben über die Vorsorgearten hinweg bestehen (vgl. Figure 4). Interessanterweise ist die Diskrepanz ausgedrückt in Prozentpunkten am geringsten bei den

Riester-Verträgen, was wiederum auf die relativ starke staatliche Förderung von Niedrigeinkommensbeziehern zurückzuführen sein könnte. So zeigen Coppola und Reil-Held (2009, S.17), dass der Median-Haushalt im untersten Fünftel der Einkommensverteilung überhaupt kein Finanzvermögen hat, außer der Riester-Ersparnis.

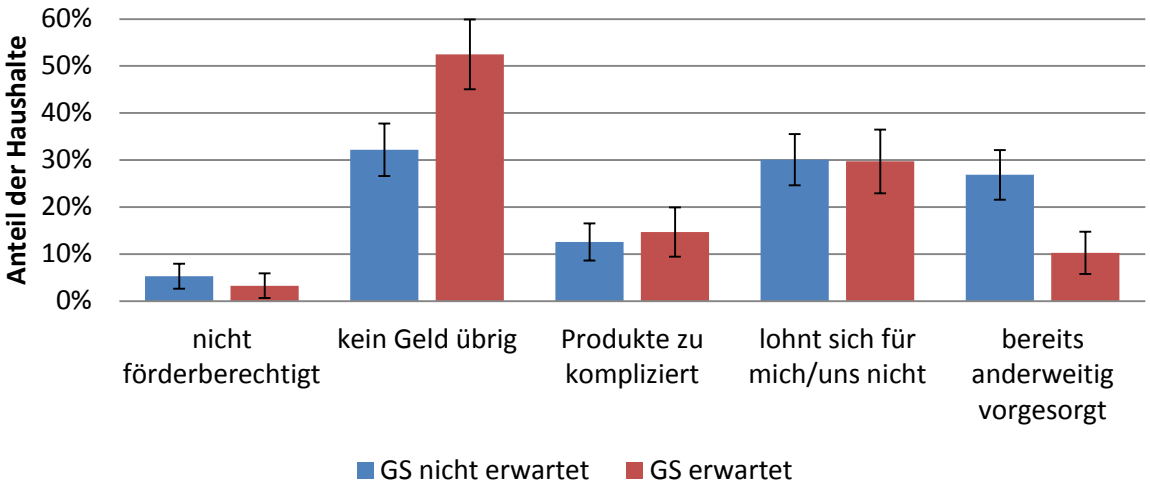
Figure 4: Private und betriebliche Altersvorsorge der Haushalte unter 65 Jahre – „GS nicht erwartet" im Vergleich zu „GS erwartet"



Quelle: SAVE 2010-2011. Eigene Berechnungen.
Notiz: Ergebnisse sind gewichtet.

Fragt man hingegen nach den Gründen, warum die förderberechtigten Haushalte keinen Riester-Vertrag haben (vgl. Figure 5), spielen bei der Gruppe „GS erwartet" die mangelnden finanziellen Mittel wieder eine weit größere Rolle als bei der Gruppe „GS nicht erwartet" (52% im Vergleich zu 32%). Zudem zeigt sich, dass der Gruppe „GS nicht erwartet" offenbar die Altersvorsorge wichtiger ist, da fast 27% als Grund, warum kein Riester-Vertrag abgeschlossen wurde, eine bestehende anderweitige Vorsorge nennen. Bei der Gruppe „GS erwartet" sind es nur 10%.

Figure 5: Gründe, wieso kein Riester-Vertrag besteht – „GS nicht erwartet" im Vergleich zu „GS erwartet"



Quelle: SAVE 2011. Eigene Berechnungen.
Notiz: Ergebnisse sind gewichtet. Die Stichprobe ist auf Hauhalte reduziert, welche die Kriterien für Riesterförderung erfüllen und nicht bereits eine Riester-Rente abgeschlossen haben.

Positiv kann gesehen werden, dass auch Haushalte, die Grundsicherung erwarten, als eines der vier Hauptsparmotive die Altersvorsorge angeben. Dies könnte so interpretiert werden, dass viele sich offensichtlich noch nicht mit dem Grundsicherungsbezug abgefunden haben, sondern die Möglichkeit sehen, durch private Altersvorsorge das Alterseinkommen aufzubessern und damit möglicherweise der Grundsicherung zu entgehen. Zugleich bewertet aber ein größerer Anteil in der Gruppe „GS nicht erwartet" in jeder Altersklasse Altersvorsorge als wichtigen Spargrund – ein Hinweis auf die unterschiedliche Sparbereitschaft zwischen den Gruppen. So stimmen auch knapp 16% in der Gruppe „GS erwartet" der Aussage in SAVE 2010 zu, es würde sich nicht lohnen, für das Alter zu sparen, da die Zukunft ohnehin unsicher sei. In der Vergleichsgruppe war der Anteil mit nur 10% signifikant geringer.

Insgesamt lässt sich festhalten, dass die Haushalte, die den Grundsicherungsbezug mit hoher Wahrscheinlichkeit erwarten, sich im Sparverhalten von denen, die keine Grundsicherung erwarten, unterscheiden. Dies bedeutet allerdings nicht, dass die Grundsicherungserwartung ein anderes Sparverhalten verursacht, es zeigt nur, dass die Grundsicherungserwartung mit einem anderen Sparverhalten einhergeht.

Arbeitsmarktverhalten

Weiterhin versuchen wir, das Arbeitsmarktverhalten der befragten Personen mit Grundsicherungserwartung zu charakterisieren. So zeigt sich, dass die Gruppe der unter 65-Jährigen, die Grundsicherung erwartet, signifikant weniger in Vollzeit arbeitet als die Gruppe „GS nicht erwartet“ (39% im Vergleich zu 52%). Dagegen ist die Nichterwerbstätigkeit bei den Haushalten mit Grundsicherungserwartung stärker ausgeprägt. Vor allem Arbeitslosigkeit ist deutlich häufiger zu beobachten (15% „GS erwartet“ im Vergleich zu 3% „GS nicht erwartet“).

Hinsichtlich des erwarteten Verbleibs auf dem Arbeitsmarkt ergeben sich vordergründig keine Unterschiede zwischen den Gruppen. Unabhängig von ihrer Erwartung über den Erhalt von Grundsicherung denken die Befragten im Durchschnitt, dass sie mit 65 Jahren in Rente gehen werden. Die Unterschiede zwischen den Gruppen bleiben insignifikant, auch wenn eine Unterteilung nach Altersklassen betrachtet wird. Die Antwort zum erwarteten Renteneintrittsalter kann jedoch von unterschiedlichen, teilweise gegenläufigen Effekten beeinflusst werden. Zum einen hat ein potentieller Grundsicherungsbezieher eher einen Anreiz, sein Arbeitsangebot einzuschränken und tendenziell früher in Rente zu gehen, weil er durch Arbeit und entsprechende Beitragszahlungen sein Alterseinkommen nicht mehr über das Niveau der Grundsicherung erhöhen kann, das auch ohne weitere Beitragszahlung staatlich garantiert ist. Dem kann jedoch entgegenstehen, dass die Eingangsvoraussetzungen für einen Frührentenbezug (z.B. 35 Versicherungsjahre) nicht erfüllt werden. Zudem ist der Bezug von Grundsicherung im Alter (ohne, dass man die gesundheitlichen Voraussetzungen für die Erwerbsminderung aufweist) nur ab dem gesetzlichen Renteneintrittsalter möglich. Insgesamt ist bedeutend, dass es auch hinsichtlich des Arbeitsmarktverhaltens Unterschiede zwischen den beiden Gruppen gibt. Dass dieses Arbeitsmarktverhalten sowohl Folge als auch Ursache des erwarteten bzw. nicht erwarteten Grundsicherungsbezugs sein kann, liegt auf der Hand.

4.6 FEHLEINSCHÄTZUNGEN

Das Ergebnis eines sehr hohen Anteils von 38% der Haushalte, die Grundsicherungsbezug im Alter für sehr wahrscheinlich halten, im Vergleich zu der jetzigen Situation (Stand 31.12.2012), in der nur rund 2,7% der über 65-Jährigen tatsächlich Grundsicherung beziehen, kann von unterschiedlichen Faktoren bestimmt sein. Einer dieser Faktoren könnte

sein, dass die Befragten die Voraussetzungen für den Grundsicherungsbezug und die Höhe der Grundsicherungsleistungen nicht gut kennen, aber aufgrund einer relativ geringen erwarteten Rente mit Unterstützung durch den Staat rechnen. Dies könnte allerdings eine Fehleinschätzung sein. Tatsächlich sind die Voraussetzungen für den Grundsicherungsbezug recht streng. Es muss, vereinfacht gesprochen, so wenig Einkommen und Vermögen vorhanden sein, dass ein Leben auf dem Niveau des Existenzminimums nicht möglich ist. Der Staat stockt in diesen Fällen die Einkommen auf, sodass zumindest das Existenzminimum gesichert ist. Zum Stichtag 31.12.2011 lag der durchschnittliche Bruttobedarf für Personen im Alter ab 65 Jahren bei 698 Euro monatlich (Duschek und Lemmer, 2013). Wer also ein Alterseinkommen hat, welches dieses Niveau übersteigt, dürfte in der Regel keinen Anspruch auf Grundsicherungsleistungen haben.

Für eine Abschätzung, in welchem Ausmaß Personen, die Grundsicherung erwarten, einer Fehleinschätzung unterliegen, wird eine SAVE-Frage ausgewertet, in der Angaben zur erwarteten gesetzlichen Rente gemacht wurden. Dabei sollte der in der Renteninformation ausgewiesene Rentenbetrag angegeben werden, der sich ergibt, wenn man in allen Jahren bis zum gesetzlichen Renteneintrittsalter die gleichen Rentenansprüche erwirbt wie im Durchschnitt der vergangenen fünf Jahre. Die Frage wurde daher nur Personen gestellt, die sich nicht bereits in Rente befanden. Die Befragten sollten für die Angabe ihre Renteninformation zur Hilfe nehmen. Wenn dies nicht möglich war, sollten sie den Betrag schätzen. Es zeigt sich, dass über 48% derjenigen, die erwarten, auf Grundsicherung angewiesen zu sein, mit einem Renteneinkommen über 700 Euro allein aus der gesetzlichen Rente rechnen können. In der Gruppe „GS nicht erwartet“ sind es 67%.

Im Jahr 2010 wurde in SAVE direkt nach den bereits in der GRV erworbenen Rentenansprüchen in Form von Entgeltpunkten gefragt. Es geht also nicht um die bei Renteneintritt erwartete Rente, sondern um die zum Zeitpunkt der Befragung bereits bestehenden Rentenansprüche. So kann für diejenigen Personen, die bereits 27 Entgeltpunkte erworben haben mit einiger Sicherheit ausgeschlossen werden, dass sie jemals auf Grundsicherung im Alter angewiesen sein werden. [52] Denn 27 Entgeltpunkte

[52] Die einzige Voraussetzung ist, dass die durchschnittliche Rentenanpassungsrate nicht niedriger ist als die durchschnittliche Zuwachsrate des Grundsicherungsregelsatzes. Bis zum Jahr 2010 war dies per Definition erfüllt, da sich die Regelsätze nach Maßgabe der Rentenanpassungsrate entwickelten. Seit 2011 werden die Regelsätze nach dem Regelbedarfs-Ermittlungsgesetz alle fünf Jahre festgelegt. Grundlage ist dabei die Einkommens- und Verbrauchsstichprobe (EVS). Zwischen den Festsetzungsterminen wird für die

ergeben, bewertet mit dem aktuellen Rentenwert West eine Monatsrente von 758 Euro und bewertet mit dem aktuellen Rentenwert Ost von 673 Euro (Stand Frühjahr 2013). Dies sind Beträge über dem jeweiligen durchschnittlichen Grundsicherungsniveau. Die Auswertung der Angaben zu den Entgeltpunkten ergibt das erstaunliche Ergebnis, dass 50% derjenigen Personen, die Grundsicherung erwarten, mehr als 27 Entgeltpunkte aufweisen. Knapp in der Hälfte der Haushalte, die Grundsicherung erwarten, hat der Hauptbefragte heute schon, also vor Ende seines Erwerbslebens, Rentenansprüche, die alleine mit ihrer gesetzlichen Rente das Grundsicherungsniveau übersteigen.

Unsere hier vorgestellten Abschätzungen von Fehleinschätzungen sind mit Problemen behaftet. Zum einen wird nur die gesetzliche Rente des Hauptbefragten berücksichtigt und nicht die des Partners. So kommt es zu einem Messfehler, da 35% der Hauptbefragten, aber 38% der Haushalte Grundsicherung erwarten. Zum anderen berücksichtigen wir weder die zukünftigen Vermögenswerte noch andere Einkünfte, die vom Grundsicherungsanspruch abgezogen werden könnten. So kommt es eventuell zu einer Unterschätzung des Ausmaßes an Fehleinschätzungen. Zudem verwenden diejenigen, die Grundsicherung erwarten signifikant weniger die Renteninformation, geben also eher eine Schätzung ab, was möglicherweise die Qualität der Antworten beeinträchtigt. Bei der Frage nach den Entgeltpunkten ist ferner nicht bekannt, inwieweit zur Beantwortung die Renteninformation herangezogen wurde.

Bei allen Problemen, mit denen die Fragen zu den Rentenansprüchen behaftet sind, scheint das Ausmaß der Fehleinschätzung des Grundsicherungsbezugs und damit eine Fehleinschätzung hinsichtlich der eigenen Bedürftigkeit im Alter recht hoch zu sein. Der Anteil der Personen, die für sich selbst und/oder den Partner einen Grundsicherungsbezug erwarten, und die Tatsache, dass ein großer Teil dabei offenbar einer Fehleinschätzung unterliegt, sind ein Hinweis darauf, dass noch weitere Faktoren bei der Einschätzung der Wahrscheinlichkeit des Grundsicherungsbezugs eine Rolle spielen müssen.

Dynamisierung der Sätze ein Mischindex , der zu 70% die bundesdurchschnittlichen Entwicklung der Preise für regelbedarfsrelevante Güter und Dienstleistungen und zu 30% die bundesdurchschnittliche Entwicklung der Nettolöhne und -gehälter je beschäftigtem Arbeitnehmer nach der volkswirtschaftlichen Gesamtrechnung berücksichtigt, zugrunde gelegt. Damit ist zwar nicht ausgeschlossen, dass das Grundsicherungsniveau stärker steigt als die Renten, große Abweichung der Zuwachsraten dürfte es jedoch nicht geben, da sich auch die Rentenentwicklung an den Löhnen orientiert und z.B. von Beitragssatzerhöhungen in der GRV gedämpft werden, die sich aber auch auf das Nettoeinkommen der Arbeitnehmer auswirken.

4.7 MÖGLICHE GRÜNDE FÜR FEHLEINSCHÄTZUNGEN

Es stellt sich die Frage, wodurch Fehleinschätzungen begünstigt werden. Nachfolgend werden zwei mögliche Gründe für Fehleinschätzungen, ein mangelndes Wissen über das Grundsicherungssystem, sowie Pessimismus, diskutiert.

Wissen

Wie oben bereits beschrieben, können Fehleinschätzungen aus einem mangelnden Wissen über die Grundsicherungsvoraussetzungen resultieren. Tatsächlich verfügt die Gruppe „GS erwartet“ über ein geringeres Wissen über das Rentensystem. Dies legt wiederum die Vermutung nahe, dass diese Gruppe auch weniger über das Grundsicherungssystem weiß und es deshalb zu diesen Fehleinschätzungen kommt.[53]

Im Rahmen eines Moduls zu Finanzwissen in SAVE 2009 wurden die Haushalte gefragt, wofür die Beiträge in der GRV verwendet werden und wie hoch der aktuelle Beitragssatz der GRV sei (vgl. Table 10). Die Frage nach der Verwendung der Beiträge zur GRV beantworten 50% in der Gruppe, die Grundsicherung nicht erwartet, richtig, nämlich mit „für die heutigen Rentner“. Aus der Gruppe „GS erwartet“ geben nur 43% die richtige Antwort. Der Rest meint, dass die heutigen Beiträge ganz oder teilweise für die zukünftigen Rentnergenerationen genutzt werden. Auch die Höhe des Beitragssatzes der GRV können diejenigen, die Grundsicherung erwarten, schlechter einschätzen. Insbesondere fühlt sich ein hoher Anteil dieses Personenkreises nicht in der Lage, eine Schätzung zum Beitragssatz abzugeben.

[53] Tatsächlich bauen die in diesem Papier vorgestellten Überlegungen darauf auf, dass Individuen die Existenz von Grundsicherung im Alter bei ihren Entscheidungen berücksichtigen. Wenn aber das Wissen über das Rentensystem und das Grundsicherungssystem stark fehlerhaft ist, kann es sein, dass diese grundsätzliche Überlegung nicht angemessen ist und die beobachten Verhaltensunterschiede durch andere Faktoren getrieben werden.

Table 10: Wissen über die Gesetzliche Rentenversicherung – „GS nicht erwartet" im Vergleich zu „GS erwartet"

	Grundsicherung wird…	
	nicht erwartet	*erwartet*
Verwendung der Beiträge korrekt benannt	0.499	0.434
	[0.016]	[0.021]
Beitragssatz zur GRV korrekt geschätzt	0.293	0.199
	[0.014]	[0.017]
keine Angabe zum Beitragssatz der GRV	0.358	0.463
	[0.015]	[0.021]
N	1021	539

Quelle: SAVE 2009, 2011. Eigene Berechnungen.
Notiz: Standardfehler in Klammern. Ergebnisse sind gewichtet.

Pessimismus

Weiterhin könnte ein genereller Pessimismus die Erwartung des Grundsicherungsbezugs begünstigen. Dabei kann der Pessimismus ganz unterschiedliche Ausprägungen haben. Dies kann genereller Pessimismus bezüglich des Rentensystems sein („wir kriegen sowieso nichts aus der Rentenversicherung raus"). Es kann sich auch um Pessimismus hinsichtlich der eigenen Lebenssituation oder hinsichtlich der gesamtwirtschaftlichen Entwicklung handeln.

Eine (ökonomische) Messung des psychologischen Merkmals Pessimismus ist in Haushaltsbefragungen nur schwer zu erreichen (Kemper et al., 2012). Wir stellen daher verschiedene Maße dar. Beispielsweise wurden die SAVE-Befragten in 2007 auf einer Skala von 11-Punkte gefragt, ob sie sich selbst als Optimist bezeichnen würden.[54] Während 64% derjenigen, die keine Grundsicherung erwarten, dieser Aussage eher zustimmen würden, sind es nur 52% der Befragten mit Grundsicherungserwartung.

