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Investment Decisions of Private Households and the Role of Financial Advice

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Contents

List of Figures ..... **xi**

List of Tables ..... **xiii**

List of Symbols and Abbreviations ..... **xv**

1 General Introduction **1**

1.1 Motivation 1

1.2 Outline of the Thesis and Main Results 3

2 Financial Advice **7**

2.1 The Need for Financial Advice - Individual Investor Behavior 7

2.2 Potential Benefits of Advice - Professional Investor Behavior 9

2.3 Compensation Models and Conflicts of Interest 12

2.4 Performance of Advised versus Non-Advised Investors 14

3 False Consensus and the Role of Ambiguity in Predictions of Others' Risk Preferences **17**

3.1 Introduction 17

3.2 Methodology 22

3.2.1 Study 1 22
3.2.2 Study 2 24
3.3 Results and Discussion 25
3.3.1 Analysis of Average Effects 25
3.3.2 Individual Level Analysis 27
3.4 Interval Analysis 40
3.5 Conclusion 46
3.6 Appendix A: Paper-Based Questionnaire 48
3.7 Appendix B: Order Effects 52
3.8 Appendix C: Median Split 53
3.9 Appendix D: Lottery Plots 55
3.10 Appendix E: Histograms and Twoway Graphs 58

4 German Household Portfolios 63
4.1 Introduction 63
4.2 Related Literature and Hypotheses 64
4.3 Data 69
4.4 Household Portfolios: Results and Discussion 72
4.4.1 Descriptive Statistics 72
4.4.2 Bivariate Analyses 77
4.4.2.1 Age Effects 78
4.4.2.2 Income Effects 80
4.4.2.3 Financial Literacy Effects 81
4.4.3 Multivariate Analyses 84
4.4.4 Diversification 90

4.5 Household Portfolios and Risk Tolerance 93

4.6 Conclusion 105

5 The Willingness to Follow Financial Advice 107

5.1 Introduction 107

5.2 Related Literature and Hypotheses 110

5.3 Dataset and Descriptive Statistics 114

5.3.1 Dataset 114

5.3.2 Descriptive Statistics 116

5.4 Results and Discussion 119

5.4.1 Advice Acceptance 119

5.4.2 Influence of Person-Related Attributes of the Decision Maker 121

5.4.3 Influence of Person-Related Attributes of the Advisor 125

5.4.4 Influence of Motivation 129

5.4.5 Influence of Option-Related Attributes 131

5.5 Robustness Checks 140

5.6 Conclusion 144

5.7 Appendix A: Cover Letter and Questionnaire 147

5.8 Appendix B: Regression Analysis 158

Bibliography 167

List of Figures

Figure 1.1: Outline of the thesis 3

Figure 3.1: Extract from the paper-based questionnaire 23

Figure 3.2: Screenshot from the computer-based questionnaire 24

Figure 3.3: Plot of the (100,0) lottery 30

Figure 3.4: Plot of combined lotteries, paper-based questionnaire 35

Figure 3.5: Histogram of own certainty equivalents, (1000,0) lottery with 50/50 probabilities 40

Figure 3.6: Twoway graph of predicted 90 percent intervals, (1000,0) lottery with 50/50 probabilities 41

Figure 4.1: Holdings 77

Figure 4.2: Participation rates by age 78

Figure 4.3: Participation rates by income 80

Figure 4.4: Participation rates by financial literacy 82

Figure 5.1: Potential determinants of the willingness to follow advice 113

Figure 5.2: Number of pieces of advice 120

Figure 5.3: Individual advice acceptance 121

Figure 5.4: Acceptance by age 123

Figure 5.5: Cattell scree test 126

Figure 5.6: Alternative pieces of advice 132

Figure 5.7: Overall advice acceptance 142

List of Tables

Table 3.1: Descriptive statistics 26

Table 3.2: Median split 28

Table 3.3: Correlation coefficients 31

Table 3.4: Regression results, single lotteries, paper-based questionnaire 33

Table 3.5: Regression results, single lotteries, computer-based questionnaire 34

Table 3.6: Regression results, several lotteries, paper-based questionnaire 36

Table 3.7: Regression results, several lotteries, computer-based questionnaire 37

Table 3.8: 90 percent intervals 42

Table 3.9: Regression results, lower and upper bounds, single lotteries 43

Table 3.10: Regression results, lower and upper bounds, several lotteries 44

Table 4.1: Descriptive statistics 72

Table 4.2: Reasons for the interview 73

Table 4.3: Knowledge and experience 75

Table 4.4: Market participation: savings account and insurance 85

Table 4.5: Market participation: investment funds and real estate 86

Table 4.6: Market participation: stocks and savings bonds 88

Table 4.7: Market participation: bonds and federal savings bonds 89

Table 4.8: Diversification, descriptive 91

Table 4.9: Diversification 92

Table 4.10: Risk preferences, influence of the investment horizon 97

Table 4.11: Risk preference women (over the investment horizon) 100

Table 4.12: Risk preference men (over the investment horizon) 101

Table 4.13: Risk preference women (at the end of the investment horizon) 103

Table 4.14: Risk preference men (at the end of the investment horizon) 104

Table 5.1: Descriptive statistics 117

Table 5.2: Comparison of groups 118

Table 5.3: Individual advice acceptance, decision maker 122

Table 5.4: Satisfaction with the interview and the advisor 125

Table 5.5: Individual advice acceptance, advisor 127

Table 5.6: Benefits of the interview 128

Table 5.7: Motivation of asking for advice 129

Table 5.8: Individual advice acceptance, motivation 130

Table 5.9: Individual advice acceptance, number of pieces of advice and alternative pieces of advice 133

Table 5.10: Asset types 134

Table 5.11: Individual advice acceptance, asset types 135

Table 5.12: Individual advice acceptance, one-time investments 136

Table 5.13: Individual advice acceptance, one-time investments (dummy) 138

Table 5.14: Individual advice acceptance, all variables 139

Table 5.15: Reasons not to follow 141

Table 5.16: Overall advice acceptance, all variables 143

List of Symbols and Abbreviations

α	constant from a regression model
β	coefficient from a regression model
Ambi	Ambiguity
CE	Certainty equivalent
CE_O	CE other: Predicted certainty equivalent
CE_S	CE self: Own certainty equivalent
Corr.	Correlation
DAX	Deutscher Aktienindex (main German stock market index)
e. V.	eingetragener Verein (incorporated society)
EVS	Einkommens- und Verbrauchsstichprobe (Income and Expenditure Survey)
Fin.	Financial
FL	Financial literacy
LB	Lower bound
LB_O	LB other: Predicted lower bound of others' certainty equivalents
Max.	Maximum
MBA	Master of Business Administration
MiFID	The Markets in Financial Instruments Directive

Min.	Minimum
Obs.	Observations
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary least squares
SCF	Survey of Consumer Finances
Std.	Standard
Std. Dev.	Standard deviation
UB	Upper bound
UB_O	UB other: Predicted upper bound of others' certainty equivalents

Chapter 1

General Introduction

1.1 Motivation

From July 1999 to July 2009, financial assets of private households in Germany increased by 42.4 percent, from 3,260.2 billion Euro to 4,641.4 billion Euro.[1] Even though households always had to face the asset allocation problem, the responsibility for private savings for old age is as high as never before.

Empirical evidence disagrees with the neoclassical perspective that perceives investors as rational decision makers possessing all relevant information and processing it correctly. According to the expected utility theory, investors distribute their assets (including human capital) over their entire life span and react sensitively to external changes. In addition, markets are assumed to be perfect, so financial intermediaries and financial advice are irrelevant (see von Neumann and Morgenstern (1944), Modigliani and Brumberg (1954), Friedman (1957)).

In contrast, empirical evidence finds that financial literacy of private households is quite bad (see e.g. Cole and Shastry (2009)). Lusardi and Mitchell (2006) analyze U.S. household data from a specially designed module on planning and financial literacy for the 2004 Health and Retirement Study. They find that only half of the elderly participants (age 50+) could correctly answer simple questions like “Suppose you had $100 in a savings account and the interest

[1] See German Federal Bank, Time series CEB00I: Financial assets D: Total C: Private Households (last updated July 2009).

rate was 2 percent 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?". In a German study on behalf of the Commerzbank AG (see Brettschneider and NFO Infratest Finanzforschung (2003)), 1,032 participants aged between 18 and 65 were interviewed. 42 percent of the people were not able to correctly answer even half of the 35 questions concerning general economic knowledge, monetary transactions, and financial investments; this seems to be the prevailing situation. An OECD study (2005) on financial literacy looks at several countries and finds low levels of financial understanding over all studies and countries.

It is hence not surprising that many households are put off by the complexity of many investment products and ask for investment advice. In fact, the majority of private investors is relatively uninformed and relies on professional investment advice (see e.g. Allen (2001), Guiso and Jappelli (2007)). In Germany, more than 80 percent of individual investors consult an advisor before making an investment decision (see Bluethgen et al. (2008)). Within this thesis, we refer to the term "financial advisor" as someone who professionally provides investment advice to individuals. In the broader sense, this definition also includes professionals acting on behalf of the investor (e.g. fund managers). Ideally, the financial advisor assists the investor in achieving an optimal asset allocation best suiting his preferences (basically risk, return, and liquidity preferences). However, empirically it is not clear whether investors are always better off making use of financial advice. Whether advice is beneficial or not to an investor depends on numerous factors, including investor's financial sophistication and sensitivity to cognitive errors, the costs of acquiring financial information and of getting access to financial products as well as the cost and quality of financial advice (see e.g. Bolton et al. (2007)).

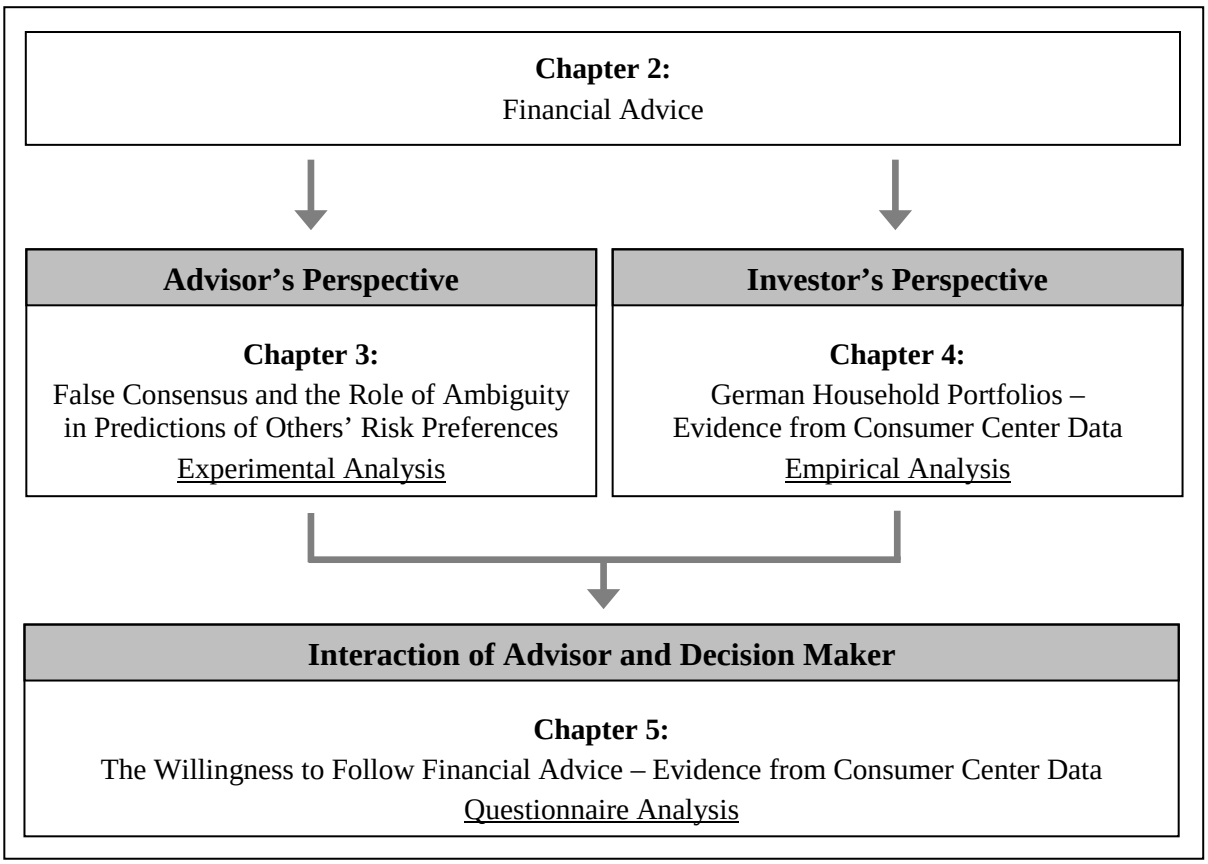
Regulation for investment services aims for an improvement of the quality of financial advice. The Markets in Financial Instruments Directive (MiFID) by the European Parliament and the European Council (2004 and 2006) requires firms performing investment services and activities to elicit their customers' financial situation (e.g. the purpose of the investment, risk preferences) to guarantee the appropriateness of any investment advice (see Article 35 of the MiFID). In addition, the customer has to be made aware of any conflicts of interest, e.g. commissions paid by product providers.

The present thesis contributes to an enhanced understanding of the relationship between individual investors and financial advisors. Chapter 3 takes the perspective of the advisor. It investigates the question of whether a person is actually able to correctly evaluate the risk prefe-

rences of others. Indeed, the MiFID requires investment firms to elicit the risk preferences of their investors but it does not say anything about the correct procedure of doing so. Chapter 4 switches to the perspective of the investor and looks at household portfolios. By studying potential determinants of investment decisions, it contributes to a better understanding of individual households' behavior. Finally, Chapter 5 analyses the interaction of advisor and investor. With the help of a unique dataset about real financial investment decisions, it considers determinants of the willingness to follow advice. Again, we go beyond current attempts by legislation or consumerists who aim to improve the quality of financial advice. There is actually more to it than this as the best piece of advice is of course useless if people are not willing to follow it.