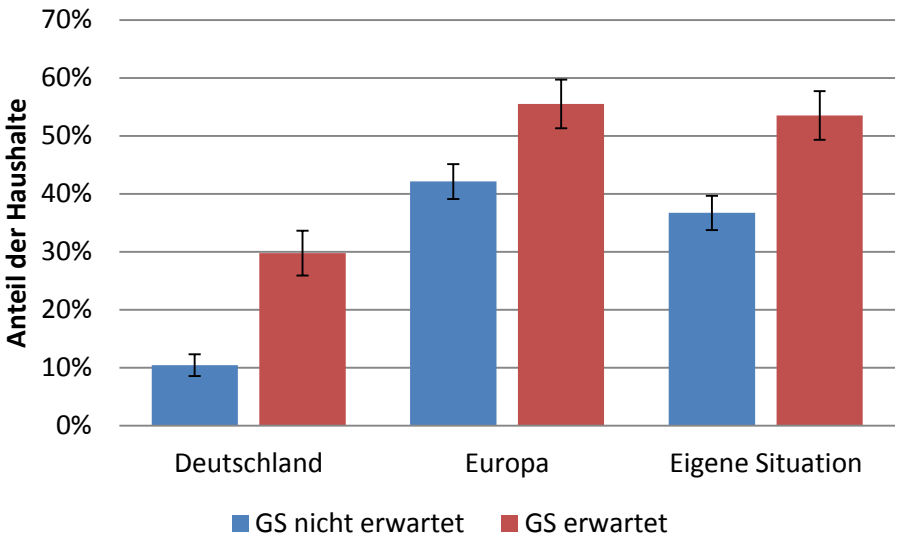
Einen aktuelleren, weiteren Hinweis auf die pessimistische bzw. optimistische Einstellung der Menschen können somit die SAVE-Fragen nach den Erwartungen hinsichtlich der zukünftigen Entwicklung in Deutschland, Europa und hinsichtlich der eigenen Situation liefern.[55] Hier stellen wir fest, dass die Erwartungen der Gruppe „GS erwartet" hinsichtlich der Zukunft durchweg schlechter sind als die Erwartungen derjenigen, die nicht von Grundsicherungsbezug ausgehen (vgl. Figure 6). Während negative Erwartungen hinsichtlich der eigenen Situation bei der Gruppe „GS erwartet" plausibel sind und nicht unbedingt auf

[54] Hier steht 0 für „Ich stimme überhaupt nicht zu" und 10 für „Ich stimmt voll und ganz zu". Wir gehen ab einer Angabe von 7 und mehr davon aus, dass die Befragten eher zustimmen.

[55] Schreier und Carver (1985) definieren Pessimismus als negative Erwartungen hinsichtlich zukünftiger Ereignisse.

einen generellen Pessimismus hindeuten, ist dies bei der Interpretation der signifikant schlechteren Erwartungen dieser Gruppe hinsichtlich der generellen Entwicklung in Deutschland und Europa anders. Hier kann eine pessimistische Einstellung durchaus eine Rolle spielen.

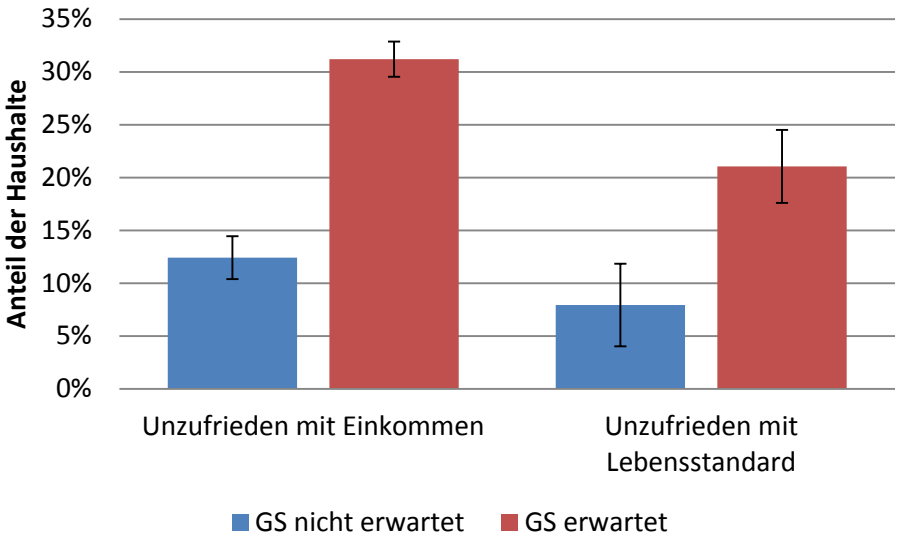
Figure 6: Negative Einschätzung bzgl. zukünftiger Entwicklungen – „GS nicht erwartet" im Vergleich zu „GS erwartet"



Quelle: SAVE 2011. Eigene Berechnungen.
Notiz: Ergebnisse sind gewichtet.

Ein weiteres Indiz für eine pessimistische Einstellung könnte die Beantwortung der SAVE-Frage nach der Zufriedenheit mit dem eigenem Einkommen und mit dem eigenem Lebensstandard sein (vgl. Figure 7). So ist bekannt, dass ein höheres Maß an Optimismus mit einem subjektiv höheren Wohlbefinden einhergeht, auch nachdem für vorherige Lebenszufriedenheit kontrolliert wurde (Carver et al., 2010). Tatsächlich sind 31% der Gruppe „GS erwartet" mit ihrer Einkommenssituation unzufrieden im Vergleich zu 12% der Gruppe „GS nicht erwartet". Bei der Frage nach der Zufriedenheit mit dem Lebensstandard sind es 21% im Vergleich zu 8%.

Figure 7: Unzufriedenheit mit dem Einkommen sowie Unzufriedenheit mit dem Lebensstandard – „GS nicht erwartet“ im Vergleich zu „GS erwartet“



Quelle: SAVE 2011. Eigene Berechnungen.
Notiz: Ergebnisse sind gewichtet.

Ein immer häufiger genutztes Maß für Pessimismus bzw. Optimismus ist die subjektive Lebenserwartung (Puri und Robinson, 2007). In SAVE 2010 wurden die Befragten nach der durchschnittlichen Lebenserwartung von Menschen ihrer Kohorte und ihres Geschlechts gefragt und sollten im Verhältnis dazu ihre eigne Lebenserwartung unter Berücksichtigung ihrer persönlichen Situation und ihres Gesundheitszustands angeben. Während 17% der Gruppe „GS nicht erwartet“ glaubt, kürzer zu leben als der Durchschnitt ist der Anteil bei der Gruppe „GS erwartet“ mit über 25% signifikant höher. Dabei unterscheidet sich aber der Anteil derjenigen mit langwierigen Gesundheitsproblemen zwischen den beiden Gruppen nicht. Dies kann als weiterer Hinweis auf einen allgemeinen Pessimismus in der Gruppe „GS erwartet“ gesehen werden.

4.8 FAZIT UND SOZIALPOLITISCHE SCHLUSSFOLGERUNGEN

Die Analyse hat gezeigt, dass mit 38% ein sehr hoher Anteil der Haushalte den Bezug von Grundsicherung im Alter erwartet. Grundsicherung im Alter wird eher von Frauen, Menschen in Ostdeutschland und von Haushalten mit geringem Einkommen und Vermögen erwartet. Somit erwarten diejenigen Haushalte, Grundsicherung im Alter zu beziehen, denen man gemeinhin ein höheres Altersarmutsrisiko zuschreibt.

Soweit die Individuen bei ihren ökonomischen Entscheidungen die Existenz einer Grundsicherung in ihr Kalkül mit einbeziehen, müssten sie ein anderes ökonomisches

Verhalten an den Tag legen. Tatsächlich lässt sich feststellen, dass die Gruppe, die Grundsicherung erwartet, sich im Sparverhalten und im Arbeitsmarktverhalten signifikant von der Gruppe unterscheidet, die keine Grundsicherung im Alter erwartet. Haushalte der Gruppe „Grundsicherung erwartet“ haben eine geringere Sparneigung und sorgen weniger für ihr Alter vor. Sie sind im Durchschnitt weniger vollzeitbeschäftigt, Nicht-Erwerbstätigkeit und Arbeitslosigkeit sind ebenso stärker ausgeprägt.

Geringere Altersvorsorge in der Erwartung Grundsicherung im Alter zu beziehen, kann durchaus rational sein, da alle Alterseinkommen eins zu eins bei der Grundsicherung angerechnet werden. Problematisch ist dieses Kalkül jedoch, wenn man hinsichtlich des Grundsicherungsbezugs einer Fehleinschätzung unterliegt. Personen bzw. Haushalte mit einer solchen Fehleinschätzung könnten sich so verhalten wie die tatsächlichen künftigen Grundsicherungsbezieher und somit falsche Entscheidungen hinsichtlich des Altersvorsorgesparens und Arbeitsangebots treffen. Dies kann letztlich dazu führen, dass sich ihre falsche Erwartung zwar nicht erfüllt, aber jedoch dahingehend realisiert, dass sie im Alter ein schlechteres Auskommen haben, als sie es hätten, wenn sie der Fehleinschätzung nicht unterlegen wären. Tatsächlich zeigen unsere Auswertungen der SAVE-Daten, dass ein sehr großer Teil der Haushalte, die Grundsicherung erwarten, mit großer Wahrscheinlichkeit eine gesetzliche Rente über dem Grundsicherungsniveau haben wird.

Als ein Grund für diese Fehleinschätzungen kommt zum einen ein geringes Wissen in Frage. So können wir feststellen, dass die Gruppe, die Grundsicherung erwartet, ein signifikant geringeres Wissen über die GRV aufweist. Zum anderen kann eine Erklärung für die Fehleinschätzung in einer pessimistischen Einstellung liegen. Alle hier verwendeten Indikatoren für Pessimismus zeigen, dass die Gruppe, die Grundsicherung im Alter erwartet, pessimistischer ist als die Gruppe, die keine Grundsicherung erwartet.

Die Ergebnisse zeigen, dass sozialpolitisch nicht nur mit der direkten Bekämpfung der Altersarmut angesetzt werden muss, sondern, dass auch einer falschen Grundsicherungserwartung begegnet werden muss. Fehleinschätzungen aufgrund von mangelndem Wissen über das Rentensystem und das Grundsicherungssystem können am besten durch Informationen und Aufklärung begegnet werden. Dazu gehört eine objektive Berichterstattung in den Medien, Aufklärung über die Höhe der Grundsicherung sowie über die Höhe der gesetzlichen Rente. Hier wird mit der Renteninformation bereits der richtige Weg beschritten. Zu prüfen wäre, ob zusätzliche Informationen bereitgestellt werden

sollten, z.B. wie sich die bereits erworbenen Rentenansprüche im Vergleich zum durchschnittlichen Niveau der Grundsicherung verhalten. Dies würde Auskunft darüber geben, ob jemand schon allein aufgrund der gesetzlichen Rente keinen Grundsicherungsanspruch hat. Dies kann zum einen die gewünschte Wirkung haben und Fehleinschätzungen entgegenwirken. Zum anderem besteht aber die Gefahr, dass diejenigen, die noch weit vom Grundsicherungsniveau entfernt sind, ihre Anstrengungen sowohl hinsichtlich Altersvorsorge als auch hinsichtlich des Arbeitsangebots vermindern. Dem Pessimismus dürfte dagegen schwieriger zu begegnen sein. Hier muss Vertrauen in die gesamtwirtschaftliche Entwicklung im Allgemeinen und das Rentensystem im Besonderen geschaffen werden.

5. PLEASE SIGN HERE: ASKING FOR CONSENT WITHOUT INTERVIEWERS

5.1 INTRODUCTION

An increasing number of large-scale social surveys around the world are now using some form of data linkage in order to supplement the information obtained from the survey with administrative records. Since the advantages offered by these two kinds of data are strongly complementary, combining the two sources represents a very promising way to enhance the quality and the quantity of the information available to researchers (Calderwood and Lessof, 2009). There are two main procedures to combine surveys and administrative records: statistical matching and record linkage. While statistical matching links cases which are statistically similar according to characteristics observable in both datasets, record linkage uses a unique identifier to find exactly the same person in both data sources. To proceed with record linkage respondents' explicit and informed consent is usually required (Schnell, 2012; Calderwood and Lessof, 2009). As the willingness to provide consent is not universal, bias might be introduced if individuals who consent differ systematically from those who do not.

Much of the previous literature on consent to record linkage is based on epidemiological and health related studies.[56] However, as the willingness to participate in a survey and possible consent to further requests is greatly influenced by the survey topic (Singer and Couper, 2010), it is not clear to what extent these results can be transferred to social surveys. Consequently, a growing body of literature is emerging that analyses the mechanisms behind the consent decision in social surveys (e.g. Jenkins et al., 2006; Sala et al., 2012; Sakshaug et al., 2012; Korbmacher and Schröder, 2013). These studies have provided useful insights to understand the consent decision in interviewer-administered social surveys, showing that a lot of the variance in consent is attributable to interviewer characteristics. Much less is known about consent when other data collection modes are used and the influence of the interviewer is absent. Indeed, over the past few years, interest in self-administered surveys has been rising, partially due to new opportunities offered by the

[56] See Dunn et al. (2004) and Kho et al. (2009) for literature reviews.

internet (Couper, 2011). Many scientific socio-economic panels consider switching to web-surveys while striving for record linkage at the same time (Couper, 2012).

The aim of the paper is twofold: In the first part, we document how consent was asked in the German SAVE study, a self-administered mail survey, and evaluate the achieved consent rate and potential linkage success. In the second part of the paper, we investigate patterns of consent.

The paper is structured as follows. We provide a description of the SAVE data and an overview of the achieved participation and consent rate in section 5.2. Section 5.3 presents several hypotheses on the determinants of the consent decision. It further translates our hypotheses into an empirical model. The estimation results are discussed at the end of the section. We conclude in section 5.4.

5.2 ASKING FOR CONSENT IN SAVE

5.2.1 THE SAVE SURVEY

The analysis is based on the German SAVE study, a longitudinal survey of private households initiated in 2001 by the Mannheim Research Institute (since 2011 Munich Center) for the Economics of Aging and run on an annual basis since 2005. The main goal of the study was to create a sound empirical foundation for an understanding of households' savings behaviour based on the insights from behavioural economics. Besides detailed information on income, financial and real assets as well as debt, the survey collects a rich set of psychological indicators by including questions on expectations and personal attitudes. The survey answers are provided by the individual who knows best about the household's financial situation, the so-called reference person (RP). SAVE has a rather complex design: its sample consists of two main subsamples which differ in their design and in the interview mode. The following analysis will focus exclusively on the Random Sample, which was drawn from the community-based population registers in a multistage procedure.[57] In the Random Sample, respondents receive mail questionnaires to be completed and sent back in a pre-paid envelope. A first and, if necessary, a second reminder are sent to those who do not return the questionnaire within a certain time. Non-respondents after the second reminder are contacted by an interviewer to arrange an appointment. In such cases, the questionnaire is

[57] See Börsch-Supan et al. (2009) and Coppola and Lamla (2013) for further details on the design of SAVE.

completed in a personal interview. We restrict our analysis to the part of the sample that answered to the mail questionnaire, keeping in mind that these respondents might be more motivated and hence more willing to give their consent than the other respondents.[58]

5.2.2 ADMINISTRATIVE RECORDS

In 2011, respondents and their partners were asked for written consent in order to link their survey answers with administrative records stored at the Federal Employment Agency. These records contain daily information on wages and social transfer payments received since 1975. Information on the participation in active labour market programmes is included from the year 2000 onwards, taken from the so-called Integrated Employment Biographies (Dorner et al., 2010). The labour market histories are enhanced with additional information on the employers at the establishment level (such as the business sector or qualification and age structure of the employees) drawn from the Establishment History Panel (Spengler, 2008; Gruhl et al., 2012). All individuals who have worked at least one day as an employee paying social security contributions in Germany are included in these administrative records. Thus, individuals who were always self-employed or who solely worked as civil servants or who were never parts of the labour force cannot be found in the administrative data.

5.2.3 CONSENT REQUEST

In 2011, the ninth wave of the survey was collected and consent to data linkage was asked for the first time. Both RP and his partner were asked to give their consent, even if the latter is usually not directly involved in the survey. As to signal the benefits of data linkage in terms of a reduced workload for the respondents, the questionnaire was considerably shortened.[59] Although the respondents might have seen a connection between record linkage and a shorter and less intrusive questionnaire, this link was not explicitly mentioned in the cover letter or in the consent form. Together with the questionnaire and the usual information material,[60] the SAVE respondents received a sheet on which they were asked to report their name, surname, sex, date of birth, current address and their social security number (SSN). The respondents were instructed to fill in and sign the form and to send it via a prepaid

[58] Descriptive statistics comparing the two groups are reported in appendix D.1.
[59] The questionnaire is available at www.mea.mpisoc.mpg.de.
[60] Together with the questionnaire, respondents usually receive a cover letter from both MEA and the survey agency, an easy-to-understand summary of the results obtained with the data from the last wave on a flyer as well as a data protection statement.

envelope to the Institute for Employment Research (IAB)[61], which is part of the Federal Employment agency. Two further identical sheets (but in different colours) were provided: one for the informed consent of the partner (if any) and one as a copy to be kept for the respondent's own records. A short introduction on the front-page of the consent form stressed the relevance of data linkage for social research, informed the respondents about the kind of data to be linked, and gave instructions on how to proceed in case of consent (i.e. which form had to be sent to which address). Additionally, the name and the telephone number of a contact person at the IAB were added, in case the respondents needed further explanations. A short reminder about the relevance of data linkage for the scientific community was placed within the questionnaire, followed by the explicit request to complete the consent form (see appendix D.2). Killpack and Oskala (2011) show that asking for consent in the relevant context elicited higher consent rates in comparison to asking at the end of the interview. As the request for consent was motivated with the need to achieve a better estimation of the future pension needs, it was placed right after a set of questions on pension income and before a battery of questions on future entitlements to public pensions.

5.2.4 CONSENT RATE

Out of the 1,019 households in the Random Sample that were contacted at the beginning of the fieldwork in November 2011, 828 (81%) participated in the ninth wave of SAVE. About 9% of the interviews were completed in a face-to-face interview and therefore will not be included in the following analysis.[62] A detailed breakdown of the consent rate by household type is reported in appendix D.3.[63] In total, 433 households signed and sent back at least one consent form, leading to a consent rate at the household level of about 58%. As mentioned above, both the RP and the partner were asked for consent on separate forms. When considering all individuals who were asked for consent, we obtain a consent rate of 49% as among couples not all the partners agreed to the record linkage. This rate is lower than the one usually reached in interviewer-based studies when consent is asked verbally (e.g. verbal

[61] The IAB is the research institute of the Federal Employment Agency. It is the institution which actually performs the record linkage.

[62] The low number of observations does not allow a separate analysis of the consent decision in the group receiving a personal interview.

[63] The consent request was sent to all households who participated in the study in the previous wave in 2010, irrespectively of their occupational status.

consent rate in SHARE: 78% – Korbmacher and Schröder, 2013; PASS 80% – Beste, 2011), but in line with written consent rates in interviewer-based studies (e.g. written consent rate in SHARE: 46% – Korbmacher and Czaplicki, 2011; BHPS: between 32% and 41% – Sala et al., 2012). Further differences in consent rates between the studies can be explained by the fact that different sub-populations are studied (Sakshaug et al., 2012). SAVE is a general population survey targeting households such as the BHPS, whereas SHARE or PASS target specific groups that may have different propensities to agree to data linkage.

The degree of control that the researcher can exert in a mail survey is very limited (Couper et al., 2008). The respondents set the pace and the flow of the interview so that it is not possible to tell if they answer the questionnaire first and then turn to the consent form or the other way around. This is important as reporting errors might be high if respondents answer without reading and following instructions. If such errors result in a mismatch between survey and administrative data, the resulting bias might be large (Kapetyn and Ypma, 2007). Yet, the quality of the information provided in the consent form is good. In only 2% of the cases severe deficiencies in the reported data can be found (wrong or missing SSN associated with incomplete criteria for reconstruction). In all remaining cases, either the correct SSN (66% of the cases) or the complete set of criteria (32% of the cases) are reported.[64] The results show that both the consent rate and the potential linkage success achieved in a self-administered mail survey like SAVE are comparable to interviewer-based studies. In the next section, we focus on the determinants of the consent. As much of the information is only available for the RP, we restrict our analysis exclusively to his behaviour.[65]

5.3 THE DETERMINANTS OF CONSENT

5.3.1 CONCEPTUAL FRAMEWORK AND HYPOTHESES

Despite the long tradition of record linkage in epidemiological and health related studies, there is no established theoretical framework to specifically model the consent decision. Therefore, we will borrow from well-established theoretical concepts explaining survey

[64] See Coppola and Lamla (2012) for further details.

[65] In the following analysis, we keep all observations irrespective of the quality of the information on the consent form.Results do not change when we drop observations with severe errors on the consent form.

participation, assuming that consent is yet another form of survey cooperation.[66] The final choice to agree to data linkage is modelled as the outcome of a subjective calculus between the costs and the benefits related to the consent decision. When the latter outweigh the former, the respondent is likely to give his consent.