1.2 Outline of the Thesis and Main Results

Figure 1.1: Outline of the thesis



The following research questions are addressed in this thesis:

1. Is it possible to correctly evaluate other persons' preferences? Which factors drive the egocentric bias? (Chapter 3)

2. What does the typical household portfolio look like? What are determinants of households' investment behavior? (Chapter 4)

3. Which factors drive the willingness to accept financial advice? (Chapter 5)

Figure 1.1 illustrates how the respective chapters of this thesis are related. The remainder of the general introduction will shortly summarize each chapter.

Chapter 2 of this thesis shortly summarizes evidence on typical behavior of individual and professional investors. Individual investors are prone to behavioral biases and investment mistakes, possibly making financial advice useful in principle. Nevertheless, professional investors' behavior is biased as well. There is contradicting evidence if professionals have better investment skills compared to individual investors. We provide an overview of potential conflicts of interest existing between advisor and decision maker. These conflicts might cause the advisor not to act in the best interest of the investor. Different compensation models imply different conflicts of interest. The last section of Chapter 2 summarizes studies comparing portfolios of advised investors with portfolios of non-advised investors. Again, evidence about the usefulness of financial advice is mixed.

Chapter 3 (joint work with Martin Weber) investigates the perspective of the advisor. As early as the 1930s, psychologists mentioned the tendency of people to see the self as the center of social judgment. This leads to egocentrically biased judgments when assessing others' behavior. Ross, Greene, and House (1977) demonstrated this social projection bias in four studies and called it the "False Consensus Effect". In this chapter, we analyze the false consensus effect in a financial context. We investigate whether an advisor is able to abstract from his own preferences. In two studies, we use simple lottery questions and ask subjects to state certainty equivalents for the own person and also to predict the average certainty equivalent of all participants. We find a strong correlation between the own and the prediction of others' certainty equivalents. As we use 50/50 lotteries and in addition use ambiguous probabilities in our studies, we extend the scope of Gilovich (1990) to financial decisions. We find a stronger effect in situations with ambiguity. We also ask participants to give an interval for the certainty equivalents, i.e. a lower bound that they think will not be fallen short of by more than 5

percent of the participants and also an upper bound that is not exceeded by more than 5 percent. We find that people strongly underestimate the variation in others' risk preferences.

Chapter 4 investigates the perspective of the decision maker. We contribute to the literature on positive household finance by analyzing a unique dataset of German households from the consumer center Baden-Wuerttemberg. The data stems from real counseling interviews dealing with financial investments and old-age provisions. Compared to the whole German population, we find that the average customer looking for advice at the consumer center is older and more likely to be female. Concerning the portfolios, the most prominent asset type is a savings account, with more than 80 percent of customers owning at least one. About 60 percent hold some form of life insurance and about 40 percent own real estate. The participation in the stock market is pretty high in our dataset, with about 20 percent holding stocks and about 45 percent holding investment funds. We find that marital status, income, and financial literacy are determinants of the participation rate for most asset types. Compared to single households, couples have a higher participation rate for asset markets. Higher income and higher financial literacy have a positive influence on the participation rate as well. However, the influence of age is not clear. In addition to the single asset types, we analyze portfolio diversification. We find similar results as for market participation. Couples, older people, people with higher income and higher financial literacy are better diversified. Our results for German households are to a very large extent in line with international findings as well as with earlier studies of German household portfolios. Moreover, our dataset features an exceptional time dimension concerning the measurement of risk tolerance; people at the consumer center are explicitly asked about their risk preferences regarding their current investment, thus enabling us to analyze the influence of the existing asset types in the portfolio on the new investment choice. We find that people tend to have constant risk tolerance, e.g. those households with risk-free assets in the portfolio show a higher risk aversion than do those with risky assets.

Chapter 5 (joint work with Markus Glaser, Niels Nauhauser, and Martin Weber) investigates the determinants of why people choose to follow or not to follow financial advice. We add to the existing literature by empirically analyzing this issue. We again make use of the data of the consumer center. Additionally, we set up a personalized questionnaire, which includes the specific recommendations for each household. We ask households about their action following the interview with the consumer center, during which they received the advice. Did they choose to follow the advice or not? So far, there is very little empirical evidence about the

acceptance of advice, especially in relation to financial decisions. We find that person-related attributes, i.e. characteristics of the advisor (satisfaction with the advisor and the interview) influence the willingness to follow advice. Here, the likability of the advisor seems to be as important as his expertise. Person-related attributes of the decision maker are of only low significance. The original motivation of asking for advice (concrete problem versus general need for information) plays a role. An already existing own investment strategy decreases the willingness to follow advice. We also find that option-related attributes of the advice, e.g. the specific asset, considerably influence the probability of acceptance. Pieces of advice concerning call money, “Riester” savings plans, or insurance contracts are more likely to be followed. On the contrary, advice related to bonds or bond funds is less likely to be followed. In addition, we find that advice about one-time investments is more likely to be followed compared to advice about regular savings. Overall, option-related attributes have a higher influence on the willingness to follow advice than person-related attributes. Our results partly confirm theoretical predictions and experimental results. Furthermore, due to our unique dataset, we are able to provide new insights into real world decision making.

Chapter 2

Financial Advice

2.1 The Need for Financial Advice - Individual Investor Behavior

Financial decision making is not at all trivial. Typical precepts of standard financial theory concern diversification, how much to save to smooth consumption, and participation to risky asset markets (see e.g. Markowitz (1952), Modigliani and Brumberg (1954), Merton (1969), and Campbell (2006)). To prepare an investment decision, a household first needs a complete overview of the individual financial situation including all existing assets, for example stock holdings, real estate, and human capital (see e.g. Goetzmann (1993), Heaton and Lucas (2000a, b), Viceira (2001), and Yao and Zhang (2005)) as well as existing liabilities. Of course, the correlations between the assets are also important. Moreover, all factors that may have an influence on the financial situation, for example future salary increases or the birth of a child need to be taken into consideration. Ideally, to make an optimal decision, the individual already has a complete scheme of his life in mind. Second, the household has to determine its preferences, for example risk tolerance, purpose of the investment, and investment horizon. Third, if the status quo and preferences are well defined, the mix of assets has to be chosen. Fourth, within the asset classes, the single securities have to be chosen. Fifth, the portfolio has to be adapted to changes (e.g. to preference changes or to changes in the financial situation) over time.

Looking at the above process of financial decision making, it is not surprising that people make a lot of mistakes and thereby lose welfare. The investment behavior of many households deviates from normative precepts.

Kotlikoff et al. (2001) find evidence of bounded rationality in consumption choices. People make substantial errors in life cycle consumption choices; many of them undervalue future earnings. Benartzi and Thaler (2002) also find that investors do not have a well-defined idea of their preferences, as they on average prefer a model portfolio over their own portfolio. One essential part of a person's preferences is the risk attitude. Camerer (1989) and Hey and Orme (1994) analyze the stability of risky choices. They find that from one point in time to another (less than ten days apart), individuals change their risk taking behavior in about 25 to 30 percent of all cases. Other studies explicitly investigate the reasons for changes in risk taking behavior. It can change due to feelings (see e.g. Finucane et al. (2000) or Slovic et al. (2002)), due to prior outcomes (see e.g. Staw (1976), Thaler and Johnson (1990), Odean (1998), or Weber and Zuchel (2005)), or due to personal macroeconomic experiences (see e.g. Malmendier and Nagel (2009)). It is also possible that the risk preference itself is stable but that changes in expectations lead to changes in risk taking behavior (see e.g. Nosic and Weber (2009)). The framing of investment alternatives can for example influence the risk perception. Different presentation formats can lead to different judgments of the riskiness of investment alternatives (see e.g. Weber et al. (2005) or Diacon and Hasseldine (2007)).

The framing does not only influence the risk perception but the perception of the whole security or the whole portfolio (see e.g. Langer and Weber (2001) or Karlsson et al. (2006)). Specific heuristics also lead to a biased perception of choice alternatives. For example, due to the representativeness heuristic, investors mistake company for stock characteristics (Solt and Statman (1989)). These biases can easily lead to investment mistakes. For example, people tend to invest in stocks that grab their attention because they are biased by the news (Barber and Odean (2008)). Here, the availability heuristic leads to a biased perception of the attractiveness of the stocks in the media.

Another example is the tendency of people to think in separate mental accounts (see e.g. Thaler (1985), Shefrin and Statman (1985), or Grinblatt and Han (2005)). Thus, when making decisions, they neglect interactions between different assets or concentrate on only a small part of their total wealth. Glaser and Weber (2007a) find that investors are not able to estimate their past portfolio performance correctly. Moreover, they tend to ignore background risks, e.g. risks from other financial investments, from housing, and from labor and entrepreneurial

income (see e.g. Goetzmann (1993), Heaton and Lucas (2000a, b), and Klos and Weber (2006)).

When allocating their wealth to different asset classes, investors fail to form optimal portfolios. Despite a high premium for equity (Mehra and Prescott (1985)) many investors do not hold stocks or investment funds at all (see e.g Haliassos (2002), Eymann and Boersch-Supan (2002), or Campbell (2006)). Moreover, many portfolios are not sufficiently diversified and people tend to apply naive diversification strategies (see e.g. Benartzi and Thaler (2001), Langer and Fox (2005)). Investors prefer securities they are familiar with (Hubermann (2001)), investments from their home country (French and Poterba (1991), Coval and Moskowitz (1999)), and stocks of their own company (Bernartzi (2001)). By their non-participation in the risky asset markets, investors lose about 2 to 6 percent equity premium (Haliassos (2002), Calvet et al. (2007)). Missing diversification of the risky part of the portfolio causes a reduction of the Sharpe Ratio (Guiso and Jappelli (2007), Calvet et al. (2007), Ivkovic et al. (2008)). However, Ivkovic et al. find a higher return for concentrated portfolios.

Concerning trading behavior, investors tend to trade too much and by this excessive trading reduce their performance (Barber and Odean (2000)). One possible reason for this behavior is overconfidence (see e.g. Odean (1999) or Glaser and Weber (2007b)). In addition, investors exhibit the disposition effect, i.e. they prefer to sell winning stocks and hold losing stocks (Shefrin and Statman (1985), Odean (1998), Weber and Camerer (1998)). Again, this behavior reduces performance as investors would be better off by selling losers instead of winners.

2.2 Potential Benefits of Advice - Professional Investor Behavior

Financial advice can be beneficial to a decision maker in several ways. The economic perspective considers financial advisors acting as financial intermediaries which pool supply and demand. Financial intermediaries provide the transformation of risks, terms, and quantities. Moreover, they produce information and reduce problems emerging from asymmetric information in financial markets (see e.g. Freixas and Rochet (2008)). As they gather and circulate information for many investors, advisors can exploit economies of scale. Investors hence benefit from a reduction of information and transaction costs when consulting a financial advisor. These costs can have a substantial impact on investment decisions. For example, Haliassos and Bertaut (1995) and Vissing-Jorgensen (2002) report that high entry or participation costs are the reason for many households not to participate in the stock market. The most

commonly stated reason (about 83 percent of investors) by German investors to use financial advice is a time reduction for information gathering (see Jansen et al. (2008)).

The behavioral perspective considers the adequate modeling of preferences and the avoidance of investment mistakes. Financial advisors can support decision makers in clarifying their own preferences and in the investment process. As stated before, individual decision makers are prone to behavioral biases and investment mistakes. Jansen et al. (2008) find that for 76 percent of German investors, the avoidance of investment mistakes is a reason to use advice.

As professional investors have more knowledge and are much more experienced in financial matters, private investors can benefit from this expertise. Capon et al. (1996) show that knowledge is indeed important. They analyze mutual fund investors and find most of them to be naive. Especially those who seek advice from financial advisors (in contrast to those buying directly from fund companies) have only little knowledge about their investments. More than 80 percent do not know whether they invested in an equity fund or a fixed income fund.

On the level of the asset allocation decision (allocation to broad asset classes such as stocks and bonds), it is hardly possible to judge whether advice is rational or not as it depends on the data sets (see Canner et al. (1997) and Elton and Gruber (2000)). With empirical data of German investors, Jansen et al. (2008) find that advisors' recommendations are oftentimes not consistent with investors' risk preferences; for instance, most of the portfolios contain high equity shares in spite of a high risk aversion of the investors.

When deciding for a mutual fund, Jones et al. (2005a, b) find that the majority of investors consult financial advisors. The advice on average provides value to the investors because the advisors use a more sophisticated decision making process (a more objective set of fund characteristics). Furthermore, however, they also find that advisors do not seem to care about recommending funds with cheap expense ratios to the investors.

Concerning behavioral biases, on the one hand, there is some evidence that education and experience may reduce behavioral biases. Shapira and Venezia (2001) find that the disposition effect is less pronounced for professional investors compared to independent investors. List (2003) finds that market experience leads to higher rationality; it eliminates a prominent market anomaly, the endowment effect. On the other hand, several other studies confirm the existence of the disposition effect for professional investors as well (Garvey and Murphy (2004), Coval and Shumway (2005), Locke and Mann (2005)). Kaustia et al. (2009) report

about unstable preferences of financial advisors, i.e. the advice varies with the framing of the question (related to required return versus expected return) the client asks.

There is also mixed evidence about the stock picking abilities of financial experts. Copeland and Mayers (1982) analyze the value of stock recommendations made by security analysts; they do not find an excess return after costs. Metrick (1999) analyses stock recommendations by investment newsletters. He also finds no evidence for superior stock picking abilities. Barber et al. (2003) even find that the most recommended stocks substantially underperformed and the least recommended outperformed the market. Jegadeesh and Kim (2006) confirm that the potential profit from recommended trading strategies cannot compensate for transaction costs. On the contrary, Barber et al. (2001), Jegadeesh et al. (2004), and Green (2006) find higher returns for most recommended stocks than for least recommended stocks indicating that there is a potential benefit from experts' recommendations.