Consenting to record linkage is a *trust-intensive* activity.[67] As stressed in Korbmacher and Schröder (2013), the respondent has no control over the data the administrative body has collected and no possibility to release only a part of the administrative records. Furthermore, he cannot track how the provided information is processed and in which way it is used by the researcher. Several factors are associated with the level of respondents' trust. For instance, East Germans are characterized by a persistent level of social distrust and are less inclined to consider others as being fair (Heineck and Süßmuth, 2013), which might result in a negative association between having been educated in the GDR and the consent decision. However, East Germans are also found to be less risk averse (e.g. Heineck and Süßmuth, 2013; Bonin et al., 2009), which should be positively correlated with willingness to give consent. Moreover, East Germans are more in favour of state interventions (Alesina and Fuchs-Schündeln, 2007), which might result in a greater willingness to provide information that can be used to design social policies. Studies analysing the determinants of consent in Germany find contradictory results (Antoni, 2011; Beste, 2011; Hartman and Krug, 2009). Thus, it remains an empirical matter which of these aspects dominate in the case of SAVE.

Beyond individual preferences, the *social and institutional environment* plays an important role for trusting behaviour (e.g. Fehr, 2009; Guiso et al., 2004). Areas with high social capital are marked by high levels of trust (Coleman, 1990). Consequently, we expect higher consent rates in areas with higher voter turnouts. Similarly, urbanity is one of the universal correlates of survey cooperation (Groves and Couper, 1996), with urban dwellers being less likely to participate in a survey. For the same reason, we expect lower consent rates among urban households. In addition, Hartmann and Krug (2009) suggest a parallel between consent to data linkage and the internet. As the latter is a medium where a huge amount of data is exchanged, the authors expect groups who are more likely to use the internet to be also more likely to consent to data linkage. We therefore expect those being online to have a

[66] See Glaser (2012) for an overview of the main survey participation theories.

[67] Fehr (2009) describes trust as the belief in the trustworthiness of others and the willingness to take social risks.

more positive attitude towards innovations and data exchange, which in turn might positively affect the probability to consent to data linkage.

The link between civic engagement and trust levels is strong not only from a theoretical (e.g. Putnam, 2000) but also from an empirical point of view (e.g. Scheufele and Shah, 2000; Uslaner, 2002, Bekkers, 2012). Besides, civic engagement is also related to the notion of civic duty which is considered a relevant factor in determining survey participation (e.g. Groves et al., 2000). Consequently, we expect a positive effect of civic engagement on the probability to consent to record linkage. Furthermore, some individuals might be more willing to consent due to their *psychological predisposition* which makes them exhibit higher levels of trust. Individuals with character traits that hint at a more positive and trustful view of the world are expected to have a positive impact on the probability to consent to record linkage.

A further element of cost related to consent is the effort required to take the decision. The task of giving an informed consent is quite difficult. The respondents need to figure out what data linkage means and what the possible consequences of this decision are. Therefore, cognitive abilities and decision-making style are expected to be crucial. A thoughtful reflection and higher cognitive abilities could help individuals understand the question and the scope of their consent, which might lead to higher consent rates. However, thoughtfulness could also induce privacy concerns and fears of breaches of data confidentiality, which in turn might reduce the willingness to consent. At the same time, respondents with lower cognitive abilities might feel that the data linkage can reduce the cognitive burden of participating in a survey if the questionnaire is shortened or difficult questions are left out due to the additional information from the administrative records. The more difficult it is for the interviewee to provide the relevant information during the survey, the more likely it is that he will agree to record linkage. Similarly, a bad health status may impair the cognitive process required to fully understand the consent request. On the other hand, the benefits of linking the survey data with administrative data are potentially higher for individuals in bad health if a poor health status induces or sharpens recall problems. The expected overall influence of respondent's health on the consent decision remains an empirical matter.

Privacy concerns can prevent respondents from consenting to data linkage. In particular, they might lead to *interview resistance* that is due to the consent request. While respondents might be willing to reveal sensitive information to the researcher and have

therefore participated in the survey, they might be concerned about disclosure to third parties (Tourangeau et al., 2000, p. 280). A breach of confidentiality in the linked dataset or an unsavoury use of the records could have tangible negative consequences for the respondents, such as the curtail of means-tested benefits paid by the institution holding the relevant administrative data. As the SAVE questionnaire includes detailed quantitative information on assets and income, which are supposed to be linked with data from the Federal Employment Agency, households receiving means-tested unemployment benefits might fear harm in case the survey data are disclosed to the Employment Agency and should therefore be less likely to consent.

A sign for a more general resistance to participate in the survey could be a high number of missing answers (Sakshaug et al., 2012) as well as difficulties in contacting the respondent. In SAVE, interviewers contact respondents only if the mailings of the questionnaire and of a successive reminder are left unanswered. Thus, a high number of previous surveys conducted with an interviewer may be interpreted as a sign of interview resistance which should be negatively associated with consent to record linkage. The next section translates our hypotheses in an empirical model. Our hypotheses are summarized in appendix D.4.

5.3.2 MODEL SPECIFICATIONS

We estimate a Probit model where the dependent variable is an indicator taking the value 1 if the RP has agreed to record linkage and 0 otherwise.[68]. We start with a basic model (which includes respondent's gender, age, education, citizenship, employment history, household composition, household's net monthly income and net wealth) and nest it in gradually richer models in order to test our hypotheses. The additional variables are arranged in three groups, which capture *trust beliefs, psychological traits* as well as *interview resistance*.[69] The choice of assigning a particular covariate to a specific cluster is of course fictitious as many of them tap into different domains at the same time. That means that we cannot unambiguously test which of the three blocks are the main drivers behind the consent decision. We choose this approach for ease of exposition.

[68] If only the partner sent back a signed form the dependent variable equals 0. That concerns only 7 cases (see appendix D.3).

[69] Our sample is a balanced panel so that information from previous waves is available for all observations. We compare the models using a Wald test which tests the hypothesis that the coefficients on the additional covariates are jointly zero. As the regressions are run using multiple imputed datasets, it is not possible to perform likelihood-ratio tests to compare nested models. The Wald test is asymptotically similar to a likelihood ratio test.

Trust and social environment

As argued the previous section, East Germans tend to have lower levels of trust relative to West Germans. Therefore, we include an indicator which equals 1 the respondent completed his secondary education in the former German Democratic Republic (GDR) and 0 otherwise.

While the GDR indicator captures past societal effects, the next two variables measure contemporary impacts of the surrounding environment. The first one is the turnout at the federal elections in the respondent's district of residence (Landkreis[70]) in 2009. Districts where the turnout is one standard deviation below (above) the mean are classified as "low (high) turnout" districts. Districts where the turnout is one standard deviation below (above) the mean are classified as "low (high) turnout" districts. As a further indicator on the aggregate level, we include a dummy which takes the value 1 if the respondent lives in an urban area.

Two further variables are used to capture trust beliefs at the individual level. As a first indicator, we consider the frequency of internet usage as of 2005. The variable equals 1 if in the wave of 2005 the RP reported to access the internet several times a week. The second variable equals 1 if the respondent reports to do voluntary work on a regular basis (at least once a month). The indicator refers to data from SAVE 2008.

Psychological traits

In the questionnaire of 2007, respondents were asked to rate on a scale from 0 (completely disagree) to 10 (completely agree) to what extent they felt they could be described by a series of short statements. The following statements: "I am an optimist", "I am open to change", "I am self-confident" and "I am cheerful" are considered relevant for the analysis. We transform the response scales into dichotomous variables taking the value 1 if the RP rated the specific statement with a value greater than 6.

In order to control for the decision-making style and the cognitive abilities of the respondent, we introduce an index based on the answers to the Cognitive Reflection Test (CRT). The CRT is a three-item math-puzzle developed by Frederick (2005). It was introduced

[70] The *Landkreis* corresponds to the smallest level of territorial classification (before the municipality itself). In the European geocode standard *Nomenclature of Units for Territorial Statistics* (NUTS) the *Landkreis* correspond to level 3.

in the SAVE questionnaire in 2009.[71] Besides being positively correlated with numeracy and general measures of intelligence (Liberali et al., 2012), the CRT measures a specific aspect of cognitive ability, namely reflectiveness, i.e. careful, thorough, elaborative search, and low impulsiveness (Cokely and Kelley, 2009). Each of the three items has an intuitive (but incorrect) answer that comes to mind quickly. Giving the right answer requires overcoming the impulsive response. Based on the CRT answers, we construct an index which is 0 (*intuitive/low cognitive ability*) for those respondents with up to 1 correct answer, and is 1 for the respondents with 2 to 3 correct answers (*meditated/high cognitive ability*).[72] It remains a priori unclear in which direction the results of the CRT should influence the consent decision. As stated above, respondents with higher cognitive abilities might find it easier to understand the relevant information on the consent form. At the same time, they might give more thought to potential risks related to data linkage.

Finally, we include a dummy which equals 1 if the respondent reports to be in good or very good health and 0 otherwise.

Interview resistance

Certain privacy concerns might be invoked by the specific survey situation. We include a dichotomous variable which takes value 1 if in the previous wave (run in 2010), the RP reported to receive unemployment benefits from the Federal Employment Agency.

Additionally, we include the ratio of missing answers to sensitive items to the total number of sensitive items in the previous wave of the survey.[73] The ratio ranges from 0 (all sensitive items have been answered) to 1 (none of the sensitive items have been answered).

Finally, as an indicator for the general attitude of the respondent towards the survey, we take the number of past interviews conducted face-to-face.[74]

[71] SAVE is the first general population survey to include this three-item test. Prior studies are experimental and restricted to very narrow populations (e.g. Oechssler et al., 2009; Toplak et al., 2011; Koehler and James, 2010).

[72] Oechssler et al. (2009) use the same categorisation when testing the relationship between cognitive abilities and behavioural biases.

[73] We consider all the variables which relate to the household's monthly income, value of real and financial assets, type and amount of outstanding debts as sensitive items. A total of 61 sensitive items were included in the survey 2010.

[74] We need to subtract the interview in the first wave as all respondents who entered the panel were initially contacted by an interviewer.

5.3.3 ESTIMATION RESULTS

Table 11 displays marginal effects evaluated at mean characteristics after Probit regressions. As we believe that the underlying mechanisms which determine the consent decisions are different between a self-administered and an interviewer-based survey and we cannot sufficiently control for mode effects, our main analysis is restricted to the 750 respondents who replied to the mail questionnaire.

Background characteristics

We find evidence for an age effect with the older respondents (age 55+) being more likely to agree to data linkage than the younger respondents (age <35). Given their long employment history, older respondents might find it difficult to report events correctly and feel that linkage can reduce their answering burden. Moreover, in case the respondent is retired, the employment records are already outdated and hence the costs in case of disclosure are rather low. An alternative explanation is that positioning the data linkage request after the question module on pensions makes the request more salient for older respondents.

There are no significant gender effects. In addition, neither the nationality (German vs. Non-German) nor the household composition (living with a partner, number of children in the household) significantly influence the consent decision.

Respondents with a higher schooling degree are more likely to consent in all specifications. As opposed to schooling, a post-secondary degree lowers the probability to give consent. It appears that education helps respondents to process the new information coming with the consent request. However, from a certain educational level onwards, respondents seem to give more thought to the consent decision and the risk of disclosure. We suspect that privacy concerns dominate in the upper educational classes.

Financial variables are known to be significant predictors of consent (Sakshaug et al., 2012). Our results indicate an important income effect while net wealth remains insignificant. Across all specifications, households with higher income are more likely to consent than the reference group, i.e. households from the first income quintile. That is in line with many other studies (e.g. Beste, 2011; Haider and Solon, 2000; Hartman and Krug, 2009).

The employment history of the respondent reflects the salience of the linkage with data from the Federal Employment Agency. Respondents who were never subject to social security contributions are not included in the administrative records and might therefore

feel that their information is irrelevant to the researcher. At the same time, these respondents have no pre-existing history with the institution and therefore no risk of disclosure. It appears that these mechanisms counterbalance as the variable is not significant in our model.

In contrast, respondents who have a pre-existing relationship with the Federal Employment Agency in a sense that they experienced short spells of unemployment (6 months to 2 years), are more likely to consent to data linkage. These respondents might have had some good experience with the institution (they received unemployment benefits and possibly successful aid with their search for a job) which has built trust and the desire to support its work. Interestingly, respondents with unemployment spells in excess of 2 years have a lower probability to consent, although the marginal effect is only significant in the second specification.

Trust and social environment

Our theoretical expectation is that trust attitudes are of major importance in determining the consent decision. However, we find only mild evidence that these factors influence the willingness to give consent. The fit of the model which includes these indicators is not significantly better than the basic model.

In line with the results of Hartman and Krug (2009) and Antoni (2011), we find that respondents educated in the GDR are more likely to consent to data linkage. A more favourable attitude towards government intervention and the acquainted habit of cooperating with public agencies appear to compensate for lower levels of social trust in East Germany.

Similar to the results in Korbmacher and Schröder (2013), environmental influences – as measured by the electoral participation in the district and whether the respondent is living in an urban area – are not significant predictors for the consent decision.

Individuals who volunteer on a regular basis are more likely to consent. The probability of agreeing to record linkage is about 7 percentage points higher than for individuals who did not volunteer, although the effect turns insignificant once we control for resistance towards the interview.

Furthermore, results do not show a significant relationship between the consent decision and internet usage in 2005. This might indicate that our proxy does not sufficiently capture

related character traits such as being interested in innovation and open to change, given that theoretical considerations are clear-cut.

Psychological traits

Neither the health status[75] of the respondent nor the decision-making style as measured by the CRT score are significantly associated with the probability of giving consent. As described in section 5.3, the effect of intuitiveness and low cognitive abilities on the consent decision can go in either direction. Respondents with a high score might find it easier to understand the provided information and the scope of the consent decision. At the same time, they might give more thought to the decision and give more weight to privacy concerns.

Within this block, optimism is the only variable which is systemically associated with the consent decision. Psychological research has found a significant correlation between optimism and the Big Five model of personality traits, in particular with agreeableness and adaptive behaviour (Sharpe et al., 2011; Milligan, 2003). Rather optimistic persons are known to tolerate more risk or to perceive risk as comparatively low, for instance in health related behaviour or portfolio choice (Puri and Robinson, 2007 and references therein). Privacy concerns might therefore play a minor role for optimistic respondents.[76]

Interview resistance

In contrast to our expectations, the fact, whether or not respondents receive unemployment benefits, does not influence their consent decision. As mentioned above, theoretical considerations yield ambiguous results. While the variable can represent a proxy for higher costs in the case of disclosure, it might also capture the perceived benefits of giving consent for some respondents, hoping that their answers will lead to policy intervention which can help to improve their situation.

Our results provide strong evidence that a general resistance towards the interview significantly affects the probability to consent to data linkage. Both the ratio of the number of missing sensitive items to the number of sensitive questions as well as the number of personal interviews in previous waves are negatively correlated with the likelihood of agreeing to record linkage. Personal interviews in previous waves might indicate a lack of

[75] Using objective measures of the health status (i.e. indicator for having chronic conditions) lead to similar results.

[76] Results do not change when we reduce the number of psychological traits.

motivation or a reluctance to reveal personal information. The consent request might be considered as an additional burden which the respondents are not willing to take.

Altogether, the included variables explain only a small fraction of the total variance in the probability of giving consent. Even in the full model, which includes the whole set of potentially relevant regressors, the obtained pseudo R-squared is quite low (10%). It is, however, in line with the values reported in other studies (e.g. Hartmann and Krug, 2009; Antoni, 2011; Beste, 2011). On the one hand, these results could be interpreted as a sign that most of variance in consent is indeed random, which is good news with respect to possible biases introduced by the consent request. On the other hand, the low explanatory power could be due to a poor understanding or a poor measurement of the mechanisms behind the consent decision, pointing out the need for a more refined theoretical model to properly explain the complex process that leads (or does not lead) to consent to record linkage.

Table 11: Determinants of consent – Marginal effects after Probit regressions

dep. var.: RP gives consent (1/0)	(1)	(2)	(3)	(4)
		background characteristics		
age <35	ref.	ref.	ref.	ref.
age 35-54	-0.029	-0.058	-0.048	-0.034
	[0.070]	[0.070]	[0.080]	[0.080]
age 55+	0.215 ***	0.187 **	0.198 **	0.205 **
	[0.070]	[0.080]	[0.080]	[0.080]
male	0.003	0.016	0.022	0.012
	[0.040]	[0.040]	[0.040]	[0.040]
foreign	-0.049	-0.016	-0.022	-0.026
	[0.230]	[0.230]	[0.220]	[0.230]
living with partner	-0.005	-0.013	-0.014	-0.031
	[0.050]	[0.050]	[0.050]	[0.050]
# children living in household	0.001	0.000	-0.002	0.000
	[0.030]	[0.030]	[0.030]	[0.030]
no degree/				
low secondary education	ref.	ref.	ref.	ref.
intermediate secondary education	0.097 **	0.077	0.075	0.063
	[0.050]	[0.050]	[0.050]	[0.060]
high secondary education	0.146 **	0.134 **	0.136 **	0.118 *
	[0.060]	[0.070]	[0.070]	[0.070]
no post-secondary education	ref.	ref.	ref.	ref.
vocational training	-0.085	-0.112	-0.122 *	-0.124 *
	[0.070]	[0.070]	[0.070]	[0.070]
university degree	-0.160 *	-0.214 **	-0.227 **	-0.228 **
	[0.090]	[0.090]	[0.090]	[0.090]
income: 1st quintile	ref.	ref.	ref.	ref.
income: 2nd quintile	0.115 *	0.117 *	0.127 *	0.112
	[0.069]	[0.069]	[0.070]	[0.110]
income: 3rd quintile	0.293 ***	0.302 ***	0.304 ***	0.300 ***
	[0.072]	[0.072]	[0.070]	[0.070]
income: 4 quintile	0.163 **	0.172 **	0.184 **	0.175 **
	[0.077]	[0.079]	[0.080]	[0.080]
income: 5th quintile	0.179 **	0.191 **	0.191 **	0.189 **
	[0.082]	[0.084]	[0.090]	[0.090]
net wealth: 1st quintile	ref.	ref.	ref.	ref.
net wealth: 2nd quintile	-0.046	-0.061	-0.066	-0.065
	[0.070]	[0.070]	[0.070]	[0.070]
net wealth: 3rd quintile	-0.094	-0.098	-0.101	-0.102
	[0.070]	[0.070]	[0.070]	[0.070]
net wealth: 4 quintile	-0.028	-0.028	-0.039	-0.040
	[0.060]	[0.060]	[0.070]	[0.070]
net wealth: 5th quintile	-0.110	-0.108	-0.117	-0.112
	[0.070]	[0.070]	[0.070]	[0.070]
never subject to social insurance	-0.035	-0.042	-0.036	-0.044
	[0.090]	[0.090]	[0.090]	[0.090]

Table 11: Determinants of consent – Marginal effects after Probit regressions (continued)

	background characteristics			
unemployed in the past: never	ref.	ref.	ref.	ref.
unemployed in the past: up to 6 months	-0.036	-0.033	-0.037	-0.041
	[0.050]	[0.050]	[0.050]	[0.050]
unemployed in the past: 6 months up to 2 years	0.134 ***	0.130 **	0.127 **	0.123 **
	[0.050]	[0.050]	[0.050]	[0.050]
unemployed in the past: longer than 2 years	-0.094	-0.108 *	-0.105	-0.107
	[0.060]	[0.060]	[0.060]	[0.070]
	trust & social environment			
educated in GDR		0.099 **	0.091 *	0.089 *
		[0.050]	[0.050]	[0.050]
electoral turnout: low		ref.	ref.	ref.
electoral turnout: medium		0.049	0.045	0.029
		[0.050]	[0.060]	[0.060]
electoral turnout: high		0.003	-0.012	-0.029
		[0.070]	[0.070]	[0.070]
living in urban area		0.001	0.004	-0.008
		[0.040]	[0.040]	[0.040]
civic engagement in 2008		0.070 *	0.070 *	0.065
		[0.040]	[0.040]	[0.040]
internet usage in 2005		0.016	0.010	0.009
		[0.050]	[0.050]	[0.050]
		psychological traits		
good health			0.033	0.039
			[0.040]	[0.040]
Cognitive Reflection Test			0.011	0.002
			[0.040]	[0.040]
optimist			0.083 *	0.083 *
			[0.050]	[0.050]
open to change			0.057	0.055
			[0.040]	[0.040]
self-confident			-0.064	-0.059
			[0.050]	[0.050]
cheerful			-0.039	-0.036
			[0.050]	[0.050]
			interview resistance	
receiving unemployment benefits				-0.012
				[0.080]
missings ratio				-0.216 *
				[0.012]
# personal interviews				-0.041 **
				[0.020]
Pseudo R2	0.074	0.083	0.091	0.100
Wald Test (Prob > F)	-	0.189	0.210	0.035
N	750	750	750	750

Source: SAVE 2007-2011. Own calculations. **Notes:** Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

5.4 CONCLUSION

In this paper, we investigate the success of asking for consent as well as patterns of consent in a self-administered social survey using the example of the SAVE study. While there is a growing string of literature studying consent bias in interviewer-based surveys, we could only hypothesize that obtaining consent is more difficult in a self-administered survey design as no empirical evidence exists on this topic. Especially in the face of the increasing importance of web surveys, this appears to be an important gap. The achieved consent rate in SAVE is similar to consent rates in interviewer-based surveys, showing that – at least in stable panels – asking for consent to data linkage in a self-administered survey is feasible. In our empirical analysis, we extend the common predictors used in existing studies to explain the determinants of consent by *trust and the social environment* as well as *psychological traits*. We find that individuals who were educated in the former communist part of Germany, those who volunteer on a regular basis as well as those who think of themselves as being optimistic are more likely to consent to record linkage. A general *resistance towards the interview* is found to be one of the main determinants of the consent decision. In particular, respondents who are reluctant to answer sensitive questions and who were difficult to contact are less likely to consent. From a researcher's point of view this can be good news. While social environments as well as respondents' predispositions are out of the control of the researcher, interview resistance that is specific to the consent request can be mitigated by putting more effort into pointing out the benefits of consent and by explaining the very limited risk of disclosure. By participating in the survey and answering to the survey questions, the respondents indicate that they are willing to reveal at least some sensitive information to researchers. However, they might be concerned about disclosure to third parties involved in the linkage process (here: the Federal Employment Agency). Therefore, trust in the legitimacy of the request and confidentiality of the information are pivotal. One of the major advantages of asking for consent in a panel study is that the respondents already trust the institution as well as the survey agency. It should be far more difficult to ask first time respondents for consent.

In our study, we only consider one aspect that might lead to a biased sample. Besides of consent bias, panel studies face attrition with selection taking place over the years. As we model the consent decision similar to the decision to participate in a survey, the bias should go in the same direction but we cannot relate its size. A recent paper by Sakshaug and

Kreuter (2012) is a first advancement in this field, suggesting that consent bias is small in comparison to other sources of error. Clearly more evidence on the effect of asking for consent on attrition is needed. Moreover, it is known that the context of a question affects the respondents' willingness to answer (e.g. Schwarz, 1991; Tourangeau and Smith, 1996). While the control of the researcher is very limited in a paper and pencil design, one future avenue for research is to control for order effects in self-administered web surveys where the respondent cannot choose which information to read first.

Our analysis is exploratory in its approach. We control for a series of variables that proxy for privacy concerns, in particular interview resistance. Yet, we cannot explain what causes these concerns: neither trust attitudes nor the controls for psychological traits contribute significantly to explaining the consent decision. We conclude that the underlying mechanisms that lead to the consent decision are still not well understood. We understand our paper as a step towards improving this knowledge.

6. IS IT ALL ABOUT ACCESS? PERCEIVED ACCESS TO OCCUPATIONAL PENSIONS IN GERMANY

6.1 INTRODUCTION

Population aging is one of the main demographic challenges of the 21st century. In order to face this challenge, many countries have introduced major reforms. In particular, pension systems have witnessed radical changes: monolithic systems have been gradually replaced by multi-pillar systems. While individuals are increasingly responsible for securing their own retirement, the adaption of their savings behaviour will take some time. In order to accelerate the take up of supplementary pensions, two competing strategies were applied (Börsch-Supan et al., 2012): some countries have made supplementary pensions mandatory (e.g. Sweden) while in other countries supplementary pensions remained voluntary, but the incentives to save privately were changed (e.g. Germany).[77] A large string of literature has developed, evaluating the effectiveness of such incentives (e.g. Börsch-Supan, 2004). Although incentives turn out to be powerful determinants of individuals' behaviour (e.g. Samwick, 1998; Gustman and Steinmeier, 2001), several studies find widespread ignorance of pension plan details (e.g. Mitchell, 1988; Gustman et al., 2007; Gustman and Steinmeier, 2005; Luchak and Gunderson, 2000). A possible explanation for this puzzle is that people respond to incentives as they perceive them. Chan and Stevens (2008) show that even after controlling for the actual set of financial incentives to take up an occupational pension plan, workers still respond to their perceived incentives. In the extreme case, preferences, even if they are rational, become irrelevant as perceptions determine savings decisions (McFadden, 1999).

This paper provides an empirical analysis of workers' perceptions regarding their access to occupational pensions. Understanding the determinants of these perceptions is relevant for policy makers in order to design better and more cost-efficient pension information. In particular, we examine whether a lack of knowledge is associated with factors determined by firm-side or worker-side characteristics, or the interaction of both. The paper most closely related to ours is Mitchell (1988). She presents a theoretical model explaining how worker and firm reports on pension plans may diverge, namely when information is costly. In her

[77] See Barr and Diamond (2010) for an overview of recent pension reforms.

empirical analysis, she shows that missing or wrong information is widespread, concluding that good information is systematically related to both worker and firm characteristics.

We will explore perceived access to occupational pensions in Germany. As of 2001, every employee has the legal right to participate in an occupational scheme. However, not all the employers have necessarily set up occupational pension schemes and are only obliged to do so if explicitly requested by their employees. Many employers might be reluctant to inform their employees about their right due to the high costs related to setting up an occupational pension in combination with a low anticipated demand (BMAS, 2012a). At the same time, workers' ignorance of their legal right may be the outcome of a rational decision if incentives are too low or the cognitive burden that is required to process the information is too high. For instance, it might be optimal for workers to choose a path of ignorance if they can insure their needs better with transfer programmes (Lamla and Gasche, 2014; Lusardi et al., 2013). To shed light on this issue, we will use an innovative linked employer-employee data set which combines survey responses of workers on their perceived access to occupational pension with administrative information on their employment histories as well as administrative information on the firms.[78]

The paper is structured as follows. Section 6.2 gives an overview of the key features of occupational pensions in Germany and discusses which factors might influence perceived access to occupational pensions. Section 6.3 explains the data and sample used as well as our empirical model. The estimation results are presented in section 6.4, followed by a discussion of several caveats related to measurement error in section 6.5. We conclude in section 6.6.

6.2 INSTITUTIONAL FRAMEWORK AND HYPOTHESES

6.2.1 OCCUPATIONAL PENSIONS IN GERMANY

Standard economic theory usually highlights the role of occupational pensions as a Human Resource (HR) tool used to regulate employment-related outcomes such as work efforts, turnover of the labour or retirement decisions (Gustman et al., 1993).[79] In Germany, there

[78] Throughout the paper we will use the words firm and establishment interchangeably.

[79] Competing theories exist on the mechanisms through which occupational pensions help employers achieving these goals. Occupational pensions could provide a set of incentives for the employees to behave in a certain way (e.g. Becker and Stigler, 1974; Ippolito, 1985). Alternatively, they could act as a sorting device, attracting workers with desirable characteristics (e.g. Allen et al., 1993; Ippolito, 2002).

have been profound changes in employers' and employees' roles and risk exposure concerning occupational pensions since 1974, changing the role of occupational pensions as an HR tool. The traditionally employer-centric occupational pension system (Burger and Clark, 2011) has evolved to a more employee-friendly system: initially, all decisions related to occupational pensions were made by employers. In 1974, employees received an occupational pension guarantee and a vesting period of 10 years. In 2001, the so-called Riester reform dramatically changed the institutional setting of the German pension system. With respect to occupational pensions, the reform extended employee rights, including shorter vesting periods and easier portability. An important change introduced by the reform was the legal right of workers to occupational pensions. Workers are now entitled to convert parts of their salary (up to 4% of the upper earnings threshold for social security contributions) into contributions to occupational pension plans (*Entgeltumwandlung*), unless the employer offers another occupational pension scheme. In their most basic version, these plans are employee-financed occupational pensions which are guaranteed by the employer.[80]

Employers' contributions to occupational pensions are not mandatory. At the saem time, employers can have tax advantages by offering an occupational pension, which strongly depend on the funding vehicle.[81] Employers can decide how the occupational pension system is structured, but face strong and complex institutional regulations. In particular, conservative investment rules and mandatory reinsurance are supposed to keep the risk for the employees low (Burger and Clark, 2011). Employees participating in an occupational pension scheme benefit from deferred taxation as pension plans are treated according to the "exempt, exempt, taxed" (EET) formula: contributions and investment returns are tax exempt while benefit payments are subject to income tax.

It is unclear which proportion of employees already has an occupational pension and existing estimates vary considerably. In a recent employee survey, 39% of the respondents reported to take part in an occupational pension plan (BMAS, 2012b). Coverage rates gauged surveying employers or pension providers amount to about 60% of the German labour force (BMAS, 2012a). The study by BMAS (2012b) documents pension coverage rates by socio-demographic groups, showing that men are more often covered by an occupational pension

[80] At least the nominal value of the contributions has to be guaranteed at the beginning of retirement.

[81] In Germany, five different funding vehicles exist with distinct advantages and disadvantages. See Pfaffenholz et al. (2005) for an overview.

than women. Besides, those with higher education, full-time employees and high-income earners are also more likely to participate in a pension plan. Moreover, there are distinct patterns by firm size and business sector. The question remaining unanswered by existing literature is what drives these differences in participation. One possible channel could be the lack of awareness about the access to occupational pensions among workers.

Despite the legal entitlement to occupational pensions, not all employers have set up a scheme yet. At the end of 2011, about 50% of the establishments in Germany had an occupational pension scheme in place (BMAS, 2012a). Again, there are differences by business sector (Statistisches Bundesamt, 2011; Blanck and Wiececk, 2012). Furthermore, the share of firms offering an occupational pension scheme is higher in West than in East Germany and it increases with firm size (BMAS, 2012a). The study by BMAS (2012a) presents the most important reasons from the perspective of employers not to offer an occupational pension: Many employers name the high costs related to occupational pensions as an obstacle (49%). Similarly, 18% of the employers perceive the administrative burden as too high and occupational pensions as too complicated. 11% say that occupational pensions are not relevant for them due to high turn-over rates resulting from a high share of marginally employed or seasonal workers.[82] About 4% of the employers are not even aware of the employee right to an occupational pension. The perceived lack of demand by employees turns out to be the most important reason for not offering an occupational pension (69%). Interestingly, a recent employee survey identifies the lack of supply as the main reason for employees not to have an occupational pension (BMAS, 2012b, p. 41). Apparently, there is a wedge in perceptions between the two sides of the labour market.

6.2.2 HYPOTHESES: THE DETERMINANTS OF PERCEIVED ACCESS

In a world of costless information, workers' knowledge of occupational pensions would be without gap. Workers would know exactly whether they have access to an occupational pension and, if yes, what the characteristics of the available pension plans are. However, gathering and processing information is costly for the worker. Assuming a utility-maximizing decision maker, a worker should first decide how much to invest in acquiring and processing the relevant information about his access to an occupational pension and then, conditional

[82] Marginally employed workers are employees on fixed-term contracts with an income below the threshold of 450€/month and with reduced social security contributions. These kind of jobs are also called *Mini-Jobs*.

on access, decide if he wants to participate in the available pension plan. By giving every worker the legal right to an occupational pension, the institutional framework in Germany should have reduced the information costs of this first step. However, if the costs of processing information are too high or the expected benefits are too low, it might be rational for some individuals not to collect information about their access to an occupational pension. In particular, many workers will rely exclusively on the information available at the firm and will not gather information on their legal right in order to request an occupational pension. If individuals place too much weight on easily accessible and salient information (McFadden, 1999), employers will continue to have a pivotal role in determining perceived pension access. Furthermore, even if workers are aware of their legal right, they might still perceive occupational pensions as inaccessible in case the (psychological) costs of urging the employer to set up a pension plan are too high. Thus, workers' perceived access rather than real access to occupational pensions plays a vital role in the decision to participate. We expect individuals to differ in the degree to which they are aware of their possible savings opportunities and thus in the way they perceive their access to occupational pensions. Therefore, we propose a simple conceptual framework similar to the ideas presented in Mitchell (1988), where perceived pension access can be explained by characteristics of employers and employees as well as their interaction. Within our framework, we want to test the following hypotheses:

Workers' educational attainment and financial sophistication should be associated with a higher ability to understand the legal rights and tax benefits from occupational pensions. Consequently, we claim that

H1: Education and financial knowledge are positively associated with perceived pension access.

In addition, workers' savings preferences should affect the incentives to gather information. On the one side, workers with strong preferences for saving might be more interested in learning about their access to occupational pensions as an additional savings tool. On the other side, workers who already provide for their old age through other savings instruments might have lower incentives to gather information on their access to an occupational

pension. Thus, the relationship of savings preferences with perceived access remains an empirical matter.

Characteristics determined by the employer-employee match also affect workers' perceived access. Knowing whom to contact in the HR department in order to ask for information and explanations can facilitate the acquisition of the relevant knowledge. Such firm-specific knowledge should increase with tenure (Mitchell, 1988). Consequently, we formulate the following hypotheses:

H2a: The longer the worker is employed at the firm, the more likely he is to report pension access.

We expect tenure to have an additional effect on workers who used change jobs more often. On the one hand, individuals who exhibit high job mobility might fear the capital loss imposed by job changes before pensions are vested and due to limited portability. On the other hand, job mobility might have a positive effect on the quality of the employer-employee-match (Widerstedt, 1998). Workers who expect to stay longer with their current employer due to the good match should not anticipate capital losses. Therefore, we expect that

H2b: For workers who exhibit high job mobility, tenure has a supplementary effect on perceived pension access.

Employers can regulate the amount and the quality of the information provided to their employees (Mitchell, 1988; Ghilarducci, 1990). High-income earners might be the elite the employer wants to retain, so that employers' contributions are usually higher for these workers. For the same reason, employers might put more effort in promoting occupational pensions among high-income earners, thus raising their awareness. We propose that

H3: Income is positively associated with perceived pension access.

Setting up and administering an occupational pension plan requires considerable administrative effort (Greer et al., 1999; BMAS, 2012a). Thus, firms that can exploit technical

efficiencies in producing and disseminating information are more likely to raise awareness among workers (Mitchell, 1988). In contrast, if firms are negligent in complying with other administrative duties, they might be less likely to inform their workers about their right to participate in an occupational pension. We argue that

H4: Working for a firm that is diligent in complying with administrative duties increases the probability to be aware of pension access.

Larger firms can exploit economies of scale in setting up and managing pension plans (Mitchell, 1988), this way reducing their costs and increasing the administrative efficiency. This leads to our fifth hypothesis:

H5: Working for a large firm increases the probability to be aware of pension access.

The more relevant occupational pensions are for the HR concept of the employer, the more plentiful the information provided to the employees should be. Recent studies have shown that marginal workers represent substitutes for regular jobs in production (Jacobi and Schaffner, 2008). Thus, binding workers might be less relevant for firms if marginal workers are prevalent. In addition, the effectiveness of the HR concept depends on employees' valuation of occupational pensions (Gustman et al, 1993). If the employer anticipates a low demand for occupational pensions based on the prevalent labour force structure, the provision of information should be less efficient. Consequently, our sixth and final hypothesis states that

H6: Working for a firm with a high share of marginal workers decreases the probability to report pension access.

The next section presents the data and empirical model used in order to operationalize our conceptual framework.

6.3 ESTIMATION STRATEGY

6.3.1 DATA AND SAMPLE

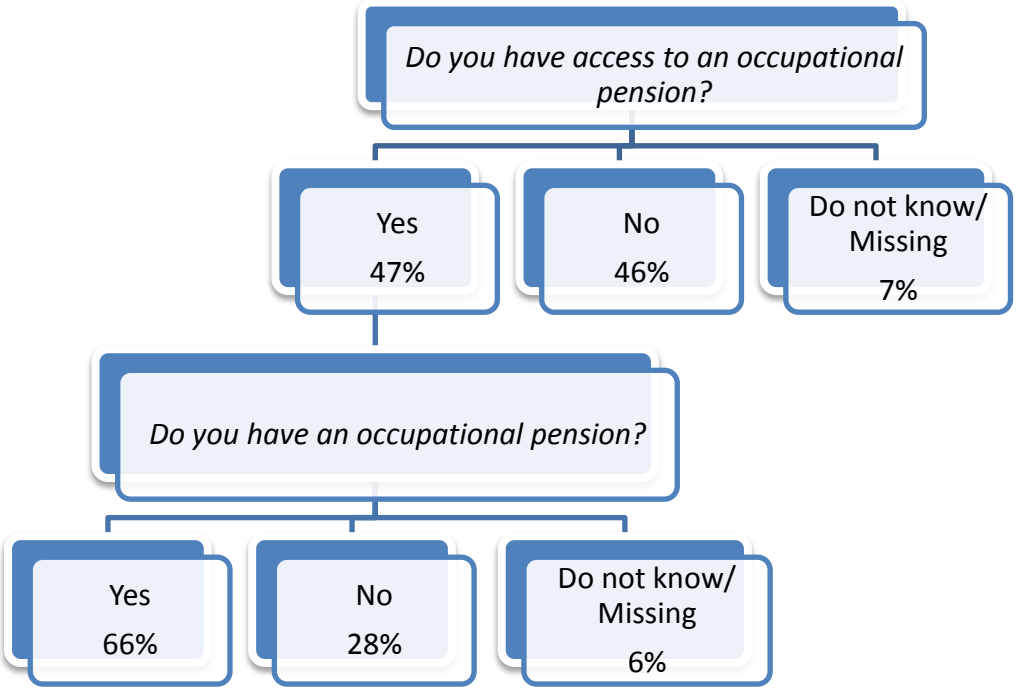
The analysis is based on the German SAVE study, a longitudinal survey of private households, initiated in 2001 and run on an annual basis since 2005. The main goal of the study was to create a sound empirical base to understand households' savings behaviour.[83] Information on the perceived access to an occupational pension is extracted from the survey. First, respondents are asked if they have access to an occupational pension[84] In a follow-up question, those respondents who report to have access to an occupational pension are asked if they participate in the available pension scheme.

47% of the SAVE respondents report to have access to an occupational pension, 46% say that they do not have access while a fraction of 7% of the respondents does not answer the question or chose the "do not know" option (see figure 8). Conditional on access, 66% of the workers say that they participate in a pension plan. Consequently, 31% of the workers in the sample are covered by an occupational pension.

[83] See Börsch-Supan et al. (2009) for more information on SAVE. In order to prevent bias due to item non-response missing values in the survey are imputed using a multiple imputation procedure based on a Markov Chain Monte Carlo simulation (Schunk, 2008; Ziegelmeyer, 2009; 2013).

[84] In the wording of the question we ask about the establishment. An English translation of the question (as well as the original text) can be found in appendix E.1.