Jensen (1968) analyses the performance of mutual funds. He finds that the funds on average are not better than a simple buy and hold strategy. Recent studies widely agree that actively managed funds underperform passively managed funds after costs (see e.g. Malkiel (1995, 2003a), Gruber (1996), Carhart (1997), or Griese and Kempf (2003)). However, when looking at the performance of the stocks before costs, there is also evidence that mutual fund managers possess stock picking abilities (see e.g. Gruber (1996), Wermers (2000), or Kosowski et al. 2006)). Grinblatt and Keloharju (2000) confirm that sophisticated investors (often professional managed funds or investment banking houses) outperform less sophisticated investors (domestic investors in Finland). In addition, the most sophisticated investors have relatively small transaction costs that lead to an even higher performance difference.

Besides information, expertise, and the avoidance of investment mistakes, there are also general motives to ask for advice. According to Harvey and Fischer (1997), people search for advice to accept help, improve judgment, and to share responsibility. Jansen et al. (2008) ask German investors for their reasons to use financial advice. Besides time constraints and the avoidance of investment mistakes, investors name higher convenience and safety. Shefrin (2007) confirms the importance of shifting the responsibility. If an investment turns out badly, people need a culprit to protect the own ego. Contrary, if the investment turns out well, the investor can attribute the profit to the own person.

2.3 Compensation Models and Conflicts of Interest

One main obstacle for the advisors to provide advice in the best interest of the investor are conflicts of interest between advisor and investor (for the general principal-agent-model, see Ross (1973) and Holmstrom (1979), for a specialized principal-agent-model for financial advice, see Golec (1992)). A conflict of interest between two parties exists when one party can gain by taking actions that are harmful to the other party (see Mehran and Stulz (2007)). Relating to an investment transaction, a conflict of interest exists when the advisor can take actions that are disadvantageous for the investor. Because of the information asymmetry between financial institutions and their representatives (e.g. the bank advisor) on the one side and private investors on the other side, financial institutions may try to bias the investor and not disclose all information. They have better information about financial products and the suitability for the investor. For the investor, it is difficult to ascertain the quality of advice. When receiving a product recommendation, he does not know whether there exists another product which better suits his interests (see e.g. Bolton et al. (2007)).

There are different compensation models if a private investor asks for financial advice. The prevalent system in Europe is commission-based advice (see e.g. Bluethgen et al. (2008)). Especially for retail clients, most banks in Germany use this compensation model. The banks and hence the advisors are paid indirectly by commissions from product providers. If an investor does not buy anything, the bank gets nothing. The existing conflict of interest is obvious: to maximize the bank's and his own profit, the advisor has to recommend the product which pays the highest commission instead of the product that is in the best interest of the investor. In addition, advisors may recommend useless transactions to generate further income.

Ottaviani (2000) and Krausz and Paroush (2002) develop theoretical models of financial advice in the presence of conflicts of interest. Both models show that advisors maximizing their own income do not necessarily act in the best interest of the investors.

Jones et al. (2005b) find that advisors making fund recommendations are more influenced by commissions and profits than by the knowledge of which is the best choice for the investor. Jansen et al. (2008) find that portfolios of advised clients are biased toward too much equity because the margins for equity-related products (stocks, funds, certificates) are the highest for the bank.

Zhao (2008) analyses mutual fund flows. He finds that high-commission funds receive higher flows compared to low-commission funds. Bergstresser et al. (2009) analyze funds sold by brokers; compared to direct-sold funds, they find lower risk-adjusted returns even before costs of distribution; brokers do not seem to have superior security picking skills. As a possible explanation for their findings, Bergstresser et al. argue that brokers simply act in their own interest, i.e. they sell the funds they get paid for most. They also find higher fund flows for funds with higher distribution fees.

However, Bolton et al. (2007) show that conflicts of interest are reduced by competition. Competition leads to a disclosure of information by the advisor for reputational reasons and to differentiate the own product from competitors. Bentz (2001) finds that commissions may also serve as a signal of product quality in the sense that high commissions are a signal for high-quality products.

Besides commission-based advice, other compensation models like fixed fees or asset-based fees are possible. In the fixed fee model, the advisor is paid directly by the investor (e.g. by a fixed fee per hour). The advice should thus be independent from commissions. But the fixed fee model is also not free of conflicts of interest; it can lead to shirking and over-billing. Under the asset-based fee model, the compensation is tied to the performance. The advisor receives a small percentage of assets under management. Theoretically, this performance-based payment should align interests of advisors and investors as both parties are better off when the investment increases in value. But the advisor might also try to increase assets under management and thus decrease investments outside of the fee arrangement, e.g. cash.

For life insurances, Gravelle (1994) finds that weak consumers will still be exploited in a fee-for-advice system. Elton et al. (2003) empirically study the influence of incentives for fund managers (compensation as a function of fund performance relative to some benchmark) in the mutual fund industry. Elton et al. find that managers of incentive-funds exhibit higher stock picking abilities; the funds have lower expense ratios and higher risk-adjusted returns. Funds flows are larger than into non-incentive funds. However, incentive-funds take higher risk compared to funds without incentives and do not outperform their benchmark because of a beta lower than one.

Massa and Patgiri (2009) also find evidence that incentives increase risk-adjusted returns but also increase risk taking as well. In addition, they find that higher incentives reduce the survival probability of the fund.

Robinson (2007) compares three different compensation models for financial advisors: commissions, asset-based fees, and fixed fees. He argues that there is no optimal compensation model as all three contain incentives that may lead to conflicts of interest.

Regulation and consumerists try to stop the intended concealment of information by financial advisors. Since the enacting of "The Markets in Financial Instruments Directive (MiFID)" by the European Parliament and the European Council (2004 and 2006), firms performing investment services and activities are forced to reveal any conflicts of interest. But this act does not solve all problems. In an experimental study, Cain et al. (2005) find that the disclosure of conflicts of interest leads to an increase of the advice bias because advisors are released from moral concern and even feel encouraged to give wrong advice. Inderst and Ottoviani (2010) also find evidence for ambiguous welfare implications of a mandatory disclosure of commissions. In their model, a disclosure indeed leads to a reduction of commissions but it may also lead to a sales increase of more costly products.

Mehran and Stulz (2007) review the large literature concerning conflicts of interest in financial institutions. They conclude that the academic literature about conflicts of interest reaches weaker conclusions than those by journalists and politicians; for instance for reputational reasons, financial institutions have incentives to weaken the influence of these conflicts. In addition, investors have an incentive to pay attention to existing conflicts and thus to adjust recommendations. Overall, the results of empirical studies are mixed; they depend on the type of conflict and on the sample period.

2.4 Performance of Advised versus Non-Advised Investors

So far, there are only very few empirical studies analyzing whether the benefits of financial advice outweigh the costs. These studies mainly use bank account record data to compare the portfolios of advised and non-advised investors.

Bluethgen et al. (2008) analyze investment account record data from a German retail bank (01/03-10/05, 4,363 investors). They compare portfolios of clients advised by bank advisors with the portfolios of clients acting on their own. They find that advice leads to a higher diversification but also to higher turnover and thus higher transaction fees. Gerhardt and Hackethal (2009) use data from a German online bank (02/06-07/07, 65,457 investors). They want to eliminate the influence of different characteristics of advised and non-advised clients. For

this, they construct a peer group for the advised subsample. For every advised client, a non-advised "twin" is selected. The twin is the non-advised investor that is most similar to the advised client with regard to his socio-demographic variables. In addition to the peer group analysis, they conduct an event study with investors switching to financial advice. They find similar results for both analyses: advice seems to reduce speculative trading motives and the advised portfolios are better diversified. When clients switch to advisors, these advisors often re-structure the portfolio, resulting in higher trading activities. Gerhardt and Hackethal find no significant difference in Sharpe Ratios (net of fees) between advised and non-advised portfolios.

Hackethal et al. (2009) control for demographic variables and the endogeneity of the choice to consult an advisor. They use German online brokerage house data (01/01-06/06, 32,751 investors). They compare non-advised portfolios to those advised by independent financial advisors. These advisors generate income almost exclusively from sales provisions or asset management fees (high-powered incentives). Hackethal et al. find that especially older and richer investors who would do better without help are more likely to consult a financial advisor. A possible reason might be time constraints of these investor groups. Advised portfolios exhibit lower returns and higher risks, with a higher probability of a loss. They state overtrading and thus higher trading costs as a possible reason for the worse performance of advised portfolios.

Kramer and Lensink (2009) compare portfolios of advised and non-advised Dutch investors using data from a retail bank (04/03-08/07, 6,758 investors). They find that advised clients tend to be better diversified; portfolio risk is lower but advised portfolios also have significant lower gross and net returns.

Chapter 3

False Consensus and the Role of Ambiguity in Predictions of Others' Risk Preferences

3.1 Introduction

The tendency of people to see the self as the center of social judgment has been known for a long time (see e.g. Holmes (1968) or Ichheiser (1970)). This leads to egocentrically biased judgments when people are asked to predict the behavior of other people. Ross, Greene, and House (1977) find confirmative evidence in four studies. They called the tendency of people to project their way of thinking onto other people the "False Consensus Effect". In a hypothetical questionnaire, they ask subjects about 35 different issues about for instance personal traits, beliefs, preferences, or activities (e.g. "Are you shy?"). They find evidence for a false consensus effect in 33 of the 35 items in the questionnaire. In another study, they confronted subjects with real conflict situations. For example, students were asked to carry a sandwich board sign saying "Eat at Joe's" and should predict how many of their fellow students would accept or refuse to carry the board. Again, they find confirmative evidence for the effect. Overall, people tend to see their own behavioral choices and judgments as relatively common and appropriate to a specific situation while alternative responses are considered to be uncommon, deviant, and inappropriate. In various follow-up studies, Ross et al. find the false consensus effect to be especially strong in political expectations, personal traits and views, and personal problems.

After 1977, a lot of other studies followed showing the false consensus effect in different contexts and it became a widely accepted phenomenon.[2] Mullen et al. (1985) provide a meta-analysis of 115 hypothesis tests. Their results show that the false consensus is a very stable effect. It could be demonstrated in behaviors (e.g. people watching TV or playing tennis think this behavior is more common than people with other hobbies), in decisions (e.g. eating ham or eggs for breakfast, painting a room blue or yellow), and in opinions (e.g. political statements, women's rights). Moreover, the effect was found in evaluations (e.g. thinking to die before the age of 70, thinking to be better off in later life than the own parents) and also in characteristics (e.g. shy people think this characteristic is more widespread than it actually is).

Marks and Miller (1987) present an empirical and theoretical review of ten years of research on the false consensus effect. Their goal was to summarize possible explanations for the effect. In order to do so, they present four general theoretical perspectives. The first perspective explains the bias with a selective exposure to others that are similar. People associate with other people that are similar rather than dissimilar to themselves. This leads to a biased and restricted sample of information. The second explanatory approach stresses salience and focus of attention. People tend to put their focus of attention on their preferred position and this act of engagement makes the position more salient than it might actually be. The third approach emphasizes the tendency of people to attribute the cause of their own behavior to situational (in contrast to dispositional) forces. They thus conclude others to behave alike in similar contexts. Finally, the fourth explanation assumes a motivational explanation. The overestimation of similarity between the own and other persons may have a functional value, e.g. to maintain self-esteem. Marks and Miller were not able to identify one approach that causes the effect but instead find evidence for each of the four theoretical perspectives.

Several studies attribute the false consensus bias to an insufficient adjustment from the anchor of the own perspective (see e.g. Gilovich et al. (1998, 2000), Nickerson (1999), or Epley et al. (2004)). They suggest that people adopt others' perspectives by using their own perspective as an initial anchor and subsequently adjust for differences between themselves and others.[3] As these adjustments tend to be insufficient, they give rise to egocentric bias.

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[2] Under some circumstances people show the opposite effect, i.e. they perceive their own attitudes, beliefs etc. as relatively uncommon. This effect is called the "False Uniqueness Effect" (see e.g. Mullen et al. (1992), Suls and Wan (1987), or Perloff and Brickman (1982)).

[3] See Tversky and Kahnemann (1974) for a description of the anchoring and adjustment heuristic.

Gilovich (1990) shows that the false consensus effect is stronger in situations with greater latitude for subjective construal. Divergence of opinions can stem not only from differences in the "judgment of the object" but may also be due to differences in the "object of judgment". For example, the question "Are you competitive?" allows a higher diversity in interpretation compared to "Are you a first-born or a later-born child?". In a first study, Gilovich makes use of the different issues originally reported in Ross et al. (1977). 32 of the 35 items used in the original questionnaire were rated based on their latitude for construal. Gilovich finds a positive correlation between latitude for construal and the strength of the false consensus effect. Moreover, he performs a study where two versions of the same choice problem were given to subjects. For example, one group was asked the question whether they prefer an American or a European snack. In contrast, the other group was asked the more specific version of the problem whether they prefer apple pie or chocolate mousse. Obviously, the room for interpretation is limited in the latter version. Gilovich finds that participants exhibit a significant consensus effect for the broadly specified problems. In contrast, he only finds a significant effect for one of three specific problems. In this case, the effect is still smaller in the specific version than in the general version. Griffin et al. (1990) show that in an ambiguous situation, people generally make one single specific construal and fail to recognize that the construal of others may differ from their own. Kunda and Sherman-Williams (1993) find that people judge an ambiguous behavior (e.g. hitting someone) depending on the stereotypicality of the source (e.g. a housewife or a construction worker) for this behavior. The ambiguous description leads to different judgments of the same behavior but this difference disappears with a more detailed description of the behavior.[4]

Despite the high number of studies analyzing the false consensus effect, to our knowledge there is little evidence of the effect in financial decisions.