Figure 8: Occupational pension access and coverage rates in SAVE 2011



Source: SAVE 2011. Own calculations.

The wave 2011 of the SAVE study was used to test the feasibility of a triple-linkage-strategy, creating a linked employer-employee data set which combines survey and administrative data.[85] The respondents (and their partners) were asked for written consent to link their survey data with their administrative records stored at the Federal Employment Agency. These records contain information on workers drawn from the so-called Integrated Employment Biographies (Dorner et al., 2010) and firms taken from the Establishment History Panel (Spengler, 2008; Gruhl et al., 2012). All individuals who have worked at least one day as an employee paying social security contributions in Germany are included in the administrative records. Thus, individuals who have been always self-employed, have worked only as civil servants or have never been part of the labour force are not part of the data.

The administrative records allow linking employers and employees. Our analysis is therefore restricted to respondents who consented to data linkage. In total, 956 households signed and sent back at least one consent form, leading to a consent rate at the household level of about 58%.[86] We have compared the linked data set to benchmarks from administrative data (see appendix E.2). Despite the small sample size, German workers and firms seem to be well represented: comparing employees in our sample with administrative data from the

[85] See Coppola and Lamla (2012; 2013) for further details on the linkage process.
[86] In contrast to the previous chapter 5, we do not restrict our analysis to the Random Sample.

Federal Employment Agency, we find that workers in the linked SAVE data set are quite similarly distributed across sectors and by the firm size as the entire German work force. Likewise, the share of marginal workers in the linked SAVE data set as well as according to the Federal Employment Agency is comparable for East and West Germany. The income of workers in linked SAVE have followed the income trends over the years (starting from 1975), but used to earn higher wages on average. This trend has changed during the last years. And lastly, workers in SAVE tend to change employers slightly more often than the average employee. Section 6.5 discusses potential problems due to selectivity. For our analysis, we further restrict the sample to respondents who have been working as employees (not as civil servant or self-employed) in 2010. Consequently, 286 observations are left for the analysis.[87]

6.3.2 MODEL SPECIFICATIONS

In order to test our hypotheses, we estimate a Linear Probability Model where the dependent variable equals 1 if the worker claims to have access to an occupational pension and 0 otherwise.[88] Explanatory variables are categorised in three groups: *worker characteristics*, *outcomes of the employer-employee match* and *firm characteristics*.

Worker characteristics

As worker characteristics, we include the age and gender of the respondent as well as the educational attainment.[89] Furthermore, we account for financial knowledge of the worker based on an financial literacy index which counts the number of correct answers to three questions capturing the understanding of basic financial concepts (namely: interest rate, inflation and risk diversification in financial investments).[90]

Workers' savings preferences are taken into account using a question which asks the respondent to rate on an 11-point scale the relevance assigned to the savings motive "old-

[87] The administrative data refers to the year 2010. In the restricted sample, 55% of the respondents report to have access to an occupational pension, and 69% of those who have access, report to take part in the pension scheme. Further descriptive statistics are displayed in appendix E.3.

[88] Our model includes interaction terms. There is much discussion on how to interpret interaction terms in non-linear models in terms of partial effects (e.g. Ai and Norton, 2003; Greene, 2010; Williams, 2009; Cornelißen and Sonderhof, 2009). We have therefore chosen to estimate a Linear Probability Model. For robustness checks, Probit models were estimated and results remain similar. The results are available upon request.

[89] The German school system offers several possible educational paths. We aggregate them according to the international standard of classification (ISCED-97) (see Schneider, 2008). For robustness we have changed the categories according to the German schooling degrees. Results remain similar.

[90] The questions werde included in the waves 2007, 2008 and 2009 of the SAVE study. We use the answers given in SAVE 2009.

age provision" (0 meaning "not important at all" and 10 meaning "very important"). A dummy variable, which equals 1 if the old-age provision motive was assigned a value of 7 or greater is included in the regression. Futhermore, we include a dummy variable being 1 if the worker owns financial assets specifically targeted to the old-age (i.e. private pensions or capital life insurances).[91]

The regression model incorporates also a dummy variable which equals 1 if the respondent lives in East Germany. In our sample, living in East (West) Germany mostly coincides with working in East (West) Germany. Only 2.4% of the respondents (which corresponds to 7 observations) are commuters. Thus, the indicator also captures differences in the awareness of employees working for East German firms.

Outcomes of the employer-employee match

We include the daily gross wage divided into quartiles. In addition, we control for worker's tenure at the current employer measured in years. As additional regressors, we include indicators for the job mobility of the worker. We divide the total number of employer changes preceding the current employment by the number of years the individual is observed in the administrative records in order to account for different lengths of the employment biography. Three dummy variables are constructed, based on tertiles of the distribution of the values, classifying workers who have experienced few, medium or many employer changes. In order to account for the complex relationship between tenure and job mobility, the indicator of past job mobility is interacted with tenure.

Firm characteristics

Several firm characteristics are included in the regression. We include an indicator variable which equals 1 if the employer failed to report the educational level of the worker to the Federal Employment Agency.[92] Although firms are required to report this information, they incur no consequences if they fail to do so. That is because employees' education has no relevance in determining social security benefits. Consequently, not all the firms report this information.

[91] Ownership of these assets is measured at the household level.
[92] See Fitzenberger et al. (2006) for further details.

A further indicator measures firm size. We distinguish between small (less than 50 employees), medium-sized (50 to 499 employees) and large firms (more than 499 employees).

Moreover, we include three dummies indicating if the share of marginal workers in the firm is low, medium or high. Again, we construct the variables based on tertiles of the firm size distribution.

Lastly, a series of business sector dummies are included in the analysis in order to account for structural differences across sectors (e.g. degree of unionization) which have been found to be significantly associated with the occurrence of occupational pensions (Hernaes et al., 2011) as well as pension awareness (Ghilarducci, 1990).

6.4 ESTIMATION RESULTS

Table 12 reports our estimation results. We comment on the results following the division in three blocks presented in the previous section.

Worker characteristics

We find that women are significantly more likely than men to report access to an occupational pension. This notion is supported by the results in Mitchell (1988) who finds that women are better informed about several aspects of their occupational pension plans than men are. We do not find significant differences in perceived access by age.

In contrast to our expectations, differences in the educational attainment are not systematically associated with perceived access once we control for the financial knowledge of the worker. This might indicate that knowledge that is more specialized is required in contrast to skills learnt at school. In particular, if many workers do not gather information beyond the information which is provided by the employer, specific (as opposed to general) human capital should be more important for the perceived access.

At the same time, our results show that workers who are more familiar with basic financial concepts are also more receptive to information about access to occupational pension plans supporting our first hypothesis.

Workers who believe that saving for the old-age is important and those who already own some other form of private old-age provision are not more likely to report access to an occupational pension. This might reflect the ambiguous effect that workers who are more

interested in retirement planning are also more likely to have good replacement rates due to private pensions they already own and thus might not gather information on occupational pensions.[93] The is idea is confirmed by results presented in Börsch-Supan et al. (2008) who show that the decisions to participate in voluntary private savings plans and to participate in an occupational are correlated.

Outcomes of the employer-employee match

As proposed by hypotheses 2a and 2b, the relationship between tenure and perceived access is heterogeneous, depending on job mobility of the worker: For the reference group, workers who have experienced medium employer changes in their career, tenure is significantly and positively correlated with perceived pension availability. This supports the notion that specific human capital is important in order to acquire the relevant information from the employer (Mitchell, 1988). It might also mean that tenure reduces the costs of asking for an occupational pension. In addition, the interaction between past employer changes and tenure at the current employer is significant for workers who have changed their employer quite often. For these workers, an additional year at the current employer has a supplementary effect in comparison to workers who have experienced only medium changes. Past job mobility is not necessary detrimental as it may increase the quality of the job-match (Widerstedt, 1998). Workers with many changes might have found a good employer-employee match. They might therefore desire to stay longer at the current firm, which should positively affect the incentive to gather information on occupational plans.

As occupational plans are traditionally used to attract and retain qualified workers, high-income earners might have both access to better information and higher incentives to get informed. Our results provide evidence in support of hypothesis 3: Workers from the lower tail of the income distribution (1st and 2nd income quartile) are less likely to be aware of an occupational pension in comparison to workers in the 3rd income quartile. In contrast, high-income earners from the 4th income quartile are significantly more likely to be aware of the availability of pension plans in comparison to the reference group.

[93] Results do not change when we include only one of these indicators.

Firm characteristics

The multivariate analysis confirms a significant association between the level of negligence of the firm when notifying the Federal Employment Agency and perceived access to occupational pensions (hypothesis 4). Workers employed at firms that are less precise in complying with the data requests of the Federal Employment Agency, are systematically less likely to report access to occupational pensions. To the extent to which this indicator captures firms' inefficiencies in administrative processes, the result indicates that employers' administrative effort to set up and manage pension plans might be one of the main obstacles in raising awareness about access to occupational pensions among workers.

In contrast, our fifth hypothesis is not confirmed: we do not find a significant association between firm size and perceived access, once we control for other firm characteristics.

The results in table 12 indicate that the share of marginal workers in the firm is significantly related to perceived access to occupational pensions. Respondents working for firms that employ a high share of marginal workers are significantly less likely to report the existence of an occupational pension scheme at their workplace. A relatively high share of employers name the high turn-over of labour due to marginal workers and seasonal workers as a reason not to offer an occupational pension (BMAS, 2012a). As argued above, they might not use pensions as a device to manage work effort or turn-over and thus might not be interested in promoting pension awareness (hypothesis 6).

Finally, we control for the business sector of the firm (aggregated in 13 categories). However, the coefficients on these indicators are jointly insignificant.

Overall, firm characteristics seem to play a crucial role for workers' perceived access to an occupational pension, significantly improving the model fit: the adjusted R-squared increases from 35% to 46% (see appendix E.4).

Table 12: Determinants of perceived access to occupational pensions – Results after OLS regression

dep. var. Access to an occupational pension (1/0)		
worker characteristics		
female	0.102	*
	[0.06]	
living (working) in East Germany	-0.085	
	[0.05]	
age	0.001	
	[0.00]	
basic education (ISCED 2)	0.073	
	[0.13]	
secondary education (ISCED 3)	ref.	
post-secondary education (ISCED 4)	-0.024	
	[0.07]	
tertiary education (ISCED 5)	0.013	
	[0.07]	
financial literacy index	0.060	*
	[0.03]	
savings motive "old-age" is important	0.005	
	[0.06]	
own private old-age provision	0.016	
	[0.05]	
outcomes of the employer-employee match		
few employer changes	0.021	
	[0.09]	
medium employer changes	ref.	
many employer changes	0.026	
	[0.08]	
tenure at current employer (years)	0.011	*
	[0.01]	
few employer changes * tenure	-0.008	
	[0.01]	
medium employer changes * tenure	ref.	
many changes * tenure	0.022	*
	[0.01]	
income: 1st quartile	-0.221	***
	[0.08]	
income: 2nd quartile	-0.297	***
	[0.07]	
income: 3rd quartile	ref.	
income: 4th quartile	0.200	***
	[0.07]	

Table 12: Determinants of perceived access to occupational pensions – Results after OLS regression (continued)

dep. var. Access to an occupational pension (1/0)	
firm characteristics	
firm did not report education of the worker	-0.132 *
	[0.07]
small firm	-0.070
	[0.06]
medium-sized firm	ref.
large firm	0.029
	[0.06]
low share of marginal workers	-0.050
	[0.06]
medium share of marginal workers	ref.
high share of marginal workers	-0.382 ***
	[0.07]
business sector	Yes
constant	0.415 **
	[0.17]
R-2	0.528
Adj. R-2	0.464
N	286

Source: linked SAVE. Own calculations.
Notes: Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

6.5 CAVEATS

In this section, we discuss a number of potential problems related to different sources of measurement error. One important caveat is that the information on pension access relies on survey responses. While the self-reported data is useful because it reflects what workers believe about their access to occupational pensions, it also contains substantial measurement error. It is possible that respondents did not report access to an occupational pension because the employer has not set up an occupational pension yet, although the respondent is aware of his right to demand an occupational pension. Even if most respondents had interpreted the question in this way, the percentage of respondents reporting access to occupational pensions would be low, confirming that distorted perceptions play a role to some extent: according to indirect estimates based on an employer survey, about 86% of the employees in Germany actually work in firms where an

occupational pension scheme is already in place.[94] A related caveat is that the analysis treats workers who claim that they do not have access to an occupational pension and those who do not give an answer as being the same. As a robustness check, we have estimated our model excluding "do not know" and missing answers from the analysis. The results remain similar and are available upon request.

SAVE is a longitudinal study and as such suffers from selective attrition so that individuals with higher socio-economic status are more likely to remain in the panel (Coppola and Alt, 2012).[95] Moreover, the linkage procedure requires written consent by respondents. It is quite likely that neither survey response nor consent occurred randomly across the potential sample and might have introduced endogeneity in the equation explaining perceived access. Comparing the entire sample of workers in SAVE to the sub-sample of consenting workers, we find that consenters are significantly older, less often female, live more often in the East of Germany, have higher financial literacy and have less often only basic education (see appendix E.6). We do not control for a possible selection bias and all we can do is to warn the reader.

The analysis is exploratory in its approach, relying on imprecisely measured information about cost and benefits related to information about occupational pension for both sides of the labour market. Without additional information, we cannot disentangle the effects of incentives, ability, and the availability of information on perceived pension access. No currently available data set meets the necessary requirements as described in Gustman and Mitchell (1990) and Coppola and Lamla (2012). Consequently, we were forced to deal with a series of data limitations and the results are likely to be sensitive to the sample. Despite these caveats, we can draw important conclusions which are presented in the next section.

6.6 CONCLUSION

In the German pension system, individuals are free to decide if they want to take up supplementary pensions. Yet, individuals can only respond to incentives they are aware of (Chan and Stevens, 2008). Despite the legal right of German workers to occupational pension, many workers report that they do not have access. There is important heterogeneity in how workers perceive access to occupational pensions, and this

[94] See appendix E.5 for the calculations.

[95] In 2011 43.3% of the respondents that entered the panel in 2005 and 39.6% of those entering the panel in 2006 took part in the survey.

heterogeneity is directly related to worker and firm characteristics as well as to outcomes of the employer-employee match. Awareness of occupational pensions is higher among workers with good levels of financial knowledge and women. Tenure has a positive effect on perceived pension access, with a supplementary effect for those workers who experienced many employer changes. In addition, working for a firm that does not fully comply with the information requests of the Federal Employment Agency is negatively associated with pension awareness. Moreover, those working for firms with a low number of marginal workers are more likely to report access to an occupational pension.

Our findings suggest that the current regulation in Germany has not resolved the problem of workers' ignorance regarding their access to occupational pensions. In particular, if many workers rely exclusively on the information provided to them by their employers, they will not gather additional information on their legal right in order to request an occupational pension. In addition, the paper has demonstrated the usefulness of self-reported survey data in combination with administrative data. Yet, key aspects are missing in our data set. Therefore, we conclude that there is an urgent need for more refined data in order to understand individual responses to retirement incentives, with survey and administrative data being complements rather than substitutes (Chan and Stevens, 2008).

The behavioural consequences of wrong perceptions have important implications for individuals, firms and policy makers: individuals can only make optimal savings decisions if they have access to information which they are able to understand. Madrian und Shea (2001) demonstrate that the decision for or against specific pension products depends to a large extent on how the different products are presented. Policy makers could help by making information material about occupational pensions mandatory and/or by defining standardised information as recently introduced for so-called Riester pensions (see Gasche et al., 2013). Financial education is often presented as a tool to enhance consumers' abilities in dealing with financial issues. Yet, the groups at most risk are arguably the hardest to reach (Lusardi et al., 2013). Thus, it remains an open question if providing more information will alter the savings behaviour of workers. A low level of knowledge of employees might also be frustrating for employers as this suggests that workers do not appreciate their occupational pension (Luchak and Gunderson, 2000). Many employees do not even seek information about pensions during the recruitment process (Clark and Pitts, 1999), limiting further the power of occupational pensions as an HR tool. Thus, not only employees but also employers

might lack the incentive to deal with issues related to occupational pensions. Additional research is needed to investigate causal relationships between the regulatory framework and the cost and benefits of occupational pensions for both sides of the labour market. We consider our paper as a first step in this direction.

A. APPENDIX TO CHAPTER 2

A.1: VARIABLE DEFINITIONS

Variable name	Variable description
3 Questions	Dummy=1 if all answers to the three financial literacy questions are correct.
Basic financial literacy	Dummy=1 if all answers to the basic financial literacy questions are correct.
Advanced financial literacy	Dummy=1 if all answers to the advanced financial literacy questions are correct.
East	Dummy=1 if the respondent lives in East Germany.
female	Dummy=1 if the respondent is female.
age <35	Dummy=1 if age of respondent is 35 years or younger.
age 36-50	Dummy=1 if age of respondent is 36-50 years.
age 51-65	Dummy=1 if age of respondent is 51-65 years.
age 66 +	Dummy=1 if age of respondent is 66 years or older.
living in rural area	Dummy=1 if the respondent lives in a rural area (less than 20,000 inhabitants)
low secondary degree	Dummy=1 if respondent has an elementary school leaving examination.
intermediate secondary degree	Dummy=1 if respondent has an examination of ten years of schooling.
high secondary degree	Dummy=1 if respondent has a high school leaving certificate or comparable certificate.
university degree	Dummy=1 if the respondent has a university degree.
not employed	Dummy=1 if the respondent is not employed but not retired
employed	Dummy=1 if the respondent is employed for wage.
self-employed	Dummy=1 if the respondent is self-employed.
retired	Dummy =1 if the respondent is retired.
log (income)	Logarithm of the average monthly net income of the household.
risk preferences	To what extent do the following statements apply to you? Please answer on a scale from 0 to 10, where 0 means “does not apply at all" and 10 means “applies very well". I do not mind taking risks with respect to financial matters."
risk averse	Dummy=1 if the respondent rates himself between 0 and 3.
risk neutral	Dummy=1 if the respondent rates himself between 4 and 6.
risk loving	Dummy=1 if the respondent rates himself between 7 and 10.
open to change	To what extent do the following statements apply to you? Please answer on a scale from 0 to 10, where 0 means “does not apply at all" and 10 means “applies very well". I am open for change." Dummy=1 if the respondent rates himself between 7 and 10.
log(financial wealth)	Logarithm of the sum of deposits held in savings accounts, building savings contracts, bonds, stocks, stock mutual and real estate funds, life insurance contracts, private and employer-based pension wealth as well as other financial assets.

A.2: DESCRIPTIVE STATISTICS – WEST AND EAST GERMAN SAMPLE

	All	West	East	West vs. East
living in East Germany	0.361	-	-	-
	[0.480]			
female	0.524	0.488	0.588	***
	[0.500]	[0.500]	[0.493]	
age	52.104	51.459	53.247	
	[16.639]	[17.068]	[15.808]	
rural	0.161	0.148	0.184	
	[0.368]	[0.355]	[0.388]	
living with partner	0.629	0.648	0.597	
	[0.483]	[0.478]	[0.491]	
low secondary degree	0.379	0.433	0.283	***
	[0.485]	[0.496]	[0.451]	
intermediate secondary degree	0.356	0.302	0.452	****
	[0.479]	[0.460]	[0.498]	
high secondary degree	0.264	0.264	0.265	
	[0.441]	[0.441]	[0.442]	
university degree	0.154	0.124	0.207	***
	[0.361]	[0.329]	[0.406]	
educated in GDR	0.30	0.10	0.66	***
	[0.459]	[0.294]	[0.473]	
not employed	0.186	0.165	0.222	**
	[0.389]	[0.371]	[0.416]	
employed	0.446	0.476	0.392	**
	[0.497]	[0.500]	[0.489]	
self-employed	0.044	0.039	0.054	
	[0.206]	[0.193]	[0.227]	
retired	0.324	0.321	0.331	
	[0.468]	[0.467]	[0.471]	
household income (€/month)	2167.694	2428.786	1704.765	***
	[1497.699]	[1626.154]	[1095.913]	
financial wealth (€)	35148.880	41672.700	23581.820	***
	[78600.210]	[84316.490]	[65821.960]	
risk averse	0.732	0.712	0.767	**
	[0.443]	[0.453]	[0.424]	
risk neutral	0.184	0.190	0.174	
	[0.388]	[0.393]	[0.380]	
risk seeking	0.084	0.097	0.060	**
	[0.277]	[0.297]	[0.237]	
open to change	0.557	0.550	0.569	
	[0.497]	[0.498]	[0.496]	
N	973	620	353	-

Source: SAVE 2009. Own calculations. **Notes:** Standard deviation in brackets. Stars indicate significant differences between West and East. * p<0.1; ** p<0.05; *** p<0.01.