In an experiment by Engelmann and Stroebel (2009), subjects had to choose whether all four members in their group play a lottery or not and at the same time estimate how many of the subjects in other groups would choose to play the lottery. They find that without any additional information, the false consensus effect appears. If information about choices in the own group is explicitly provided, the false consensus effect disappears in the estimation of the other groups. However, if the information about the own group is only implicitly provided (in

[4] Again, there is also some contradicting evidence. Bosveld et al. (1995) show that under certain circumstances differential construal can also result in a false uniqueness effect.

form of payoffs for subjects) the false consensus effect in predicting other groups' behavior again reappears.

Roszkowski and Grable (2005) study real financial advisors' estimates of risk tolerance of their clients. In contrast to the previous studies where subjects had to give a consensus estimate, the advisors in this study have to state their own risk tolerance and to estimate the preferences of individual well-known clients. Advisors were graduates of the American College's Master's in Financial Services program. Each advisor was asked to pick two of his clients and all answered a risk tolerance questionnaire developed by the college. Own risk tolerance was measured on a seven-point scale and the client's risk tolerance was measured on a ten-point scale. Roszkowski and Grable do not find a positive correlation between own risk tolerance and estimated risk tolerance of the clients.

Besides the literature strand on the false consensus effect there are also studies analyzing the prediction accuracy made by a group of people. We only mention those in the financial context that are relevant for our study.

Hsee and Weber (1997) find a general prediction error in predictions of others' risky choices. They used 50/50 lotteries and participants had to choose between the lotteries and sure options and in addition had to predict the choice concerning the same lottery by another subject. The other subject was described in three different ways: as the average American, the average student on campus, and as the person sitting next to the participant in the classroom. Hsee and Weber find that the risk preference of the average American and the average student on campus is overestimated in the sense that the prediction is not sufficiently risk averse. This prediction error vanishes if the other person becomes more tangible, i.e. if participants are asked to predict the preferences of the person sitting next to them in the room; in this situation, there is no overall prediction error.

Faro and Rottenstreich (2006) performed another study of the accuracy of people's predictions of others' risky choices. Like Hsee and Weber, they use financial lottery questions but with different probabilities to construct choices in which people typically choose more risk averse or more risk seeking. On the basis of the fourfold pattern of Tversky and Kahneman (1986) they expected risk seeking for a lottery with a small winning probability (0.001) in the gain domain and risk aversion for a high probability (0.99). In the domain of losses, they expected risk aversion for the small probability prospect and risk seeking for the large probability loss. In the prediction condition, participants are asked to indicate the certainty equivalent

of a randomly selected University of Chicago MBA student. They detect a systematic inaccuracy; the predictions of others' choices are too regressive, meaning that predicted certainty equivalents are closer to risk neutrality than they actually are. When people tend to be risk seeking in a situation, they also predict that others are risk seeking but substantially less so. Vice versa, when they tend to be risk averse, the prediction of others is less risk averse.

Our analysis also investigates predictions of others' risky choices in financial decisions. As private savings, e.g. for retirement, become more and more important, these decisions are of great importance. But, at the same time, financial literacy of private investors is quite bad (see e.g. Cole and Shastry (2009) or Lusardi and Mitchell (2006)). Thus, it is not surprising that many people ask for advice or even completely delegate these decisions to professionals (see e.g. Allen (2001) or Guiso and Jappelli (2007)). Our study investigates the ability of a financial professional to put himself in the position of an average other person. This ability is necessary to decide in another person's interest. We use risk tolerance as an example as it is a crucial factor for the investment decision. Moreover, the task of predicting risk preferences for an average individual is quite common in reality. Think of a fund manager who has to decide on behalf of many investors, or a bank that has to decide about the variety of offered products. In our questionnaires analysis, we present subjects with simple lotteries and ask them for their own certainty equivalents. In addition, they are asked to predict the average certainty equivalent of all participants. The certainty equivalent of a lottery is the guaranteed payoff for which a person is indifferent between accepting the guaranteed payoff and playing the lottery. In the presentation of the lotteries, we vary in the description of the probabilities; we use 50/50 probabilities as well as ambiguous probabilities.

With this chapter, we want to contribute to both mentioned strands of the literature. First, following Hsee and Weber (1997) and Faro and Rottenstreich (2006), we analyze the aggregated prediction of the group. We hypothesize that we will find an overall prediction bias in the sense that people overestimate the risk tolerance of others. As we analyze lotteries in the gain domain, we expect risk averse decisions for the own person. We hypothesize that we will find a prediction error in the sense that we expect inadequately high certainty equivalents when participants are asked to predict others' preferences.

Second, we analyze the predictions on an individual level. According to the literature on the false consensus effect, we hypothesize that we will find substantial variation in the individual predictions. Subject to the false consensus effect, people tend to be biased in their judgments about others. Thus, we expect subjects who state low certainty equivalents for the own person

to give low predictions for the average other as well. On the contrary, we expect subjects with high certainty equivalents to state high equivalents for others as well.

Besides 50/50 probabilities, we also use ambiguous probabilities. This vague description of the probabilities implies greater latitude for construal (for a detailed explanation of ambiguity, see Ellsberg (1961)). With our study, we extend the scope of Gilovich (1990) to financial decisions. Ambiguity is omnipresent in financial decisions; think of the future development of a stock price. Following Gilovich's results, we hypothesize that we will find a higher false consensus effect for the ambiguous lotteries than for the specific lotteries.

3.2 Methodology

We conducted a paper-based questionnaire (Study 1) as well as a computer-based questionnaire in our experimental lab (Study 2).

3.2.1 Study 1

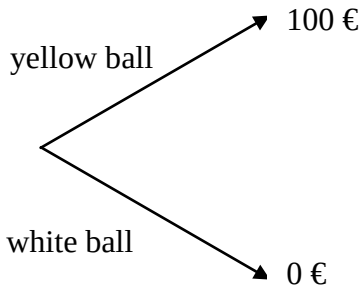
The participants in the paper-based questionnaire were 84 students from the University of Mannheim attending the graduate course in banking. We have 23 female and 61 male participants who are between 19 and 31 years old. In the paper-based questionnaire, we use a within-subject design. Participants first stated their own certainty equivalents and afterwards predicted the average choice of all participants. They were asked to consider hypothetical lottery questions. Lotteries consisted of a fifty-fifty chance of winning 100 or 0 Euro and a fifty-fifty chance of winning 200 or 50 Euro. The same outcomes were used for the ambiguous lotteries where subjects had no information about the probabilities except for them being between 0 and 100 percent. To display probabilities, we used the classical illustration of an urn containing white and yellow balls (see Ellsberg (1961)). As an example, Figure 3.1 shows the first question of the questionnaire (the whole questionnaire is displayed in Appendix A). The instructions read as follows: The following lottery either pays 100 € or 0 €. Imagine an urn containing 100 balls, 50 of them are yellow and 50 of them are white. One ball is drawn, if it is yellow the lottery pays 100 €, if it is white the lottery pays 0 €. All students answered the same questionnaire. They were first asked for their own certainty equivalent and subsequently for their prediction of the average certainty equivalent of all participants. The second question shows the same lottery but with ambiguous probabilities. Again students were supposed to

give their own certainty equivalent first and afterwards predict the average choice of all participants. The instructions in this case are as follows: The following lottery either pays 100 € or 0 €. Imagine an urn containing 100 balls. The balls are of yellow and white color, but the proportions are unknown. One ball is drawn, if it is yellow the lottery pays 100 €, if it is white the lottery pays 0 €. Students answered the questionnaire in class during an exercise session. To motivate students to participate, we randomly drew 5 questionnaires and paid 10 Euro to the respective participants. Camerer and Hogarth (1999) show that incentives sometimes improve performance, but often they do not. Moreover, we know from our course evaluations that students enjoy participating in experiments and questionnaires during the course.

Figure 3.1: Extract from the paper-based questionnaire

The figure shows an extract from the paper-based questionnaire for the lottery with outcomes 0 and 100 with 50/50 probabilities.

The following **lottery** either pays **100 €** or **0 €**. Imagine an urn containing **100 balls**, **50** of them are **yellow** and **50** of them are **white**. One ball is drawn, if it is yellow the lottery pays 100 €, if it is white the lottery pays 0 €.



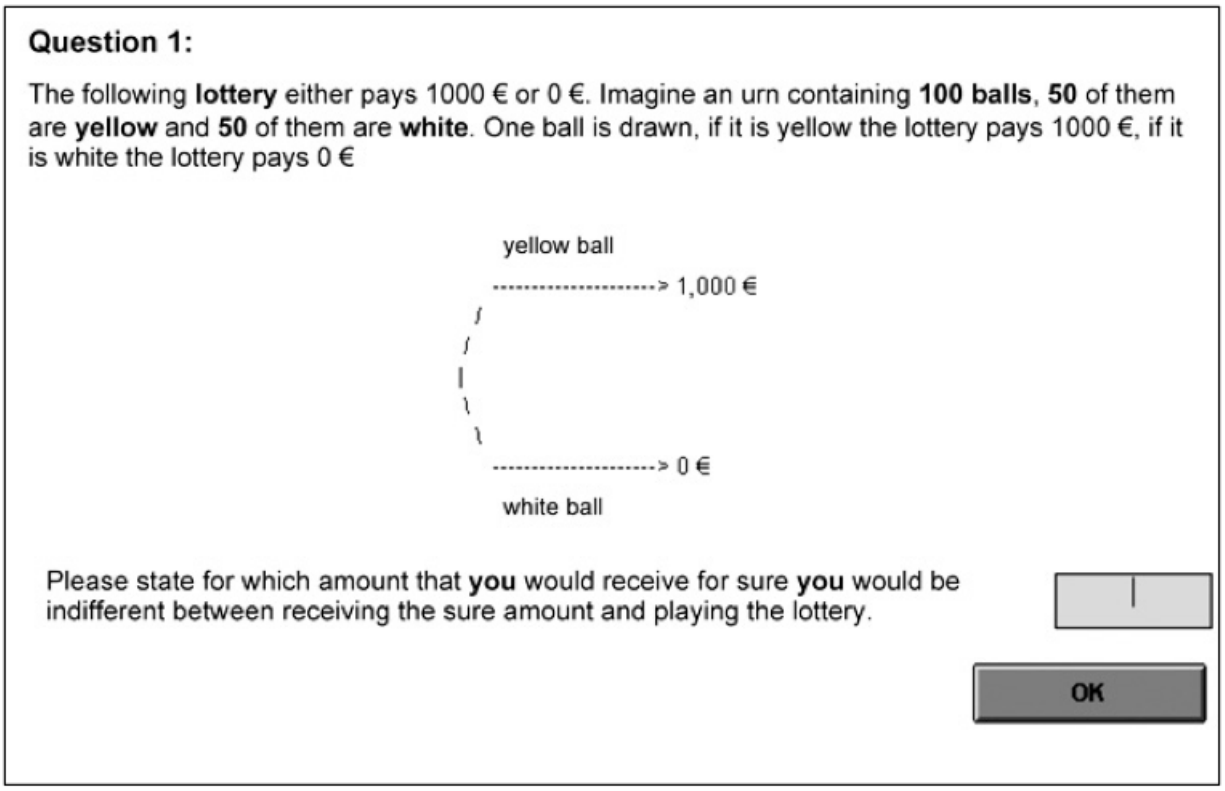
Please state for which amount that **you** would receive for sure **you** would be indifferent between receiving the sure amount and playing the lottery. _____ €

What do you think, for which amount **the participants in this questionnaire** (thus students attending the exercise course in Banking) are **on average** indifferent between receiving the sure amount and playing the lottery? _____ €

3.2.2 Study 2

Figure 3.2: Screenshot from the computer-based questionnaire

The figure shows a screenshot for the computer-based questionnaire for the lottery with outcomes 0 and 1000 with 50/50 probabilities.



The participants in the computer-based questionnaire were 199 graduate and undergraduate students from the University of Mannheim from various schools. 75 of them were female as opposed to 124 males, in age between 18 and 35 years. Participants were randomly assigned to two different groups to allow a between-subject design, allowing us thus to control for order effects. One group (group self) states own certainty equivalents in the beginning whereas another group predicts the average choice of all participants (group other). In addition, the group self afterwards was asked to predict the average and the group other was asked to state own preferences but they did not know this in advance when answering the first questions. Lotteries in the lab consisted of a fifty-fifty chance of winning 1000 or 0 Euro, a fifty-fifty chance of winning 200 or 0 Euro, and a fifty-fifty chance of winning 50 or 0 Euro. Again, the

same outcomes were used for the ambiguous lotteries. Figure 3.2 shows a screenshot of the first 50/50 lottery question in the group self.[5]

In the treatment other in the lab we also asked for an interval. Participants were asked to state a lower bound of the certainty equivalent that they think is not fallen short of by more than 5 percent and also an upper bound that is not exceeded by more than 5 percent of the participants. Students received a flat payment of 5 Euro for their participation. We decided to have a flat payment in order to have the same incentive structure in the treatments self and other. Moreover, as mentioned before, we do not think that payment is crucial.

3.3 Results and Discussion

3.3.1 Analysis of Average Effects

Descriptive statistics of the two studies are displayed in Table 3.1. People on average decide risk aversely and also show ambiguity aversion. For a risk averse person, the certainty equivalent is lower than the expected value of the lottery because the person prefers to reduce uncertainty; lower certainty equivalents correspond to higher risk aversion. An ambiguity averse person prefers known risks over unknown risks (see Ellsberg (1961)). Table 3.1 shows that certainty equivalents are on average lower than expected values of the lotteries and the certainty equivalents belonging to the lotteries with unknown probabilities are still lower than those with fifty-fifty probabilities.

First, we want to test whether there is an effect on the level of the group (aggregated level). There is a clear standard for assessing the accuracy or inaccuracy of predictions: in case of an accurate prediction, the mean predicted certainty equivalent would be equal to the mean stated own certainty equivalent. Our questionnaire data follows somewhat skewed distributions. We will therefore use nonparametric tests of statistical significance. Looking at the paper-based questionnaire results in Panel A of Table 3.1, there is no overall prediction bias as in Hsee and Weber (1997) or in Faro and Rottenstreich (2006). Considering the mean (median), people do not seem to make a difference between stating own and evaluating others' certainty equivalents. The Wilcoxon signed-rank test of matched pairs shows that there are no significant differences between the certainty equivalents for the own person and the predicted ones for the

[5] To conduct the computer-based questionnaire, we used the software z-Tree (Zurich Toolbox for Readymade Economic Experiments).

other participants. On average, people do not overestimate the willingness of others to take risks or predict them to be closer to risk neutrality than they actually are.

Table 3.1: Descriptive statistics

The table shows descriptive statistics (mean, median, standard deviation, minimum value, maximum value) of the certainty equivalents. Panel A states results for the paper-based questionnaire and Panel B for the computer-based questionnaire. In addition, own certainty equivalents (CE self) and predicted certainty equivalents (CE other) are compared. Wilcoxon matched pairs test states the probability that CE self equals CE other.

Panel A: Paper-based Questionnaire (84 observations)				
Lottery outcomes (€)	**(100,0)**	**(200,50)**	**(100,0)**	**(200,50)**
Probabilities (%)	**50/50**	**50/50**	**?/?**	**?/?**
Certainty Equivalent Self				
Mean	44.46	110.19	34.33	90.46
Median	50.00	113.50	30.00	90.00
Std.Dev.	12.94	23.82	21.40	31.93
Min.	20.00	50.00	0.00	20.00
Max.	80.00	170.00	100.00	200.00
Certainty Equivalent Other				
Mean	42.55	106.82	35.12	90.06
Median	45.00	106.00	30.00	90.00
Std.Dev.	11.86	23.29	18.97	28.03
Min.	1.00	50.00	1.00	20.00
Max.	70.00	150.00	100.00	150.00
CE self > CE other	34	25	29	34
CE self < CE other	27	30	26	25
CE self = CE other	23	29	29	25
Wilcoxon matched pairs test	not sig	not sig	not sig	not sig

Panel B: Computer-based Questionnaire (199 observations)						
Lottery outcomes (€)	**(1000,0)**	**(200,0)**	**(50,0)**	**(1000,0)**	**(200,0)**	**(50,0)**
Probabilities (%)	**50/50**	**50/50**	**50/50**	**?/?**	**?/?**	**?/?**
Certainty Equivalent Self						
Mean	440.33	93.37	25.99	362.48	81.61	23.00
Median	500.00	100.00	25.00	350.00	80.00	24.00
Std.Dev.	186.62	33.88	8.38	229.29	44.89	11.00
Min.	0.00	0.00	5.00	0.00	1.00	0.10
Max.	1000.00	200.00	50.00	1000.00	200.00	50.00
Certainty Equivalent Other						
Mean	424.34	93.13	24.89	390.35	81.44	22.34
Median	500.00	100.00	25.00	400.00	80.00	20.00
Std.Dev.	164.70	28.19	7.64	226.99	39.69	9.79
Min.	20.00	10.00	3.00	10.00	2.00	1.00
Max.	1000.00	150.00	50.00	1000.00	200.00	50.00
CE self > CE other	66	64	75	69	75	77
CE self < CE other	62	62	41	79	77	60
CE self = CE other	71	73	83	51	47	62
Wilcoxon matched pairs test	not sig	not sig	p<0.01	not sig	not sig	not sig

Our results may be compared with the third treatment in Hsee and Weber where participants were asked to predict preferences of the person sitting next to them in class. With this very concrete description of the other person, the prediction bias disappeared. We conducted our questionnaire during an exercise class and asked the students for their own certainty equivalents and afterwards to predict the average choice of all participants. As the students were able to look around in the room at the other participants, it is likely that we find the same concreteness effect as in Hsee and Weber (1997).

Panel B of Table 3.1 shows similar results for the computer-based questionnaire. As we do not find strong order effects (see Appendix B), we use all 199 observations regardless of whether participants stated their own certainty equivalents first or whether they predicted those of others first. Only one out of six differences between self and others is significant. For the 50/50 lottery (50,0), the participants are more risk seeking for the own person than for others. This is in line with Faro and Rottenstreich (2006) who find that people are closer to risk neutrality when evaluating certainty equivalents of others compared to their own. The other five differences are - like the differences in the paper-based questionnaire - not significant. We hence cannot find evidence for an effect on the aggregated level. Again, this result is comparable to the third treatment of Hsee and Weber (1997). During the experiment, students were sitting in the lab together with other participants. Up to 20 students did the experiment at the same time. As in the classroom situation, they were thus able to look around and thereby get a concrete view of the other participants.

3.3.2 Individual Level Analysis

So far we found that the average predicted certainty equivalent is not significantly different from the average own certainty equivalent. But does this necessarily mean that individuals are also capable of making good predictions?

The financial analyst Paul Johnson (2004) found an interesting effect. From 1995 to 1999, he asked his students (studying at the Graduate School of Business, Columbia University) to predict the winners in 12 Oscar categories. His results over the years have been pretty consistent, in all but one year; the consensus view has never lost to the average individual student. For instance, in 1997 (a year in which 125 students voted) the average student was right on only 4.83 predictions, but the consensus got 11 out of 12 correct. The consensus seems to be a better predictor than an individual prediction, as the prediction mistakes cancel each other out.

In the following, we go beyond the aggregated analysis and also look at individual predictions. We hypothesize that we will find a false consensus effect on the individual level. The more risk averse a person is herself, the more risk averse she evaluates others and - vice versa - a more risk seeking person sees others also as more risk seeking. To get a first idea of the data, we perform a median split of the data, thereby obtaining two halves, the relatively more risk averse whose certainty equivalent is smaller than the median and the relatively more risk seeking people who have a certainty equivalent greater than the median.

Table 3.2: Median split

The table shows the results of a median split of the data. Panel A states results for the paper-based questionnaire and Panel B for the computer-based questionnaire. The last column (Wilcoxon) states the probability the two subgroups are drawn from the same distribution.

Observations equal to the median are dropped from the analysis (see Appendix C for an inclusion of these observations).

		Total		(CE self < Median CE self)			(CE self > Median CE self)			Wilcoxon
		CE self	CE other	CE self	CE other	Obs.	CE self	CE other	Obs.	(p-value)
Panel A: Paper-based Questionnaire										
Lottery (100,0)										
50/50	Mean	44.46	42.55	33.73	37.33	40	63.29	52.50	14	<0.01
	Median	50.00	45.00	35.00	40.00		60.00	50.00		
?/?	Mean	34.33	35.12	13.46	21.75	28	52.97	48.17	36	<0.01
	Median	30.00	30.00	10.00	15.00		50.00	50.00		
Lottery (200,50)										
50/50	Mean	110.19	106.82	90.88	103.02	42	129.50	110.62	42	<0.06
	Median	113.50	106.00	100.00	100.00		125.00	120.00		
?/?	Mean	90.46	90.06	64.35	70.43	40	119.58	111.06	36	<0.01
	Median	90.00	90.00	65.00	70.00		120.00	114.00		
Panel B: Computer-based Questionnaire										
Lottery (1000,0)										
50/50	Mean	440.33	424.34	292.74	375.87	91	674.65	454.43	40	<0.01
	Median	500.00	500.00	350.00	400.00		650.00	500.00		
?/?	Mean	362.48	390.35	140.47	261.67	75	532.37	491.90	105	<0.01
	Median	350.00	400.00	150.00	200.00		500.00	500.00		
Lottery (200,0)										
50/50	Mean	93.37	93.13	64.77	77.54	81	134.11	109.02	45	<0.01
	Median	100.00	100.00	75.00	80.00		125.00	100.00		
?/?	Mean	81.61	81.44	43.32	60.51	88	118.15	101.16	93	<0.01
	Median	80.00	80.00	50.00	50.00		100.00	100.00		
Lottery (50,0)										
50/50	Mean	25.99	24.89	21.21	20.54	58	34.10	28.87	69	<0.01
	Median	25.00	25.00	20.00	20.00		30.00	25.00		
?/?	Mean	23.00	22.34	16.98	17.99	98	31.14	26.60	98	<0.01
	Median	24.00	20.00	15.00	20.00		27.00	25.00		

Table 3.2 reveals first evidence for a false consensus effect. Panel A shows the results for the paper-based questionnaire and Panel B for the computer-based questionnaire. First, we perform a median split according to the stated own certainty equivalent.[6] Second, we compare the predicted certainty equivalents for others given by the subgroups. P-values (for the Wilcoxon rank-sum test)[7] stated in the last column test the hypothesis that the predictions of the two subgroups are the same. For the 50/50 lottery (100,0) the relatively risk averse group states a mean certainty equivalent for others of 37.33 (median 40.00). In contrast, the relatively risk seeking group states a mean certainty equivalent of 52.50 (median 50.00). The difference is significant at the 1 percent level. This result is very robust as we also find significant differences in all of the other 9 lotteries. The relatively more risk averse people always give a more risk averse prediction compared to the risk seeking subgroup.

Despite the significant differences in the predicted certainty equivalents for others between the subgroups, the differences in the stated own certainty equivalents seem to be still higher. It hence seems to be the case that people adjust their own certainty equivalent when asked for a prediction of the average of all participants. We also compare the own certainty equivalents with the predicted certainty equivalents within the subgroups.[8] For example, the relatively risk averse group in the questionnaire states a mean own certainty equivalent for the 50/50 lottery (100,0) of 33.73 (median 35.00) while the mean predicted certainty equivalent is 37.33 (median 40.00). The prediction is significantly higher than the own certainty equivalent at the 5 percent level. The result that people adopt their own preferences is robust. In all but the ambiguous (200,50) lottery within the risk averse subgroup, the prediction is significantly different (at least at the 5 percent level) from the own certainty equivalent. The results in Panel B confirm the results from the paper-based questionnaire. The difference between own and predicted certainty equivalent in the relatively risk seeking subgroup for the ambiguous (1000,0) lottery is significant at the 5 percent level, all other differences are significant at the 1 percent level. In general, participants seem to make regressive predictions. More risk averse people

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[6] In Table 3.2, answers equal to the median drop out of the analysis. In some lotteries this is a considerable part, e.g. in the computer-based experiment when asked for the certainty equivalent for the 50/50 lottery (1000,0), 68 participants gave the median answer 500 €. Nevertheless, the results remain unchanged if the median observations are added to the relatively more risk averse or to the relatively more risk seeking subgroup (see Appendix C).

[7] We are not able to use the classical test of false consensus that Ross, Greene, and House (1977) define. This would be a test of the difference between the estimates of consensus for position A made by subjects who hold position A and the estimates of consensus for position A made by subjects who hold position B. As the certainty equivalent is a continuous variable with a lot more than two possible parameter values, we have to use different statistics in the following.

[8] P-Values (Wilcoxon signed-rank test of matched pairs) are not reported in the table.

estimate the average participant as less risk averse compared to themselves and the more risk seeking predict that others on average are less risk seeking and both groups are correct concerning the direction of the adjustment.

The median split is useful only for a first understanding of the data. In the following we will thus review the previous results with more sophisticated analyses. In addition, we investigate the influence of ambiguity.

Figure 3.3: Plot of the (100,0) lottery

The figure shows a plot of own (self) versus predicted (other) certainty equivalents for the lottery with outcomes 0 and 100. The hollow circles and the dashed regression line picture the prediction for the lottery with 50/50 probabilities and the black squares and the solid regression line picture the prediction for the lottery with ?/? probabilities.

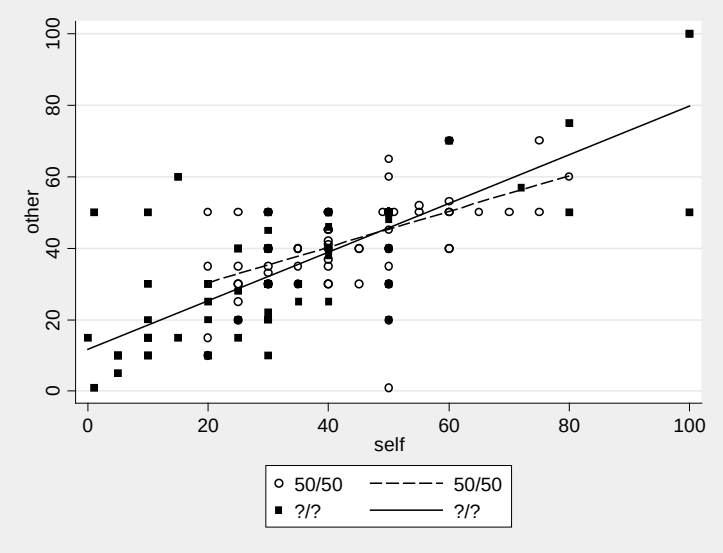


Figure 3.3 shows a plot of own and predicted certainty equivalents of the (100,0) lottery with 50/50 probabilities and with ambiguous probabilities (for plots of the other lotteries, see Appendix D). In addition to the data points, regression lines for the 50/50 case and for the ambiguous case are added to the figure. A flat regression line would indicate no false consensus effect at all, i.e. the prediction would be independent from the size of the own certainty equivalent whereas a slope of 1 would indicate a “perfect” false consensus effect, i.e. the prediction would be equal to the own certainty equivalent. Both regression lines in the figure are not as steep as the 45-degree line, indicating that individuals adjust their own certainty equivalent in the right direction for the prediction of others. Nevertheless, the relatively more risk averse participants tend to predict the average other to be too risk averse and the rela-

tively more risk seeking vice versa (positive slope of the regression lines). For the 50/50 probabilities, the adjustment is stronger than for the ambiguous probabilities; the regression line is steeper in the latter case, suggesting that the own preferences are even more crucial if uncertainty is higher.