A.3: MEASURES OF FINANCIAL LITERACY IN SAVE 2009

Basic Literacy

1. Understanding of Interest Rate (Interest) *

   "Suppose you had 100€ in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow: more than 102€, exactly 102€, less than 102€?" do not know / refuse to answer

2. Understanding of Inflation (Inflation) *

   "Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account?" do not know / refuse to answer

3. Understanding of Compound Interest (Compound Interest)

   "Suppose you had €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: more than €200, exactly €200, less than €200?" do not know / refuse to answer

4. Understanding of Money Illusion (Money Illusion)

   "Suppose that in the year 2012, your income has doubled and prices of all goods have doubled too. In 2012, how much will you be able to buy with your income: more than today, the same, less than today?" do not know / refuse to answer

Advanced Literacy

1. Understanding of Risk and Diversification (Risk) *

   "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." do not know/ refuse to answer

2. Understanding Average Asset Fluctuations (Return Volatility)

   "Normally, which asset displays the highest fluctuations over time: Savings accounts, bonds, stocks?" Do not know / refuse to answer

3. Understanding of the Main Function of the Stock Market (Stock Market)

"Which of the following statements describes the main function of the stock market?" The stock market helps to predict stock earnings. / The stock market results in an increase in the price of stocks. / The stock market brings people who want to buy stocks together with those who want to sell stocks. / None of the above. / Do not know / refuse to answer

4. Understanding of Mutual Funds (Mutual Funds)

   "Which of the following statements is correct?" Once one invests in a mutual fund, one cannot withdraw the money in the first year. / Mutual funds can invest in several assets, for example invest in both stocks and bonds. / Mutual funds pay a guaranteed rate of return which depends on their past performance. / None of the above. / Do not know / refuse to answer

* Questions marked with an asterisk are also combined into the general financial literacy measure.

A.4: ANSWERING BEHAVIOUR FOR FINANCIAL LITERACY QUESTIONS (DETAILS)

Question	Interest			Inflation			Risk			Compund interest		
	All	West	East	All	West	East	All	West	East	All	West	East
incorrect	7%	7%	7%	5%	4%	5%	6%	6%	5%	24%	25%	23%
correct	79%	82%	76%	75%	79%	70%	59%	63%	52%	61%	62%	58%
dk/refuse	11%	9%	15%	17%	14%	22%	33%	28%	41%	13%	10%	17%
missing	3%	3%	3%	3%	3%	3%	2%	3%	2%	2%	3%	2%
N	1,076	690	386	1,076	690	386	1,076	690	386	1,076	690	386

Question	Money illusion			Return volatility			Stock market			Mutual funds		
	All	West	East	All	West	East	All	West	East	All	West	East
incorrect	81%	82%	78%	10%	11%	9%	17%	16%	20%	8%	8%	7%
correct	4%	4%	3%	66%	69%	62%	47%	52%	38%	40%	44%	32%
dk/refuse	13%	11%	16%	20%	17%	25%	32%	29%	39%	49%	44%	58%
missing	3%	3%	3%	3%	3%	4%	3%	3%	4%	4%	5%	3%
N	1,076	690	386	1,076	690	386	1,076	690	386	1,076	690	386

Source: SAVE 2009. Own calculations.

A.5: DETERMINANTS OF FINANCIAL LITERACY – FULL RESULTS AFTER OLS REGRESSIONS

dep. var.	3 Questions				
East	-0.115	-0.147	-0.114	-0.116	-0.100
	[0.033]***	[0.032]***	[0.033]***	[0.033]***	[0.032]***
female		-0.111	-0.115	-0.116	-0.113
		[0.030]***	[0.030]***	[0.030]***	[0.030]***
age <35		ref.	ref.	ref.	ref.
age 36-50		0.108	0.060	0.060	0.049
		[0.050]**	[0.051]	[0.052]	[0.051]
age 51-65		0.062	0.015	0.015	-0.008
		[0.051]	[0.054]	[0.055]	[0.054]
age 66 +		0.015	-0.046	-0.045	-0.093
		[0.051]	[0.074]	[0.074]	[0.073]
living in rural area		-0.015	-0.020	-0.021	-0.027
		[0.041]	[0.041]	[0.041]	[0.041]
low sec. degree		ref.	ref.	ref.	ref.
intermediate sec. degree		0.235	0.218	0.217	0.200
		[0.037]***	[0.037]***	[0.037]***	[0.037]***
high sec. degree		0.377	0.362	0.362	0.320
		[0.047]***	[0.048]***	[0.048]***	[0.048]***
university degree		0.064	0.043	0.043	0.033
		[0.051]	[0.051]	[0.051]	[0.050]
not employed			ref.	ref.	ref.
employed			0.067	0.068	0.034
			[0.046]	[0.046]	[0.045]
self-employed			-0.016	-0.016	-0.067
			[0.083]	[0.084]	[0.083]
retired			0.072	0.072	0.044
			[0.063]	[0.063]	[0.062]
log(income)			0.064	0.063	0.025
			[0.021]***	[0.021]***	[0.022]
risk averse				0.010	0.006
				[0.040]	[0.039]
risk neutral				ref.	ref.
risk loving				-0.028	-0.041
				[0.063]	[0.062]
open to change				0.015	0.015
				[0.030]	[0.029]
log(financial wealth)					0.024
					[0.004]***
constant	0.574	0.403	-0.083	-0.088	0.079
	[0.020]***	[0.052]***	[0.152]	[0.158]	[0.157]
R2	0.01	0.15	0.16	0.16	0.20
N	973	973	973	973	973

Source: SAVE 2009. Own calculations. **Notes:** Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

A.5b: DETERMINANTS OF FINANCIAL LITERACY – FULL RESULTS AFTER OLS REGRESSIONS

dep. var.	Basic financial literacy				
East	-0.119	-0.156	-0.125	-0.122	-0.108
	[0.032]***	[0.032]***	[0.033]***	[0.033]***	[0.033]***
female		-0.050	-0.057	-0.059	-0.056
		[0.031]	[0.031]*	[0.031]*	[0.030]*
age <35		ref.	ref.	ref.	ref.
age 36-50		0.000	-0.036	-0.043	-0.052
		[0.051]	[0.052]	[0.052]	[0.052]
age 51-65		-0.001	-0.017	-0.026	-0.047
		[0.052]	[0.055]	[0.055]	[0.055]
age 66 +		0.028	0.049	0.036	-0.006
		[0.052]	[0.075]	[0.075]	[0.075]
living in rural area		-0.013	-0.012	-0.010	-0.015
		[0.042]	[0.042]	[0.042]	[0.041]
low sec. degree		ref.	ref.	ref.	ref.
intermediate sec. degree		0.206	0.191	0.192	0.176
		[0.038]***	[0.038]***	[0.038]***	[0.037]***
high sec. degree		0.213	0.197	0.197	0.159
		[0.048]***	[0.049]***	[0.049]***	[0.049]***
university degree		0.135	0.117	0.116	0.107
		[0.051]***	[0.051]**	[0.051]**	[0.051]**
not employed			ref.	ref.	ref.
employed			-0.019	-0.023	-0.053
			[0.046]	[0.046]	[0.046]
self-employed			-0.125	-0.124	-0.168
			[0.085]	[0.085]	[0.084]**
retired			-0.071	-0.070	-0.094
			[0.064]	[0.064]	[0.063]
log(income)			0.076	0.079	0.045
			[0.021]***	[0.021]***	[0.022]**
risk averse				0.050	0.046
				[0.041]	[0.040]
risk neutral				ref.	ref.
risk loving				0.105	0.094
				[0.064]*	[0.063]
open to change				-0.002	-0.002
				[0.030]	[0.030]
log(financial wealth)					0.021
					[0.004]***
constant	0.434	0.317	-0.196	-0.255	-0.108
	[0.019]***	[0.053]***	[0.154]	[0.160]	[0.160]
R2	0.01	0.08	0.10	0.10	0.13
N	973	973	973	973	973

Source: SAVE 2009. Own calculations. **Notes:** Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

A.5c: DETERMINANTS OF FINANCIAL LITERACY – FULL RESULTS AFTER OLS REGRESSIONS

dep. var.	Advanced financial literacy				
East	-0.133	-0.151	-0.125	-0.123	-0.108
	[0.030]***	[0.029]***	[0.030]***	[0.030]***	[0.030]***
female		-0.106	-0.110	-0.106	-0.103
		[0.028]***	[0.028]***	[0.028]***	[0.027]***
age <35		ref.	ref.	ref.	ref.
age 36-50		0.098	0.062	0.066	0.057
		[0.046]**	[0.047]	[0.047]	[0.046]
age 51-65		0.095	0.068	0.077	0.056
		[0.047]**	[0.050]	[0.050]	[0.049]
age 66 +		-0.001	-0.003	0.005	-0.038
		[0.047]	[0.068]	[0.068]	[0.067]
living in rural area		-0.031	-0.030	-0.030	-0.035
		[0.038]	[0.038]	[0.038]	[0.037]
low sec. degree		ref.	ref.	ref.	ref.
intermediate sec. degree		0.144	0.130	0.133	0.117
		[0.034]***	[0.034]***	[0.034]***	[0.034]***
high sec. degree		0.271	0.249	0.248	0.210
		[0.043]***	[0.044]***	[0.044]***	[0.044]***
university degree		0.025	0.007	0.008	-0.001
		[0.046]	[0.046]	[0.046]	[0.046]
not employed			ref.	ref.	ref.
employed			0.002	0.001	-0.030
			[0.042]	[0.042]	[0.041]
self-employed			0.029	0.026	-0.018
			[0.076]	[0.077]	[0.076]
retired			-0.023	-0.023	-0.048
			[0.057]	[0.057]	[0.057]
log(income)			0.063	0.062	0.028
			[0.019]***	[0.019]***	[0.020]
risk averse				-0.061	-0.064
				[0.037]*	[0.036]*
risk neutral				ref.	ref.
risk loving				-0.010	-0.021
				[0.057]	[0.056]
open to change				-0.025	-0.025
				[0.027]	[0.027]
log(financial wealth)					0.021
					[0.004]***
constant	0.326	0.214	-0.224	-0.171	-0.023
	[0.018]***	[0.048]***	[0.139]	[0.144]	[0.144]
R2	0.02	0.12	0.13	0.13	0.16
N	973	973	973	973	973

Source: SAVE 2009. Own calculations. **Notes:** Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

A.6: IV APPROACH

As explained in 2.4.3, we might run into trouble when including financial wealth as an explanatory variable. Therefore, we propose two instruments for financial wealth arguing that the household composition, i.e. whether the respondent is living with a partner, as well as a dummy indicating if the respondent has received one-time income in the previous year fulfil both exclusion restrictions.[96] The instruments must satisfy two requirements: They must be correlated with the endogenous explanatory variable (financial wealth), and they must be uncorrelated with the error term. For household composition, the first assumption requires that respondents living with a partner should be able to accumulate more financial wealth due to economies of scale in wealth accumulation. The second crucial assumption is that the living with a partner is not correlated with the level of financial literacy of the respondent. It can be argued that if the respondent is the household head, he has to manage more assets the more people live in the household and therefore requires more financial knowledge. However, in this line of argument, the pathway to more financial expertise is again wealth and that is what we want to control for. We expect a positive relationship between living with a partner and financial wealth. The rationale for one-time income gains is that part of the additional income from the previous year was not consumed immediately but translated into financial wealth. Thus, we again expect a positive relationship between one-time income and financial wealth. 11% of the West and 6% of the East German sample have experienced a one-time income gain over 500 € in 2008 – the year previous to the survey. These income gains should not be correlated with financial literacy as they are considered as an income shock, which could only be partially (if at all) anticipated by the respondent.

We use a Two Stage Least Squares estimator. The results of the first stage are reported below (appendix A.6a).[97] They confirm that both, the household composition and having experienced a one-time income gain are significantly and positively correlated with (the logarithm of) financial wealth. IV estimates can have large standard errors, especially if the instruments and the endogenous variable are only weakly correlated. In that case, the IV estimator can even have a large asymptotic bias (Wooldridge, 2002). We use the first stage

[96] As one-time income gains we consider income from an inheritance, gifts, lottery winnings, as well as other gains. For each category only income gains above a threshold of 500€ are reported.

[97] As we use the same instruments irrespective whether we want to explain the three-question task, basic financial literacy or advanced financial literacy the first stage is only reported once.

F-statistic for detecting weak instruments. Generally, an F statistic over 10 is required to suggest instruments are sufficiently strong. Our F statistic is above this threshold (21.9). Moreover, as we have two instruments for financial wealth we can test the overidentifying restrictions. The test assumes that one instrument is valid and then tests for the validity of all other instruments (i.e. whether the instruments are uncorrelated with the error term in the second stage). Based on our test statistics we do not reject the Nullhypothesis. For each of the three financial literacy measures appendix A.6b displays the OLS and the IV results next to it. In comparison to the OLS results, we find that the effect of financial wealth becomes insignificant. The East-West gap remains almost unchanged.

A.6a: FIRST STAGE REGRESSION RESULTS

dep. var. log(financial wealth)	
female	-0.093
	[0.237]
age < 35	ref.
age 36-50	0.201
	[0.406]
age 51-65	0.529
	[0.430]
age 66 +	1.742
	[0.584]***
living in rural area	0.186
	[0.326]
low secondary degree	ref.
intermediate secondary degree	0.420
	[0.288]
high secondary degree	1.598
	[0.378]***
university degree	0.294
	[0.395]
not employed	ref.
employed	1.594
	[0.361]***
self-employed	2.035
	[0.661]***
retired	1.289
	[0.495]***
log(income)	1.234
	[0.181]***
risk averse	0.098
	[0.315]
risk neutral	ref.
risk loving	0.417
	[0.493]
open to change	-0.080
	[0.236]
one-time income gain	1.810
	[0.408]***
living with partner	1.340
	[0.285]***
constant	-5.076
	[1.285]***
R2	0.26
N	973

Source: SAVE 2009. Own calculations.
Notes: Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

A.6b: DETERMINANTS OF FINANCIAL LITERACY – RESULTS AFTER OLS AND 2SLS REGRESSIONS

dep. var.	3 Questions		Basic financial literacy		Advanced financial literacy	
	OLS	IV	OLS	IV	OLS	IV
east	-0.100	-0.113	-0.108	-0.098	-0.108	-0.111
	[0.032]***	[0.035]**	[0.033]***	[0.035]**	[0.030]***	[0.032]***
female	-0.113	-0.115	-0.056	-0.054	-0.103	-0.103
	[0.030]***	[0.030]***	[0.030]*	[0.030]	[0.027]***	[0.027]***
age <35	ref.		ref.		ref.	
age 36-50	0.049	0.058	-0.052	-0.058	0.057	0.059
	[0.051]	[0.052]	[0.052]	[0.052]	[0.046]	[0.047]
age 51-65	-0.008	0.010	-0.047	-0.060	0.056	0.061
	[0.054]	[0.057]	[0.055]	[0.058]	[0.049]	[0.051]
age 66 +	-0.093	-0.056	-0.006	-0.035	-0.038	-0.029
	[0.073]	[0.082]	[0.075]	[0.084]	[0.067]	[0.075]
living in rural area	-0.027	-0.022	-0.015	-0.019	-0.035	-0.034
	[0.041]	[0.041]	[0.041]	[0.042]	[0.037]	[0.037]
low secondary degree	ref.		ref.		ref.	
intermediate sec. degree	0.200	0.214	0.176	0.166	0.117	0.121
	[0.037]***	[0.039]***	[0.037]***	[0.040]***	[0.034]***	[0.035]***
high secondary degree	0.320	0.353	0.159	0.134	0.210	0.218
	[0.048]***	[0.058]***	[0.049]***	[0.059]*	[0.044]***	[0.053]***
university degree	0.033	0.041	0.107	0.101	-0.001	0.101
	[0.050]	[0.051]	[0.051]**	[0.051]*	[0.046]	[0.051]*
not employed	ref.		ref.		ref.	
employed	0.034	0.061	-0.053	-0.074	-0.030	-0.023
	[0.045]	[0.053]	[0.046]	[0.053]	[0.041]	[0.048]
self-employed	-0.067	-0.027	-0.168	-0.199	-0.018	-0.009
	[0.083]	[0.092]	[0.084]**	[0.093]*	[0.076]	[0.083]
retired	0.044	0.066	-0.094	-0.111	-0.048	-0.043
	[0.062]	[0.065]	[0.063]	[0.066]	[0.057]	[0.059]
log(income)	0.025	0.055	0.045	0.022	0.028	0.035
	[0.022]	[0.037]	[0.022]**	[0.037]	[0.020]	[0.033]
risk averse	0.006	0.009	0.046	0.044	-0.064	-0.063
	[0.039]	[0.040]	[0.040]	[0.040]	[0.036]*	[0.036]
risk neutral	ref.		ref.		ref.	
risk loving	-0.041	-0.031	0.094	0.087	-0.021	-0.019
	[0.062]	[0.063]	[0.063]	[0.063]	[0.056]	[0.057]
open to change	0.015	-0.015	-0.002	0.002	-0.025	-0.025
	[0.029]	[0.029]	[0.030]	[0.030]	[0.027]	[0.027]
log(financial wealth)	0.024	0.005	0.021	0.036	0.021	0.017
	[0.004]***	[0.019]	[0.004]***	[0.019]	[0.004]***	[0.017]
constant	0.079	-0.052	-0.108	-0.008	-0.023	-0.054
	[0.157]	[0.203]	[0.160]	[0.206]	[0.144]	[0.184]
	0.20	0.16	0.13	0.11	0.16	0.17
N	973	973	973	973	973	973

Source: SAVE 2009. Own calculations. **Notes:** Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