Table 3.3: Correlation coefficients

The table shows correlation coefficients of the own certainty equivalent with the predicted certainty equivalent. Panel A states results for the paper-based questionnaire and Panel B for the computer-based questionnaire. The last column compares the non-ambiguous to the ambiguous case. It states the probability that correlations are the same.

Probabilities (%)	**50/50**	**?/?**	**Corr. equal?**
Panel A: Paper-based Questionnaire (84 observations)			
Lottery (100,0)	0.5447	0.7667	(p< 0.05)
Lottery (200,50)	0.2746	0.7266	(p< 0.01)
Panel B: Computer-based Questionnaire (199 observations)			
Lottery (1000,0)	0.3212	0.5733	(p< 0.01)
Lottery (200,0)	0.4996	0.7124	(p< 0.01)
Lottery (50,0)	0.6463	0.7522	(p< 0.10)

A correlation analysis confirms these results. Table 3.3 displays Pearson correlation coefficients. Panel A shows the lotteries of the paper-based questionnaire and Panel B those of the computer-based questionnaire. As expected, all correlations are significantly different from 0 at the 1 percent level. This supports our hypothesis that a false consensus effect is present in financial decisions. The predictions of the average strongly depend on the own preferences.

Furthermore, it is noteworthy that correlations between own and predicted certainty equivalent are higher in the case of ambiguous lotteries. For example, the correlation in the (100,0) lottery with 50/50 probabilities is equal to 0.5447 while the correlation with ambiguous probabilities is equal to 0.7667. The difference of the correlations with and without ambiguity is significant in all cases (paper-based as well as computer-based questionnaire); p-values are stated in the fourth column.[9] It hence seems to be the case that in situations with higher uncertainty (ambiguity), people rely more heavily on their own preference in order to predict certainty equivalents of other people.[10]

[9] We used the stata module "cortesti" by Herve M. Caci created in 2000. The test is an approximation (to be used when both samples are larger than 10).
[10] Unreported Spearman rank correlation coefficients show similar results.

To control for other effects, we use an OLS regression model and regress the predicted on the own certainty equivalent and further control variables. Table 3.4 shows the results for the paper-based questionnaire. In the paper-based questionnaire, we control for gender (dummy: 1= male, 0 = female) and age. The results show that predictions are not driven by age (however, as the studies were performed with student participants, we have little variation in age in our dataset); gender is significant in only one regression. The age of the person thus cannot explain how someone predicts the average of others' preferences. In the ambiguous (200,50) lottery, men predict a smaller certainty equivalent for the average other. This result does not contradict the frequent observation that women are in general more risk averse than men (see e.g. Dohmen et al. (2010a), Weber et al. (2002), or for a meta-analysis Byrnes et al. (1999)) because this is already included in the variable own certainty equivalent. It may simply be that our participants know about this observation and thus men adjust their own risk tolerance downwards because the whole group of participants consists of both women and men. Another reason for this adjustment may be that men perceive the average other to be less risk seeking compared to themselves because they consider risk seeking as an admirable characteristic and at the same time they think they are better than others (risk-as-value hypothesis, see Hsee and Weber (1997)). Biernat et al. (1997) provide a similar explanation. They say that the false uniqueness effect is more likely to appear in judgments of talent, ability, or other desirable characteristics. If risk tolerance is such a desirable characteristic especially men may perceive their own high risk tolerance as relatively uncommon. For the own certainty equivalent we find a highly significant coefficient in all regressions. In addition, the coefficient and the R-squared are higher for ambiguous predictions. This supports our hypothesis that the prediction depends on the own preference and that the influence of the own preference is especially strong for ambiguous situations.

Table 3.5 shows the results for the computer-based questionnaire. Participants in the lab were asked to state gender, age, semester, and their subjective knowledge concerning financial markets. Moreover, we included a dummy considering order (0 = group "self" at the beginning, 1 = group "other" at the beginning). Similar to the paper-based questionnaire, predictions are not heavily driven by control variables. Age is significant only in the (200,0) lottery with ambiguous probabilities. For two lotteries, men stated lower predictions than women. A higher semester also leads to a lower prediction in two cases. Financial knowledge (self assessment from 1 = very good to 6 = very bad) has a weakly significant effect in the (50,0) lottery with 50/50 probabilities. Order is significant for 3 lotteries in the sense that the pre-

dicted certainty equivalent is lower if participants first predicted the average certainty equivalent before they were asked to state their own certainty equivalent. For the other 3 lotteries, we do not find an influence of order. Biernat et al. (1997) find an influence of order but only if the form of judgment (objective versus subjective) changes between self-judgments and other-judgments. For the form we use in our study (objective self versus objective other), they do not find an effect of order. Again, the coefficient of the own certainty equivalent is highly significant for all predictions and the coefficients are higher for lotteries with ambiguous probabilities.

Our main results from the regressions can be summarized as follows: We document a highly significant effect of the own certainty equivalent on prediction of others. Moreover, this effect seems to be stronger under ambiguity.

Table 3.4: Regression results, single lotteries, paper-based questionnaire

The table reports determinants of the predicted certainty equivalent (linear regression model OLS).

Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Coefficients (Std. Errors)	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**
Lottery (100,0)	**50/50**	**50/50**	**?/?**	**?/?**
Gender		-0.6233		-3.4770
		(2.5200)		(3.0573)
Age		0.1022		0.5346
		(0.5418)		(0.6611)
Own CE	0.4992	0.4966	0.6797	0.6651
	(0.0849)***	(0.0868)***	(0.0629)***	(0.0639)***
Constant	20.3532	18.4492	11.7823	1.8821
	(3.9288)***	(13.7387)	(2.5387)***	(15.8429)
Observations	84	84	84	84
Adjusted R^2	0.2881	0.2711	0.5828	0.5814
Lottery (200,50)	**50/50**	**50/50**	**?/?**	**?/?**
Gender		-1.1746		-9.7995
		(5.6197)		(4.6871)**
Age		-0.7991		-0.6655
		(1.2164)		(1.0220)
Own CE	0.2685	0.2708	0.6378	0.6380
	(0.1038)**	(0.1051)**	(0.0666)***	(0.0657)***
Constant	77.2369	97.1545	32.3640	55.5530
	(11.7004)***	(31.4117)***	(6.3849)***	(24.7655)**
Observations	84	84	84	84
Adjusted R^2	0.0641	0.0469	0.5222	0.5401

Table 3.5: Regression results, single lotteries, computer-based questionnaire

The table reports determinants of the predicted certainty equivalent (linear regression model OLS).

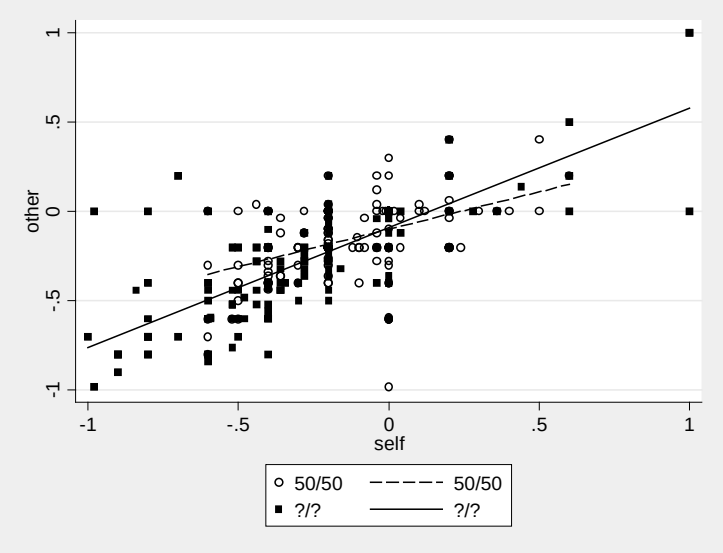
Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Coefficients (Std. Errors)	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**
Lottery (1000,0)	**50/50**	**50/50**	**?/?**	**?/?**
Gender		-46.1384		-24.4010
		(24.9462)*		(30.3754)
Age		5.1042		3.0765
		(5.7108)		(6.9610)
Semester		-2.5663		-3.1869
		(5.2514)		(6.3376)
Knowledge		-18.4568		-9.1434
		(10.6352)*		(12.9579)
Order		-44.4205		-56.8291
		(22.3085)**		(27.1557)**
Own CE	0.2835	0.3016	0.5531	0.5685
	(0.0595)***	(0.0600)***	(0.0585)***	0.0593)***
Constant	299.53	293.8568	189.88	205.0605
	(28.4680)***	(117.3651)**	(25.0740)***	(141.5260)
Observations	199	199	199	199
Adjusted R^2	0.0986	0.1168	0.3086	0.3098
Lottery (200,0)	**50/50**	**50/50**	**?/?**	**?/?**
Gender		-7.1683		-4.0683
		(4.0029)*		(5.0227)
Age		1.0012		2.5320
		(0.9159)		(1.1577)**
Semester		-1.5902		-1.3643
		(0.8435)*		(1.0497)
Knowledge		-2.5309		-2.3452
		(1.7061)		(2.1448)
Order		-4.3603		-10.3753
		(3.5586)		(4.4708)**
Own CE	0.3873	0.4134	0.5361	0.5564
	(0.0525)***	(0.0529)***	(0.0501)***	(0.0502)***
Constant	56.9594	55.6570	37.6950	-0.0590
	(5.2112)***	(18.9701)***	(4.6642)***	(23.9770)
Observations	199	199	199	199
Adjusted R^2	0.2126	0.2265	0.3643	0.3822
Lottery (50,0)	**50/50**	**50/50**	**?/?**	**?/?**
Gender		-0.5713		1.5170
		(1.0744)		(1.2228)
Age		0.0070		0.3852
		(0.2444)		(0.2792)
Semester		-0.1328		-0.4272
		(-0.2242)		(0.2551)*
Knowledge		0.1582		0.1304
		(0.4577)		(0.5220)
Order		0.5781		-0.3589
		(0.9654)		(1.0872)
Own CE	0.4611	0.4680	0.5647	0.5680
	(0.0560)***	(0.0579)***	(0.0490)***	(0.0496)***
Constant	12.9057	13.0455	9.3514	1.8635
	(1.5301)***	(5.0641)**	(1.2491)***	(5.7787)
Observations	199	199	199	199
Adjusted R^2	0.2519	0.2633	0.3994	0.3987

To include explicitly the effect of ambiguity in our regression analysis, we use combined regressions with data from several lotteries (with and without ambiguity). We control for clustering in participants. To aggregate the data in one regression, we cannot use the absolute values but need to normalize them. Predictions are normalized by the expected value of the lotteries, so the dependent variable is given by $\frac{\text{predicted certainty equivalent} - \text{expected value}}{\text{expected value}}$. Accordingly, the own certainty equivalent as an independent variable is given by $\frac{\text{own equivalent} - \text{expected value}}{\text{expected value}}$. Thus, instead of the absolute certainty equivalents, we use the relative deviations from the expected value.[11]

Figure 3.4: Plot of combined lotteries, paper-based questionnaire

The figure shows a plot of own (self) versus predicted (other) certainty equivalents (combination of 2 lotteries from the paper-based questionnaire, certainty equivalents normalized by the expected value). The hollow circles and the dashed regression line picture the prediction for the lotteries with 50/50 probabilities and the black squares and the solid regression line picture the prediction for the lotteries with ?/? probabilities.



In a first step, the 50/50 lotteries and the ambiguous lotteries were aggregated in one respective regression. Results are stated in Panel A of Tables 3.6 (paper-based questionnaire) and 3.7 (computer-based questionnaire). For demonstration purposes, Figure 3.4 shows a plot of

[11] In addition, we perform a robustness check using the mean stated certainty equivalents instead of the expected values for normalization. Our basic results, i.e. the significant coefficients, do not change when we use the mean instead of the expected value. Thus, the specific form of the normalization does not seem to have a big impact on the results.

the normalized data from the paper-based questionnaire (see Appendix D for the same figure for the computer-based questionnaire).

Table 3.6: Regression results, several lotteries, paper-based questionnaire

The table reports determinants of the predicted certainty equivalent (normalized by the expected value, linear regression model OLS with clustering). Panel A: Separate regressions for 2 lotteries with 50/50 probabilities and 2 lotteries with ambiguous probabilities. Panel B: Regressions with all 4 lotteries.

Standard errors are adjusted for 84 participant clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Coefficients (Std. Errors)	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**
Panel A: 2 Lotteries included					
Lotteries	**50/50**	**50/50**	**?/?**	**?/?**	
Gender		-0.0166		-0.0742	
		(0.0385)		(0.0424)*	
Age		-0.0022		0.0026	
		(0.0079)		(0.0095)	
Dummy Ambiguity					
Own CE * Dummy Ambi					
Own CE	0.4178	0.4160	0.6682	0.6582	
	(0.0840)***	(0.0857)***	(0.0724)***	(0.0725)***	
Constant	-0.0994	-0.0336	-0.0916	-0.1044	
	(0.0194)***	(0.1928)	(0.0280)***	(0.2267)	
Observations	168	168	168	168	
R^2	0.1983	0.2001	0.5721	0.5833	
Panel B: 4 Lotteries included (50/50 and ?/? combined)					
Gender					-0.0139
					(0.0215)
Age					-0.0018
					(0.0045)
Dummy Ambiguity		-0.0341		0.1335	0.1327
		(0.0202)*		(0.0189)**	(0.0188)**
Own CE * Dummy Ambi			0.6608	0.8239	0.8209
			(0.0616)***	(0.0519)***	(0.0519)***
Own CE	0.6109	0.5948	0.2352	0.2057	0.2062
	(0.0566)***	(0.0625)***	(0.0612)***	(0.0556)***	(0.0564)***
Constant	-0.0928	-0.0791	-0.0744	-0.1237	-0.0710
	(0.0194)***	(0.0192)*	(0.0142)**	(0.0189)***	(0.1096)
Observations	336	336	336	336	336
R^2	0.4706	0.4742	0.6908	0.7314	0.7321

Table 3.7: Regression results, several lotteries, computer-based questionnaire

The table reports determinants of the predicted certainty equivalent (normalized by the expected value, linear regression model OLS with clustering). Panel A: Separate regressions for 3 lotteries with 50/50 probabilities and 3 lotteries with ambiguous probabilities. Panel B: Regressions with all 6 lotteries.