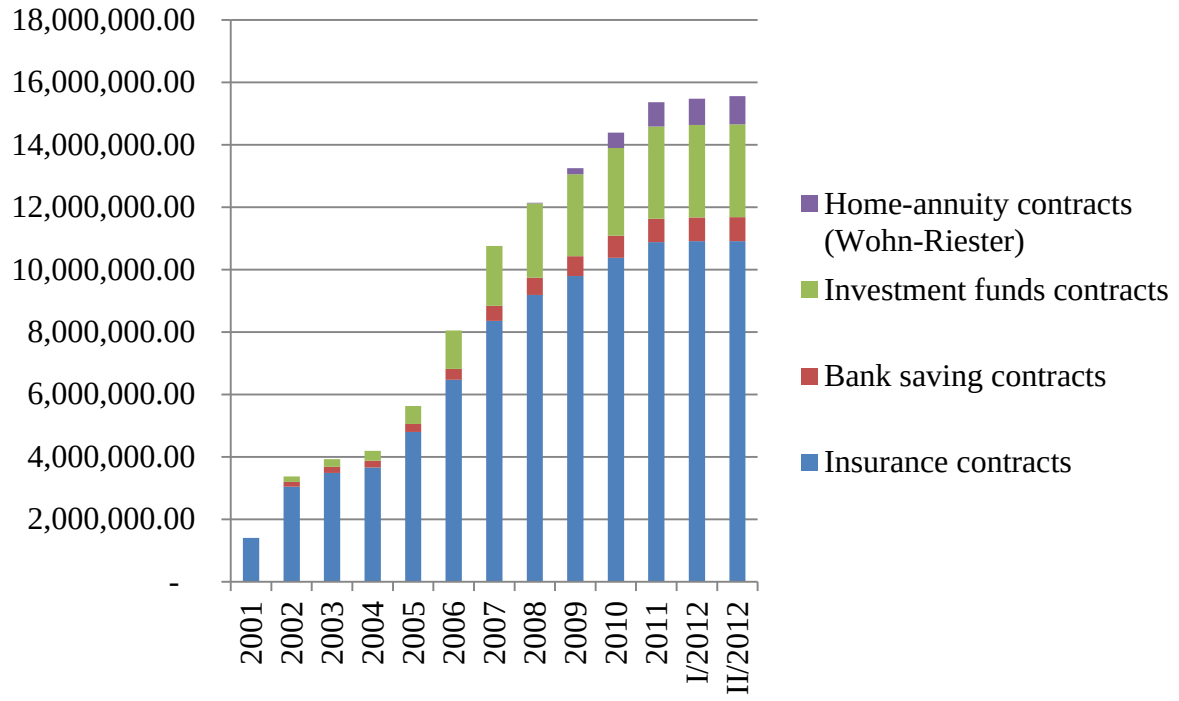
A.7: DECOMPOSITION OF THE FINANCIAL LITERACY GAP

dep. var.	3 Questions	Basic financial literacy	Advanced financial literacy
East	0.458	0.314	0.192
	[0.026]***	[0.025]***	[0.021]***
West	0.574	0.434	0.326
	[0.020]***	[0.020]***	[0.019]***
difference	-0.116	-0.120	-0.134
	[0.033]***	[0.032]***	[0.028]***
endowments	-0.001	-0.005	-0.024
	[0.020]	[0.020]	[0.020]
coefficients	-0.118	-0.122	-0.138
	[0.038]***	[0.038]***	[0.032]***
interaction	0.004	0.007	0.028
	[0.028]	[0.029]	[0.027]
N	973	973	973

Source: SAVE 2009. Own calculations.
Notes: East Germans are the reference group. Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

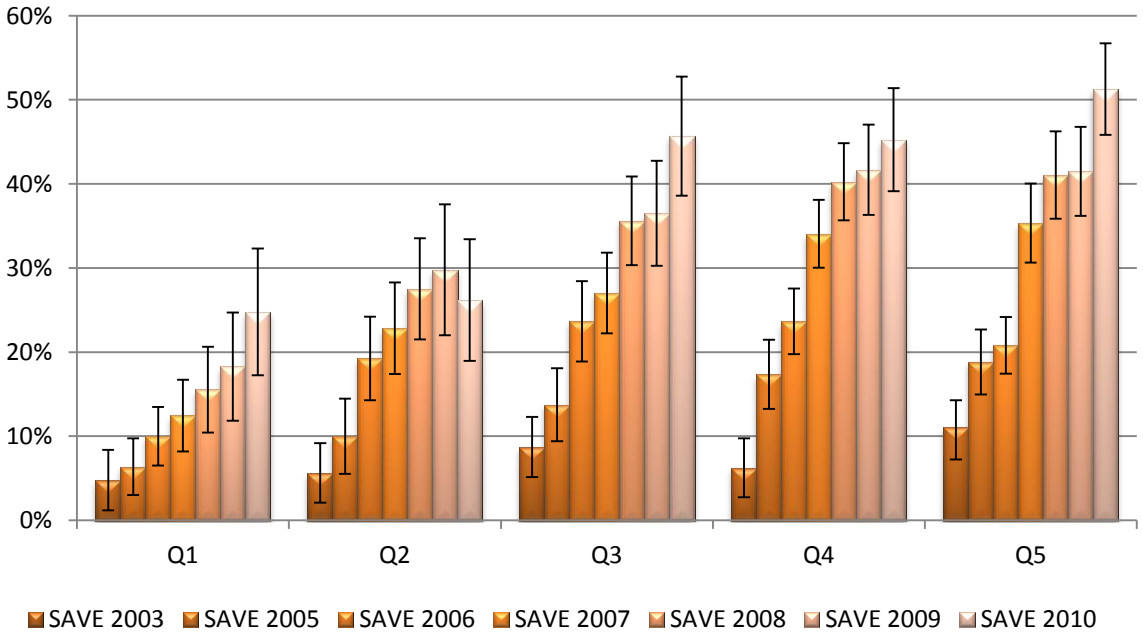
B. APPENDIX TO CHAPTER 3

B.1: DEVELOPMENT OF RIESTER PENSIONS OVER TIME



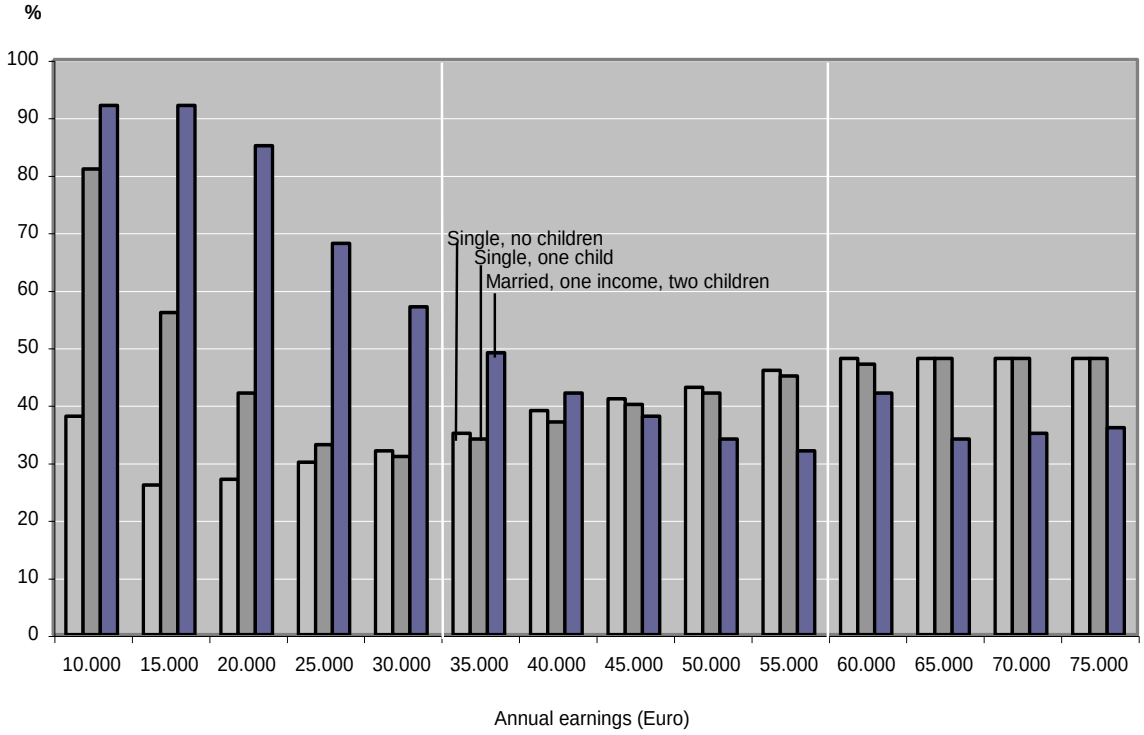
Source: Bundesministerium für Arbeit und Soziales (2012)

B.2: UPTAKE OF RIESTER PENSIONS BY QUINTILES OF MONTHLY HOUSEHOLD INCOME



Source: Börsch-Supan et al. (2012)

B.3: SUBSIDY AS PERCENTAGE OF TOTAL CONTRIBUTION



Source: Deutsche Bundesbank (2002)

B.4: DESCRIPTIVE STATISTICS – SIBLINGS SAMPLE AND SOEP POPULATION

	Siblings Sample	*SOEP Population*
individual characteristics		
male	0.528	0.472
	[0.499]	[0.499]
age	29.769	44.004
	[8.191]	[12.043]
living in East Germany	0.234	0.246
	[0.423]	[0.430]
married	0.287	0.648
	[0.453]	[0.478]
children living in household	0.318	0.337
	[0.466]	[0.473]
no degree/ low secondary degree	0.220	0.282
	[0.420]	[0.450]
intermediate secondary degree	0.338	0.369
	[0.473]	[0.482]
high secondary degree	0.328	0.315
	[0.470]	[0.464]
post-secondary degree	0.223	0.284
	[0.416]	[0.451]

B.4: DESCRIPTIVE STATISTICS – SIBLINGS SAMPLE AND SOEP POPULATION (continued)

	Siblings Sample	*SOEP Population*
individual characteristics		
income in €	3121.380	3203.623
	[2141.670]	[1990.914]
family characteristics		
mother: no degree/ low secondary degree	0.450	0.679
	[0.500]	[0.467]
mother: intermediate secondary degree	0.376	0.217
	[0.485]	[0.412]
mother: high secondary degree	0.112	0.075
	[0.315]	[0.263]
mother: post-secondary degree	0.777	0.622
	[0.416]	[0.485]
father: no degree/ low secondary degree	0.500	0.668
	[0.500]	[0.471]
father: intermediate secondary degree	0.281	0.173
	[0.450]	[0.378]
father: high secondary degree	0.156	0.128
	[0.363]	[0.334]
father: post-secondary degree	0.875	0.809
	[0.331]	[0.393]
parents own life insurance	0.539	-
	[0.499]	-
individual owns Riester pension	0.327	0.287
	[0.469]	[0.452]
sibling(s) own(s) Riester pension	0.312	-
	[0.463]	-
# siblings	2.391	-
	[0.741]	
N	1,228	10,433

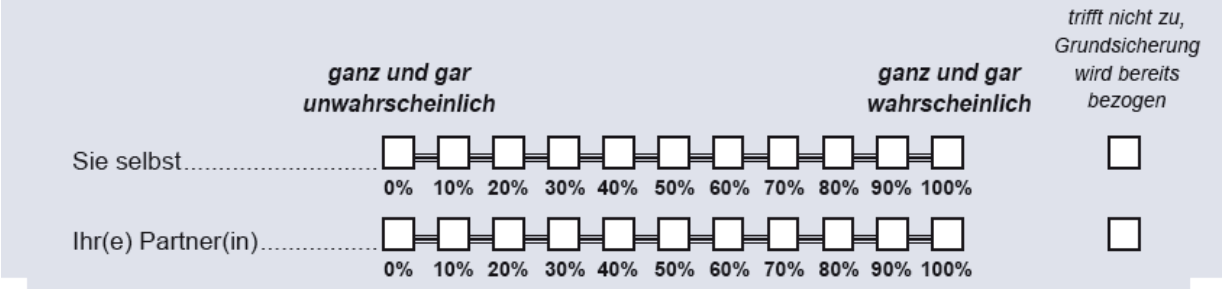
Source: SOEP. Own calculations.
Note: Standard deviation in brackets. SOEP population is restricted to individuals who are eligible for subsidies under the Riester scheme.

C. APPENDIX TO CHAPTER 4

C.1. WORTLAUT DER FRAGE ZU ERWARTETEM GRUNDSICHERUNGSBEZUG

33. Wenn Sie einmal alle Ihre (zukünftigen) Alterseinkommen und Ihr Vermögen berücksichtigen: Wie hoch schätzen Sie das Risiko ein, in Zukunft auf Grundsicherung im Alter angewiesen zu sein?

Grundsicherung im Alter erhalten Personen ab 65 Jahren mit geringem Haushaltseinkommen und Vermögen. Bitte beantworten Sie die Frage auch, wenn Sie und/oder Ihr(e) Partner(in) sich im Ruhestand befinden.



Quelle: SAVE 2011. Fragebogen verfügbar unter www.mea.mpisoc.mpg.de .

D. APPENDIX TO CHAPTER 5

D.1: DESCRIPTIVE STATISTICS BY INTERVIEW MODE

	Paper and Pencil	Personal Interview
age <35	0.199	0.301
	[0.015]	[0.052]
age 35-54	0.398	0.392
	[0.018]	[0.056]
age 55+	0.404	0.307
	[0.018]	[5.256]
male	0.468	0.383
	[0.018]	[0.055]
foreign	0.006	0.000
	[0.003]	-
living with partner	0.630	0.618
	[0.017]	[0.056]
# children living in household	0.561	0.788
	[0.034]	[0.115]
no degree/ low secondary education	0.330	0.442
	[0.017]	[0.057]
intermediate secondary education	0.372	0.368
	[0.018]	[0.055]
high secondary education	0.298	0.189
	[0.017]	[0.045]
no post-secondary education	0.108	0.227
	[0.011]	[0.048]
vocational training	0.721	0.649
	[0.016]	[0.054]
university degree	0.171	0.125
	[0.014]	[0.038]
income: 1st quintile	0.226	0.192
	[0.015]	[0.047]
income: 2nd quintile	0.190	0.244
	[0.014]	[0.051]
income: 3rd quintile	0.189	0.209
	[0.015]	[0.052]
income: 4 quintile	0.204	0.191
	[0.015]	[0.052]
income: 5th quintile	0.191	0.164
	[0.014]	[0.044]

D.1: DESCRIPTIVE STATISTICS BY INTERVIEW MODE (continued)

	Paper and Pencil	Personal Interview
net wealth: 1st quintile	0.214	0.355
	[0.016]	[0.056]
net wealth: 2nd quintile	0.171	0.116
	[0.015]	[0.056]
net wealth: 3rd quintile	0.200	0.188
	[0.015]	[0.053]
net wealth: 4 quintile	0.207	0.157
	[0.015]	[0.049]
net wealth: 5th quintile	0.209	0.183
	[0.016]	[0.047]
never subject to social insurance	0.079	0.058
	[0.010]	[0.027]
unemployed in the past: never	0.359	0.401
	[0.018]	[0.056]
unemployed in the past: up to 6 months	0.253	0.212
	[0.016]	[0.047]
unemployed in the past: 6 months up to 2 years	0.224	0.134
	[0.015]	[0.039]
unemployed in the past: longer than 2 years	0.165	0.254
	[0.014]	[0.050]
educated in GDR	0.313	0.284
	[0.017]	[0.052]
electoral turnout: low	0.200	0.216
	[0.015]	[0.047]
electoral turnout: medium	0.624	0.667
	[0.018]	[0.054]
electoral turnout: high	0.176	0.117
	[0.014]	[0.037]
living in urban area	0.701	0.596
	[0.017]	[0.056]
civic engagement in 2008	0.526	0.526
	[0.018]	[0.058]
internet usage in 2005	0.453	0.366
	[0.018]	[0.055]
good health	0.538	0.507
	[0.018]	[0.057]
Cog. Reflection Test	0.366	0.239
	[0.018]	[0.058]

D.1: DESCRIPTIVE STATISTICS BY INTERVIEW MODE (continued)

	Paper and Pencil	Personal Interview
optimist	0.612	0.596
	[0.018]	[0.057]
open to change	0.594	0.603
	[0.018]	[0.056]
self-confident	0.600	0.558
	[0.018]	[0.057]
cheerful	0.724	0.816
	[0.016]	[0.044]
receiving unemployment benefits	0.096	0.128
	[0.011]	[0.039]
missings ratio	0.075	0.259
	[0.006]	[0.041]
# personal interviews	0.514	1.880
	[0.037]	[0.212]
N	750	78

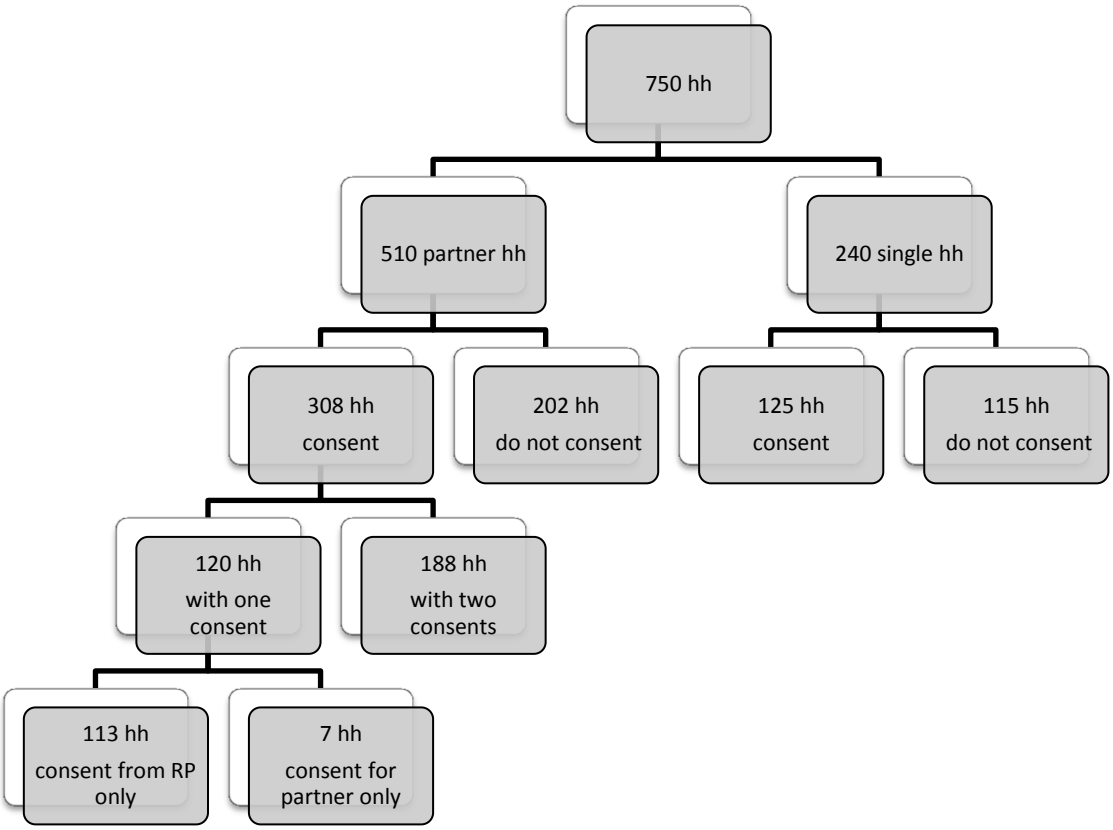
Source: SAVE 2007-2011. Own calculations.
Notes: Standard errors in brackets. Data is weighted.

D.2: RELEVANT QUESTIONNAIRE ITEM (ENGLISCH TRANSLATION)

"Scientists need information as accurate as possible to describe social changes. Therefore, we would like to use – with your agreement – data from the Institute for Employment Research. To this scope, we kindly ask you to fill in the enclosed consent form for the linkage of these data with your answers to the questionnaire. We would like to express our deepest appreciation for your support."

Source: SAVE 2011. Questionnaire available at www.mea.mpisoc.mpg.de.

D.3: BREAKDOWN OF HOUSEHOLDS BY CONSENT TO DATA LINKAGE



Source: SAVE 2011, Random Route, Paper and Pencil interviews only. Own calculations.
Note: RP "reference person"; hh "households"

D.4: SUMMARY OF HYPOTHESES

	Hypothesis
trust & social environment	
educated in GDR	+/-
electoral turnout: low	-
electoral turnout: medium	
electoral turnout: high	+
living in urban area	+
civic engagement in 2008	+
internet usage in 2005	+
psychological traits	
good health	+
Cog. Reflection Test	+/-
optimist	+
open to change	+
self-confident	+
cheerful	+
interview resistance	
receiving unemployment benefits	-
missings ratio	-
# personal interviews	-

E. APPENDIX TO CHAPTER 6

E.1: RELEVANT QUESTIONNAIRE ITEM

E.1a: RELEVANT QUESTIONNAIRE ITEM (ENGLISH TRANSLATION)

You are entitled to an occupational pension – or a supplementary pension in the public sector – if you have acquired rights to pension benefits in old age via your employer that are later paid out in terms of a monthly (occupational) pension or as an aggregate principal amount. Financing may be effected through your employer or through contributions deducted from your wage or salary (e.g. through the conversion of earnings into pension contributions).
Does the establishment where you and, respectively your partner are currently working offer an occupational pension or supplementary pension in the public sector?
That can be in the form of book reserves, direct insurance, "Pensionskasse", "Pensionsfonds" or a supplementary pension in the public sector.