Standard errors are adjusted for 199 participant clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Coefficients (Std. Errors)	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**
Panel A: 3 Lotteries included					
Lotteries	**50/50**	**50/50**	**?/?**	**?/?**	
Gender		-0.0647		-0.0096	
		(0.0333)*		(0.0517)	
Age		0.0073		0.0156	
		(0.0078)		(0.0132)	
Semester		-0.0092		-0.0124	
		(0.0077)		(0.0107)	
Knowledge		-0.0182		-0.0122	
		(0.0160)		(0.0171)	
Order		-0.0414		-0.0771	
		(0.0307)*		(0.0415)*	
Dummy Ambiguity					
Own CE * Dummy Ambi					
Own CE	0.3881	0.3963	0.5521	0.5608	
	(0.0531)***	(0.0522)***	(0.0650)***	(0.0675)***	
Constant	-0.0559	-0.0524	-0.0712	-0.2738	
	(0.0151)***	(0.1464)	(0.2660)***	(0.2388)	
Observations	597	597	597	597	
R^2	0.1956	0.2119	0.3634	0.3766	
Panel B: 6 Lotteries included (50/50 and ?/? combined)					
Gender					-0.0371
					(0.0361)
Age					0.0114
					(0.0092)
Semester					-0.0108
					(0.0079)
Knowledge					-0.0152
					(0.0142)
Order					-0.0592
					(0.0313)*
Dummy Ambiguity		-0.0314		-0.0153	-0.0148
		(0.0218)		(0.0241)	(0.0245)
Own CE * Dummy Ambi			0.1729	0.1640	0.1612
			(0.0572)***	(0.0623)***	(0.0615)***
Own CE	0.4961	0.4901	0.3854	0.3881	0.3960
	(0.0512)***	(0.0533)***	(0.0541)***	(0.0531)***	(0.0524)***
Constant	-0.0660	-0.0510	-0.0631	-0.0559	-0.1550
	(0.0175)***	(0.0152)***	(0.0175)***	(0.0151)***	(0.1711)
Observations	1194	1194	1194	1194	1194
R^2	0.3055	0.3072	0.3145	0.3149	0.3265

Looking at the results from the paper-based questionnaire (Table 3.6, Panel A) gender yields a weakly significant effect in the regression with the ambiguous lotteries in the sense that men predict the average certainty equivalent to be smaller. Age has no explanatory power. In every regression the predicted certainty equivalent is highly significantly driven by the own certainty equivalent. Moreover, the regression coefficient and the R-squared are higher for the ambiguous case.

The results from the computer-based questionnaire (Table 3.7, Panel A) confirm the previous findings. For the 50/50 lotteries, men's predictions are lower. Age has no significant influence. The predicted certainty equivalents are lower if participants first gave their prediction of the average before stating their own certainty equivalent. The order effect is even stronger than in the 50/50 regression. However, it is noteworthy that all independent significant variables expect for the own certainty equivalent show only very low regression coefficients. A change in these variables thus does not have a strong effect on the predicted certainty equivalent. The coefficient for the own certainty equivalent and the R-squared are again higher in ambiguous situations, i.e. a greater part of the prediction can be explained by the explanatory variables, especially by the own certainty equivalent.

In Panel B of Tables 3.6 and 3.7, we aggregate all observations in a single regression and add dummy variables indicating whether ambiguity is involved or not.

As the effects of own certainty equivalent and ambiguity do not need to be of a simple additive form, we also allow for interaction in our regression. The regression model (without control variables and residuals) is given by:

$$CE_O = \alpha_1 + \alpha_2 * Dummy + \beta_1 * CE_S + \beta_2 * CE_S * Dummy \text{ or}$$

$$CE_O = \alpha_1 + \alpha_2 * Dummy + (\beta_1 + \beta_2 * Dummy) * CE_S \ ,$$

with: CE_O: CE other: Predicted certainty equivalent (normalized by the expected value),

CE_S: CE self: Own certainty equivalent (normalized by the expected value),

Dummy: 1 for ambiguous predictions, 0 otherwise.

Standard errors are adjusted for participant clusters.

Again, we find highly significant coefficients for the own certainty equivalent. Adding a simple dummy variable that is equal to 1 for the ambiguous predictions and 0 otherwise reveals

an effect in the paper-based questionnaire data only (see Table 3.6, Panel B). However, the interaction term is highly significant (on the 1 percent level) for both questionnaires regardless of whether the simple dummy is included in the regression or not. The coefficient of the interaction term captures the difference in prediction power of the own certainty equivalent. This prediction power is significantly higher for ambiguous lotteries. The coefficient for the own certainty equivalent is now given by $(\beta_1 + \beta_2 * Dummy)$, so in lotteries with fixed probabilities it is just β_1 but for ambiguous lotteries the coefficient is equal to $\beta_1 + \beta_2$. The predicted certainty equivalent is thus higher if the own certainty equivalent is higher, and with ambiguity, this relationship is even stronger.

The constant term in the regression is given by $\alpha_1 + \alpha_2 * Dummy$; it is simply α_1 for the 50/50 probabilities and $\alpha_1 + \alpha_2$ for the ambiguous cases. α_2 is significant for the paper-based data only (see Table 3.6, Panel B, columns 5 and 6), the constant term is higher with ambiguity. For the lab data α_2 is not significant (see Table 3.7, Panel B, columns 5 and 6).

To summarize our results, the previous analyses very clearly show that the false consensus effect is present also in financial decisions. Even if the group seems to be able to give a good prediction, the predictions of a single individual are egocentrically biased. We confirm the results from earlier studies (e.g. Carlson (1990), Nickerson (1999), or Epley et al. (2004)) finding that people are able to adjust from own preferences, but at the same time these adjustments are insufficient. Participants in our studies seem to be aware of the fact that they are more or less risk seeking than the average and adjust their own certainty equivalent in the right direction. Thus, the prediction is not equal to the own certainty equivalent but the adjustment is still insufficient.

In addition, we extend the scope of Gilovich (1990) to a financial context. Gilovich finds a greater false consensus effect in situations with greater latitude for subjective construal. In our analysis, the egocentric bias is stronger for the case of ambiguous lotteries. If the level of uncertainty increases, participants seem to rely more heavily on the own preferences when asked to predict average preferences.

3.4 Interval Analysis

In this section, we report the results from the interval predictions. In the computer-based questionnaire participants were asked to state a lower bound that they think is not fallen short of by more than 5 percent of the participants and also an upper bound that is not exceeded by more than 5 percent. We are interested if people are aware of the variety of others' preferences. Are they able to imagine that others might have absolutely different preferences compared to their own? It may be that they are wrong in predicting the average but aware of the range of preferences. In contrast, it may also be the case that they are right in predicting the average but fail to imagine individual differences.

Figure 3.5 shows a histogram of stated certainty equivalents for the 50/50 lottery (1000,0). The vertical lines include the true 90 percent interval. The true lower bound is 50 and the true upper bound is 750. Histograms of the other lotteries can be found in Appendix E.

Figure 3.5: Histogram of own certainty equivalents, (1000,0) lottery with 50/50 probabilities

The figure illustrates the distribution of own certainty equivalents for the lottery with outcomes 0 and 1000 with 50/50 probabilities. The vertical lines indicate the 90 percent interval (50-750).

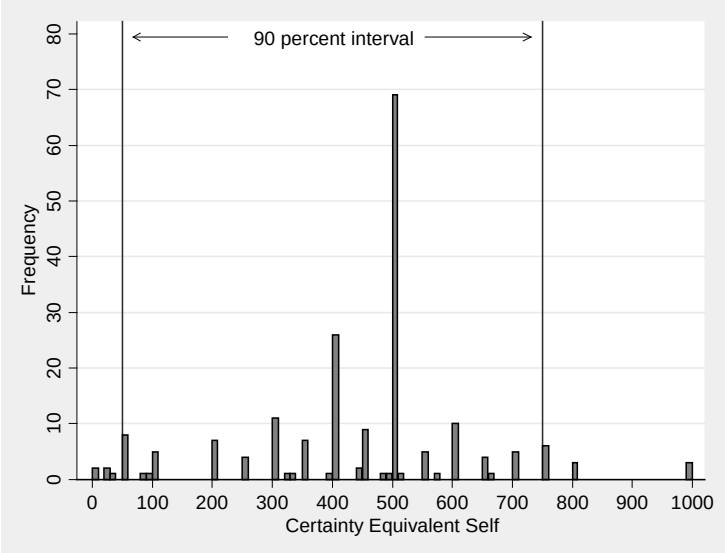


Figure 3.6 shows the predicted intervals by the participants for the 50/50 lottery (1000,0). The intervals are ordered by the size of the own certainty equivalents (x-axis from low to high). If several participants state the same own certainty equivalent, the interval predictions are dis-

played side by side instead of one upon the other. Figures for the other lotteries are included in Appendix E.

Figure 3.6: Twoway graph of predicted 90 percent intervals, (1000,0) lottery with 50/50 probabilities

The figure illustrates the predicted 90 percent intervals for the lottery with outcomes 0 and 1000 with 50/50 probabilities.

The intervals are ordered by the size of the own certainty equivalents (x-axis from low to high). The horizontal lines indicate the true 90 percent interval (50-750).

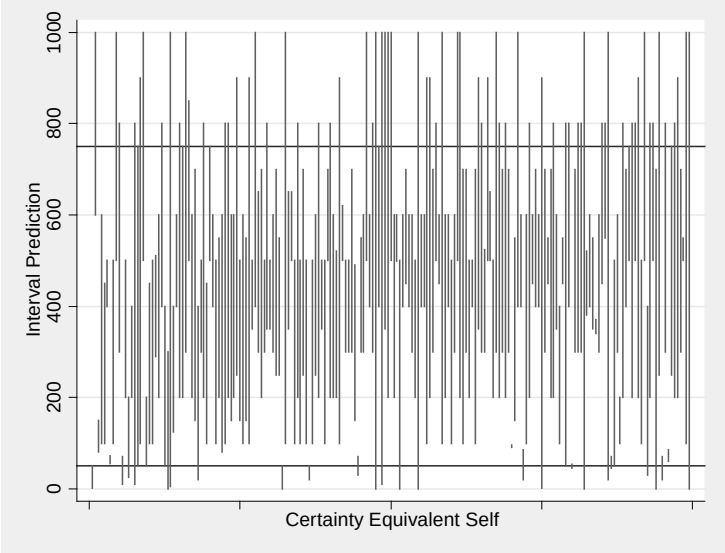


Table 3.8 summarizes the results for all six lotteries. The table displays the true 90 percent interval and the predicted lower and upper bounds. The bottom of the table displays the proportion of correct estimates. As an example, take the 50/50 lottery (1000,0). The true 90 percent interval ranges from 50 to 750. The average predicted lower bound is 239.75 (median 200), and the average predicted upper bound is 646.11 (median 600). Only 29 of 199 participants predicted the lower bound to be equal or below 50. 74 participants stated an upper bound equal to or above 750. Only 11 participants were able to state a lower bound low enough and at the same time an upper bound high enough, i.e. to give an interval that contains the true 90 percent interval.

The true 90 percent intervals are larger for the ambiguous lotteries; for the (1000,0) lottery only the upper bound is higher, for the other two lotteries the upper bounds are higher and simultaneously the lower bounds are lower for the ambiguous lottery. This is in line with the

descriptive statistics (see Table 3.1). In the case of ambiguity, the standard deviation is higher for the stated own certainty equivalents as well as for predicted certainty equivalents.

The results obviously show that the vast majority is not able to predict the variation in others' certainty equivalents correctly. Others are predicted to be too consistent in their decisions; the 90 percent intervals are too tight. The effect is slightly stronger for ambiguous predictions.

Table 3.8: 90 percent intervals

The table shows true and predicted 90 percent intervals, i.e. lower and upper bounds.

The first part shows true bounds, the second states the mean and median predictions. The last part gives the number (and percentage) of correct predictions (lower bound correct, i.e. low enough, upper bound correct, i.e. high enough, both bounds correct).

Computer-based Questionnaire (199 observations)						
Lottery outcomes (€)	**(1000,0)**	**(200,0)**	**(50,0)**	**(1000,0)**	**(200,0)**	**(50,0)**
Probabilities (%)	**50/50**	**50/50**	**50/50**	**?/?**	**?/?**	**?/?**
True 90 percent interval						
Lower bound	50	25	10	50	10	5
Upper bound	750	150	40	800	188	50
Prediction 90 percent interval						
Lower bound mean	239.75	53.37	14.84	203.87	44.55	12.37
Lower bound median	200	50	15	150	40	10
Upper bound mean	646.11	137.28	35.31	632.95	131.68	35.47
Upper bound median	600	140	35	600	125	35
Prediction correct?						
Lower bound	29 (14.57%)	49 (24.62%)	88 (44.22%)	54 (27.14%)	39 (19.60%)	64 (32.16%)
Upper bound	74 (37.19%)	93 (46.73%)	80 (40.20%)	64 (32.16%)	28 (14.07%)	27 (13.57%)
Both	11 (5.53%)	21 (10.55%)	35 (17.59%)	12 (6.03%)	9 (4.52%)	7 (3.52%)

Table 3.9 displays the results of the regression analysis. The structure of the table is analogous to Table 3.5 but this time the dependent variables are predicted lower and upper bounds instead of predicted average certainty equivalents. Again, the own certainty equivalent is a highly significant explanatory variable. The higher the own certainty equivalent, the higher the predicted lower and upper bounds. Again, the effect seems to be greater in situations with ambiguity as the regression coefficient of the own certainty equivalent as well as the adjusted R-squared are higher in ambiguous situations.