	You	Your partner
Yes	☐	☐
No	☐	☐
Does not apply, currently a civil servant, self-employed or not employed	☐	☐
Do not know	☐	☐

E.1b: RELEVANT QUESTIONNAIRE ITEM (ORIGINAL TEXT)

Eine betriebliche Altersversorgung – im öffentlichen Dienst auch: Zusatzversorgung – liegt vor, wenn Sie über Ihren Arbeitgeber eine Anwartschaft auf Versorgungsleistungen im Alter erwerben, die später als monatliche (Betriebs-)Rente oder einmalige Kapitalsumme ausgezahlt werden. Die Finanzierung kann über Ihren Arbeitgeber oder über Beiträge von Ihnen aus Lohn und Gehalt (z.B. Entgeltumwandlung) erfolgen.

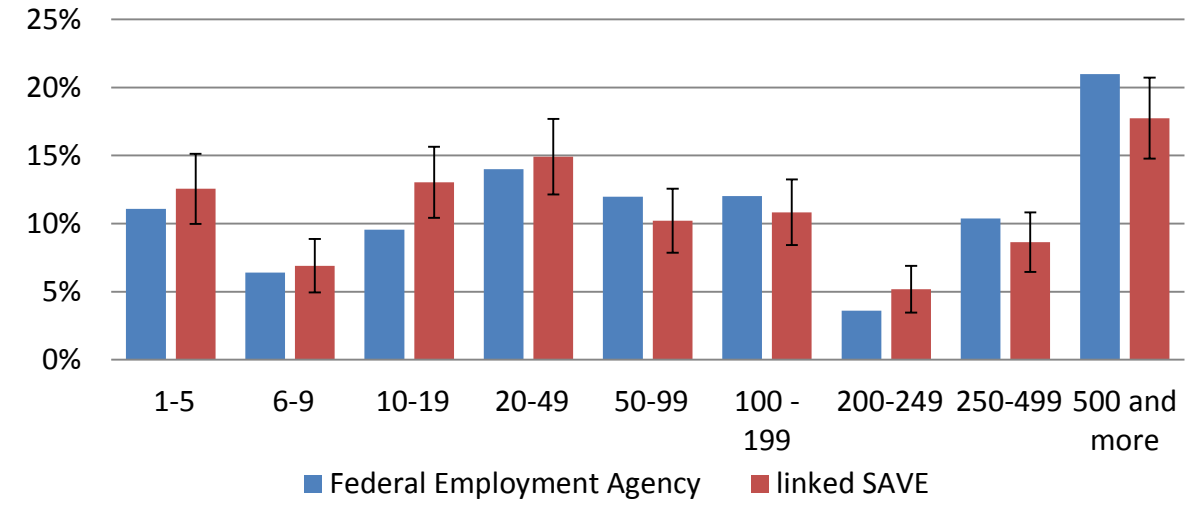
Bietet der Betrieb bzw. die Dienststelle, in dem/der Sie bzw. Ihr(e) Partner(in) derzeit arbeiten, eine betriebliche Altersversorgung oder eine öffentliche Zusatzversorgung an?
Dies kann in Form einer Direktzusage, einer Direktversicherung, einer Pensionskasse, eines Pensionsfonds oder einer Zusatzversorgung im öffentlichen oder kirchlichen Dienst geschehen.

	Sie selbst	**Ihr Partner/ Ihre Partnerin**	
Ja	☐	☐	
Nein	☐	☐	
Trifft nicht zu, derzeit Beamter, selbstständig oder nicht mehr erwerbstätig	☐	☐	*Frage* ***29***
Weiß nicht	☐	☐	

Source: SAVE 2011. The questionnaire is available at www.mea.mpisoc.mpg.de.

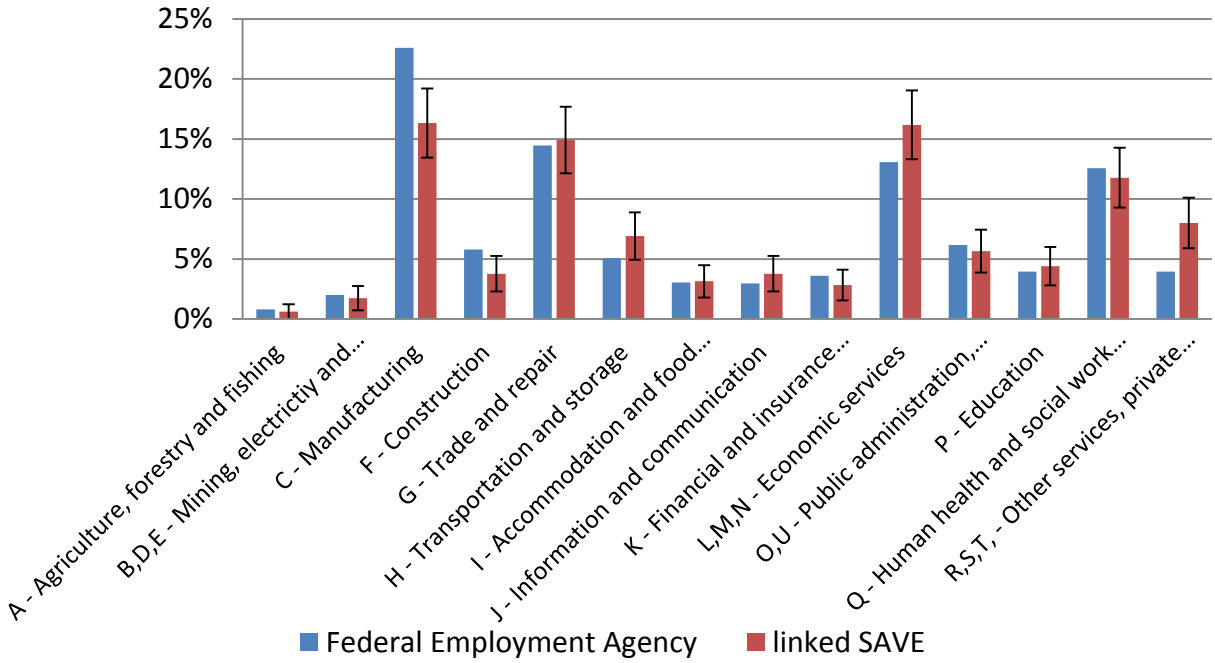
E.2: COMPARISONS OF LINKED SAVE TO BENCHMARKS

E.2a. SHARE OF EMPLOYEES BY FIRM SIZE



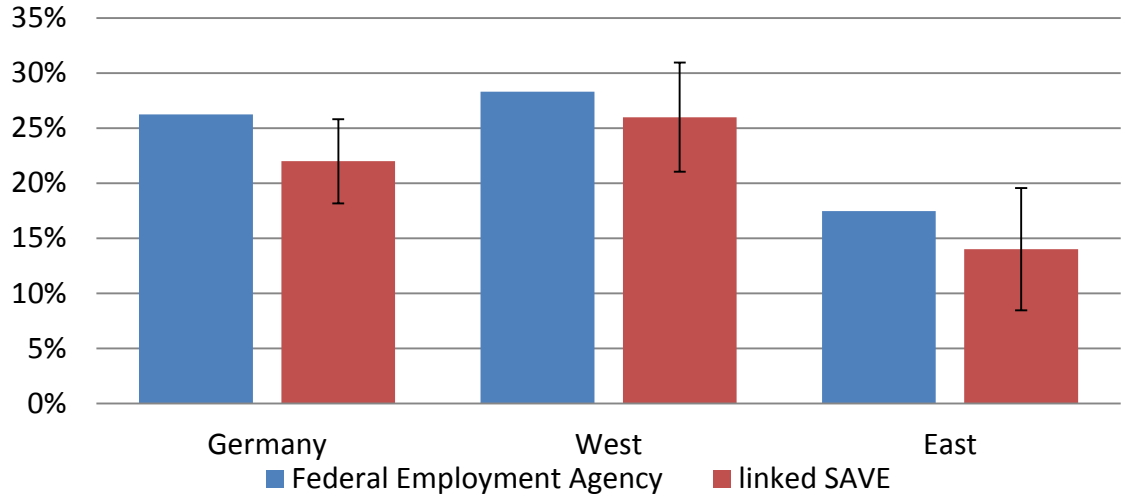
Source: Federal Employment Agency (2013), linked SAVE. Own calculations.

E.2b: SHARE OF EMPLOYEES BY BUSINESS SECTOR



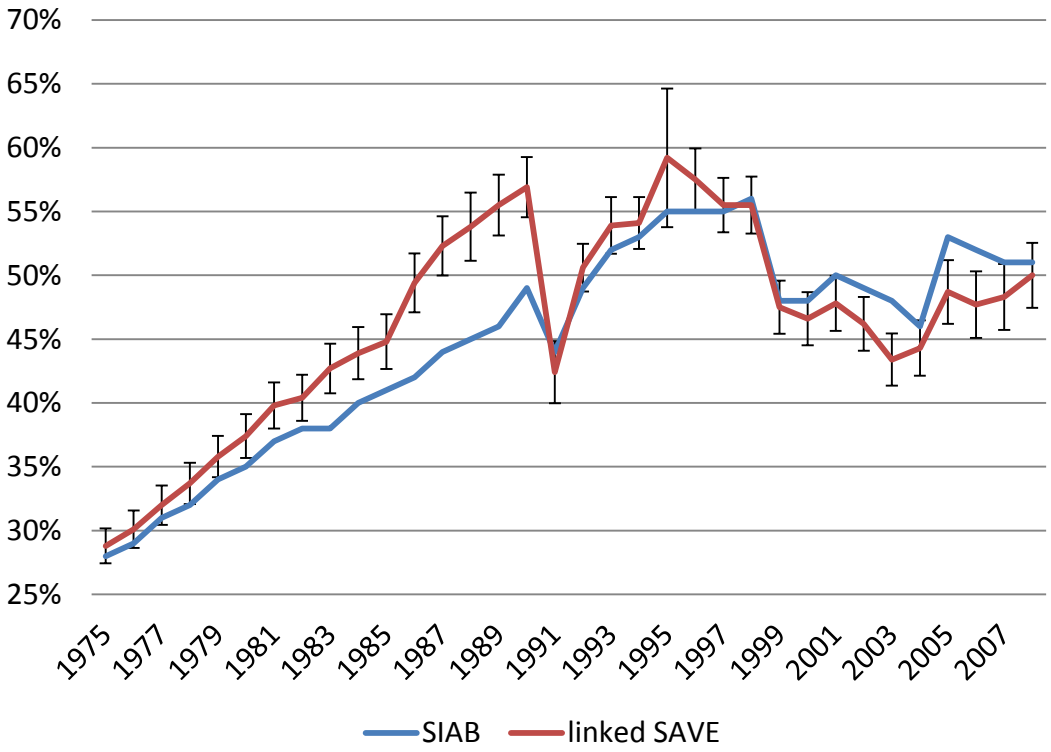
Source: Federal Employment Agency (2013), linked SAVE. Own calculations.

E. 2c: SHARE OF EMPLOYEES IN MARGINAL EMPLOYMENT



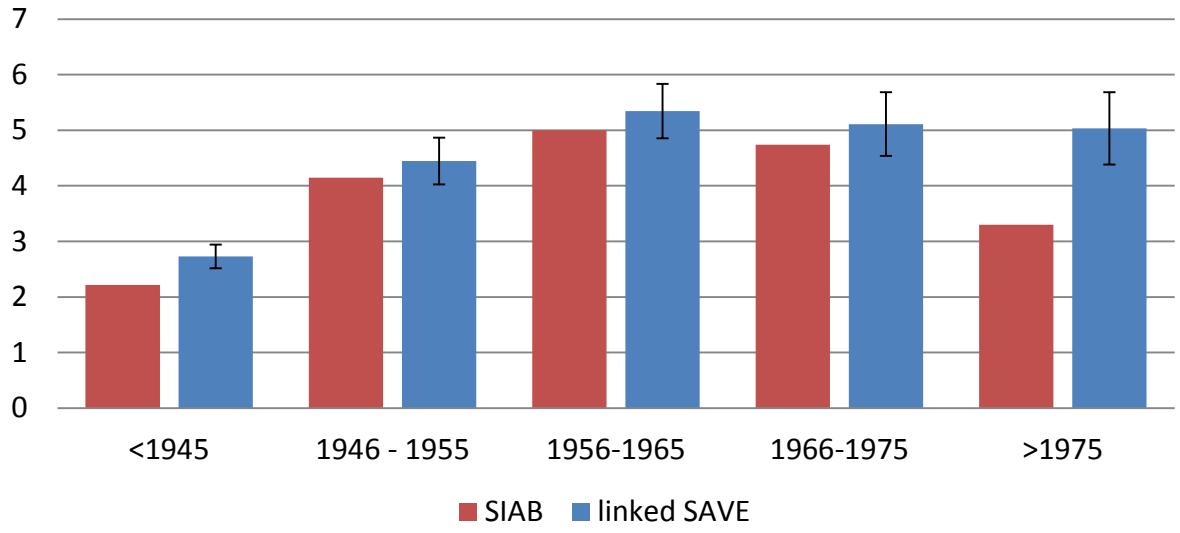
Source: Federal Employment Agency (2013), linked SAVE. Own calculations.

E.2d: AVERAGE DAILY INCOME (GROSS) OVER TIME



Source: Sample of Integrated Employment Biographies (SIAB), linked SAVE. Own calculations.

E.2e: TOTAL NUMBER OF EMPLOYERS OVER WORKING LIFE BY BIRTH COHORT



Source: Sample of Integrated Employment Biographies (SIAB), linked SAVE. Own calculations.

E.3: DESCRIPTIVE STATISTICS BY PERCEIVED ACCESS TO OCCUPATIONAL PENSIONS

Access to an occupational pension?	Yes	No/DK
worker characteristics		
female	0.437	0.602
	[0.040]	[0.043]
living (working) in East Germany	0.291	0.484
	[0.036]	[0.044]
age (years)	46.741	47.195
	[0.742]	[0.813]
basic education (ISCED 2)	0.025	0.047
	[0.013]	[0.019]
secondary education (ISCED 3)	0.563	0.711
	[0.040]	[0.040]
post-secondary education (ISCED 4)	0.177	0.125
	[0.030]	[0.029]
tertiary education (ISCED 5)	0.234	0.117
	[0.034]	[0.029]
financial literacy index	2.697	2.311
	[0.046]	[0.088]
savings motive "old-age" is important	0.801	0.719
	[0.032]	[0.040]
own private old-age provision	0.571	0.555
	[0.040]	[0.044]

E.3: DESCRIPTIVE STATISTICS BY PERCEIVED ACCESS TO OCCUPATIONAL PENSIONS

(continued)

Access to an occupational pension?	Yes	No/DK
outcomes of the employer-employee match		
few employer changes	0.171	0.117
	[0.030]	[0.029]
medium employer changes	0.741	0.750
	[0.035]	[0.038]
many employer changes	0.089	0.133
	[0.023]	[0.030]
tenure at current employer (years)	10.566	5.394
	[0.740]	[0.472]
daily gross income in €	98.410	46.184
	[3.527]	[2.962]
income: 1st quartile	0.108	0.430
	[0.025]	[0.044]
income: 2nd quartile	0.152	0.367
	[0.029]	[0.043]
income: 3rd quartile	0.323	0.164
	[0.037]	[0.033]
income: 4th quartile	0.418	0.039
	[0.039]	[0.017]
firm characteristics		
firm did not report education of the worker	0.070	0.391
	[0.020]	[0.043]
low share of marginal workers	0.500	0.242
	[0.040]	[0.038]
medium share of marginal workers	0.437	0.242
	[0.040]	[0.038]
high share of marginal workers	0.063	0.516
	[0.019]	[0.044]
small firm	0.253	0.570
	[0.035]	[0.044]
medium-sized firm	0.430	0.336
	[0.040]	[0.042]
large firm	0.316	0.094
	[0.037]	[0.026]
N	157	129

Source: linked SAVE. Own calculations.
Notes: Standard errors in brackets.

E.4: DETERMINANTS OF PERCEIVED ACCESS TO OCCUPATIONAL PENSIONS (WITHOUT FIRM CHARACTERISTICS) – RESULTS AFTER OLS REGRESSION

dep. var. Access to an occupational pension (1/0)		
worker characteristics		
female	0.132	**
	[0.055]	
living (working) in East Germany	-0.052	
	[0.054]	
age	-0.002	
	[0.003]	
basic education (ISCED 2)	0.028	
	[0.135]	
secondary education (ISCED 3)	ref.	
post-secondary education (ISCED 4)	0.013	
	[0.070]	
tertiary education (ISCED 5)	0.045	
	[0.069]	
financial literacy index	0.040	
	[0.032]	
savings motive "old-age" is important	0.042	
	[0.060]	
own private old-age provision	0.005	
	[0.052]	
outcomes of the employer-employee match		
few employer changes (1st tertile)	0.043	
	[0.096]	
medium employer changes (2nd tertile)	ref.	
may employer changes (3rd tertile)	0.005	
	[0.088]	
tenure at current employer (years)	0.018	***
	[0.007]	
few employer changes * tenure	-0.012	
	[0.008]	
medium employer changes * tenure	ref.	
many changes * tenure	0.024	*
	[0.012]	
income: 1st quartile	-0.446	***
	[0.074]	
income: 2nd quartile	-0.297	***
	[0.071]	
income: 3rd quartile	ref.	
income: 4th quartile	0.257	***
	[0.073]	
constant	0.413	**
	[0.178]	
R-2	0.388	
Adj. R-2	0.349	
N	286	

Source: linked SAVE. Own calculations. **Notes:** Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

E.5: SHARE OF EMPLOYEES WORKING IN FIRMS WHO HAVE SET UP AN OCCUPATIONAL PENSION (BY 2011)

	Firms who have set up an occupational pension (in %)	Employees subject to social security contributions working in… (in %)	Employees working in firms who have set up an occupational pension (in %)
firm size	(1)	(2)	(1)x(2)
1-4	35%	10%	3.54%
5-9	65%	9%	5.96%
10-19	84%	10%	8.50%
20-49	91%	15%	13.30%
50-99	97%	12%	11.94%
100-199	98%	12%	11.96%
200-499	99%	13%	13.21%
500-999	96%	7%	6.69%
1000+	100%	11%	11.14%
Total	-	100.00%	86.25%
Sources:	Kortmann and Heckmann, 2012, Table 3-2a (p.30)	Kortmann and Heckmann, 2012, Table 3-1 (p. 28) and Table 2-2 (p.22); own calculations	own calculations

E.6: DESCRIPTIVE STATISTICS – CONSENTERS AND NON-CONSENTERS

	Consenters	Non-Consenters
female	0.510	0.581
	[0.030]	[0.023]
living (working) in East Germany	0.378	0.268
	[0.029]	[0.021]
age	46.944	45.503
	[0.547]	[0.459]
basic education (ISCED 2)	0.035	0.071
	[0.011]	[0.012]
secondary education (ISCED 3)	0.629	0.663
	[0.029]	[0.022]
post-secondary education (ISCED 4)	0.154	0.116
	[0.021]	[1.487]
tertiary education (ISCED 5)	0.182	0.150
	[0.023]	[0.016]
savings motive "old-age" is important	0.764	0.718
	[0.025]	[0.021]
own private old-age provision	0.564	0.557
	[0.029]	[0.023]
financial literacy index	2.524	2.295
	[0.048]	[0.046]
N	286	469

Source: SAVE 2011. Own calculations.
Notes: Standard errors in brackets.

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