We also perform a regression analysis with the total size of the interval (upper bound - lower bound) as the dependent variable (results are not reported). We cannot find a significant effect of the own certainty equivalent on the total size of the interval.

Table 3.9: Regression results, lower and upper bounds, single lotteries

The table reports determinants of the predicted lower and upper bounds (linear regression model OLS). Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Coefficients (Std. Errors)	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**
Lottery (1000,0)		**Lower bound**				**Upper bound**		
	50/50	**50/50**	**?/?**	**?/?**	**50/50**	**50/50**	**?/?**	**?/?**
Gender		-33.8767		-35.1811		-105.7721		-19.2885
		(24.7856)		(27.3241)		(36.2247)***		(34.7715)
Age		-0.2500		7.9861		16.9950		-5.0586
		(5.6740)		(6.2618)		(8.2927)**		(7.9685)
Semester		-1.2204		-6.5716		-8.4151		5.3848
		(5.2176)		(5.7010)		(7.6256)		(7.2548)
Knowledge		-22.3995		-9.1407		-9.9690		5.3234
		(10.5668)**		(11.6562)		(15.4436)		(14.8332)
Order		-7.3730		-26.5674		-73.1291		-78.2999
		(22.1648)		(24.4279)		(32.3944)**		(31.0858)**
Own CE	0.1173	0.1208	0.3708	0.3838	0.2717	0.3184	0.4466	0.4642
	(0.0586)**	(0.0596)**	(0.0525)***	(0.0533)***	(0.0881)***	(0.0871)***	(0.0675)***	(0.0679)***
Constant	188.1038	291.2794	69.4733	-18.0166	526.4613	292.4890	471.0715	587.2674
	(28.0190)***	(116.6093)**	(22.4834)***	(127.3095)	(42.1365)***	(170.4271)*	(28.9146)***	(162.0085)***
Observations	199	199	199	199	199	199	199	199
Adjusted R^2	0.0150	0.0165	0.1982	0.1945	0.0412	0.0958	0.1778	0.1912
Lottery (200,0)		**Lower bound**				**Upper bound**		
	50/50	**50/50**	**?/?**	**?/?**	**50/50**	**50/50**	**?/?**	**?/?**
Gender		-13.5292		-2.4383		-9.5377		-3.4628
		(4.6558)***		(4.9438)		(5.8122)		(6.1002)
Age		-0.5167		1.6518		1.5745		1.4060
		(1.0653)		(1.1396)		(1.3299)		(1.4061)
Semester		-0.8017		-1.0655		-1.4270		0.1204
		(0.9811)		(1.0332)		(1.2248)		(1.2749)
Knowledge		-4.8133		0.9612		1.1515		0.9565
		(1.9844)**		(2.1112)		(2.4773)		(2.6050)
Order		2.5484		0.4594		-10.6736		-16.5047
		(4.1390)		(4.4006)		(5.1671)**		(5.4300)***
Own CE	0.2971	0.3166	0.3882	0.4007	0.3860	0.4162	0.4195	0.4433
	(0.0615)***	(0.0615)***	(0.0484)***	(0.0494)***	(0.0764)***	(0.0768)***	(0.0612)***	(0.0610)***
Constant	25.6296	38.0452	12.8701	-21.8121	101.2382	78.9073	97.4495	69.4424
	(6.1060)***	(22.0643)*	(4.5013)***	(23.6005)	(7.5911)***	(27.5448)***	(5.6928)***	(29.1209)**
Observations	199	199	199	199	199	199	199	199
Adjusted R^2	0.1014	0.1301	0.2426	0.2344	0.1101	0.1314	0.1887	0.2193
Lottery (50,0)		**Lower bound**				**Upper bound**		
	50/50	**50/50**	**?/?**	**?/?**	**50/50**	**50/50**	**?/?**	**?/?**
Gender		-0.9379		1.2455		-2.6568		2.2452
		(1.3634)		(1.3251)		(1.3018)**		(1.4163)
Age		-0.2460		0.2828		0.1225		0.1078
		(0.3101)		(0.3026)		(0.2961)		(0.3234)
Semester		0.0597		-0.2474		-0.1120		-0.0215
		(0.2845)		(0.2764)		(0.2716)		(0.2955)
Knowledge		0.0105		0.5872		0.5148		1.0223
		(0.5808)		(0.5657)		(0.5545)		(0.6047)*
Order		2.9916		1.9034		-0.6318		-1.0801
		(1.2251)**		(1.1782)		(1.1698)		(1.2593)
Own CE	0.2862	0.3150	0.4150	0.4224	0.4265	0.4041	0.4341	0.4436
	(0.0722)***	(0.0734)***	(0.0533)***	(0.0537)***	(0.0690)***	(0.0701)***	(0.0568)***	(0.0574)***
Constant	7.4004	11.0535	2.8227	-5.9198	24.2234	23.1387	25.4898	19.0449
	(1.9697)***	(6.4261)*	(1.3575)**	(6.2622)	(1.8838)***	(6.1357)***	(1.4480)***	(6.6935)***
Observations	199	199	199	199	199	199	199	199
Adjusted R^2	0.0693	0.0815	0.2316	0.2352	0.1581	0.1719	0.2246	0.2250

Table 3.10: Regression results, lower and upper bounds, several lotteries

The table reports determinants of the predicted lower and upper bounds (normalized by the expected value, linear regression model OLS with clustering).

Panel A shows the results for the lower bound, Panel B for the upper bound. Standard errors are adjusted for 199 participant clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Coefficients (Std. Errors)	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**
Panel A: Lower bound (50/50 and ?/? combined)					
Gender					-0.0487
					(0.0410)
Age					0.0065
					(0.0104)
Semester					-0.0071
					(0.0087)
Knowledge					-0.0127
					(0.0173)
Order					0.0237
					(0.0351)
Dummy Ambiguity		-0.0423		-0.0275	-0.0280
		(0.0201)**		(0.0233)	(0.0237)
Own CE * Dummy Ambi			0.1666	0.1507	0.1439
			(0.0529)***	(0.0592)**	(0.0599)**
Own CE	0.3436	0.3355	0.2368	0.2417	0.2478
	(0.0490)***	(0.0511)***	(0.0557)***	(0.0553)***	(0.0566)***
Constant	-0.4683	-0.4481	-0.4655	-0.4526	-0.6027
	(0.0203)***	(0.0193)***	(0.0203)***	(0.0193)***	(0.2154)***
Observations	1194	1194	1194	1194	1194
R^2	0.1631	0.1666	0.1724	0.1738	0.1804
Panel B: Upper bound (50/50 and ?/? combined)					
Gender					-0.0663
					(0.0447)
Age					0.0106
					(0.0113)
Semester					-0.0040
					(0.0109)
Knowledge					0.0125
					(0.0196)
Order					-0.1081
					(0.0417)**
Dummy Ambiguity		0.0292		0.0368	0.0389
		(0.0225)		(0.0235)	(0.0238)
Own CE * Dummy Ambi			0.0563	0.0775	0.0877
			(0.0639)	(0.0657)	(0.0645)
Own CE	0.4096	0.4152	0.3735	0.3670	0.3694
	(0.0467)***	(0.0476)***	(0.0632)***	(0.0622)***	(0.0612)***
Constant	0.3933	0.3793	0.3942	0.3770	0.0829
	(0.0197)***	(0.0219)***	(0.0197)***	(0.0220)***	(0.2243)
Observations	1194	1194	1194	1194	1194
R^2	0.1580	0.1592	0.1588	0.1605	0.1876

To test whether the influence of ambiguity is significant for predicting the interval, we use combined regressions again with data from all six lotteries (see Table 3.10). The regression models (analogous to Table 3.7, Panel B) are given by:

$LB_O = \alpha_1 + \alpha_2 * Dummy + (\beta_1 + \beta_2 * Dummy) * CE_S$ (Panel A) and

$UB_O = \alpha_1 + \alpha_2 * Dummy + (\beta_1 + \beta_2 * Dummy) * CE_S$ (Panel B),

with: LB_O: LB other: Predicted lower bound of others' certainty equivalents (normalized by the expected value),

UB_O: UB other: Predicted upper bound of others' certainty equivalents (normalized by the expected value),

Dummy: 1 for ambiguous predictions, 0 otherwise.

Standard errors are adjusted for participant clusters.

As expected, the influence of the own certainty equivalent is highly significant for the predicted lower (Panel A of Table 3.10) as well as for the predicted upper bound (Panel B of Table 3.10). Adding a simple dummy variable that is 1 for ambiguous predictions and 0 otherwise yields a significant effect only for the predicted lower bound. This effect is not robust to the inclusion of the interaction term. The model including the interaction term shows that the influence of the own certainty equivalent on the lower bound is higher for the ambiguous case, i.e. β_2 is significant. The effect is also robust to the inclusion of control variables. For the upper bound, a simple ambiguity dummy and an interaction term have no significant explanatory power. The predicted upper bound is lower if participants first gave a prediction of other certainty equivalent as well as an interval prediction before stating their own certainty equivalent.

The results from the interval analysis can be summarized as follows. People are not able to correctly estimate the variance of others' risk preferences. The participants in our studies make overconfident predictions, i.e. the predicted 90 percent intervals are much too tight (we refer to overconfidence as "miscalibration", for the different forms of overconfidence see e.g. Glaser et al. (2005)). The finding that people specify too narrow intervals is in line with the literature. Dunning et al. (1990) ask people to predict the range of others' responses to various situations and find that people are overconfident in both self and social predictions. Vallone et al. (1990) confirm these results in a follow-up study. In addition to the finding that intervals

are too tight, we find that the relatively more risk averse people give smaller lower as well as smaller upper bounds and the relatively more risk seeking people give higher lower and upper bounds. There is at least the tendency that the influence of the own certainty equivalent is stronger in ambiguous situations.

3.5 Conclusion

We analyze predictions of others' risk preferences in two studies, a paper-based and a computer-based questionnaire.

In contrast to Hsee and Weber (1997) in their first two treatments and Faro and Rottenstreich (2006), we do not find an effect on the aggregated level. In both studies, our participants as a group are able to predict the average preference of all participants quite well. The group prediction (that is the average of the individual predictions) is not significantly different from the true average certainty equivalent.

On the individual level, we find strong evidence for a false consensus effect in financial preferences. Participants suffer from an egocentric bias when making predictions of others' preferences; their predictions are highly correlated with their own preferences. Nevertheless, the correlation is less than 1, indicating that people are to some extent aware of their egocentric bias. Our participants adjust their own preferences in the correct direction, but their adjustment is not strong enough. We find that relatively more risk averse people adjust their prediction in the right direction, i.e. they predict the average certainty equivalent to be higher than their own certainty equivalent. Still, this prediction is too risk averse, i.e. the predicted certainty equivalent is too low. On the contrary, the relatively more risk seeking subjects predict that others are relatively more risk averse compared to themselves and they are right. But again, the adjustment is not strong enough; the prediction is still too risk seeking. With our findings, we confirm the results from previous studies (see e.g. Carlson (1990), Gilovich et al. (1998, 2000), Nickerson (1999), or Epley et al. (2004)).

Moreover, our study extends the scope of Gilovich (1990) to financial decisions as we do not only analyze 50/50 lotteries but also lotteries with ambiguous probabilities. As expected, we find the false consensus effect to be even stronger for these ambiguous lotteries. The explanatory power of the own preference is higher for lotteries with ambiguous probabilities.

In the computer-based questionnaire, we also asked participants to state a 90 percent interval. Only very few participants are able to state a correct interval. The majority makes overconfident predictions, i.e. their intervals are too tight. Again, we find a significant influence of the own preference. The higher the own certainty equivalent, the higher the predicted lower and upper bounds. For ambiguous lotteries, the influence of the own certainty equivalent tends to be stronger.

In practice, assessing the real preferences of people whom one does not know or assessing the average individual is quite a common task. Think of a fund manager investing money for a group of investors or of a medical firm that develops a new medicine and has to decide on the trade-off between efficiency and adverse effects. If individuals have difficulties to abstract from their own risk preference, this leads to an egocentrically biased prediction of others' preferences and decisions on behalf of others may be suboptimal. The inability to estimate the spread in others' preferences correctly could also lead to practical problems. For a financial advisor, for example, this underestimation of variety of opinions could lead to a too standardized advice concept.

The finding that the egocentric bias is stronger in situations with higher uncertainty is especially important for financial decisions as in the real world the majority of these decisions imply a high degree of uncertainty (risky outcomes, risky probabilities, risky environment (e.g. legal regulation) etc.). Thus, a person acting on behalf of another in financial affairs, e.g. a financial advisor or a fund manager has to be especially careful. A systematic adjustment of the own preference is essential in order to decide in the best interest of the clients.

As ambiguity is omnipresent in financial decisions, an interesting follow-up study to our work could clarify its exact influence. What is the reason behind the egocentric bias being higher in ambiguous situations? Gilovich (1990) attributes his findings to a particular interpretation of an ambiguous stimulus. In our setting it may be the same underlying process, i.e. participants project the particular interpretation of the probabilities, but it could also be a projection of their feelings about ambiguous probabilities, or both. One possible way to find out about different interpretations would be to ask participants to state their "best guess" of the ambiguous probabilities.

3.6 Appendix A: Paper-Based Questionnaire

The following section provides a translation of the cover letter and the paper-based questionnaire. Cover letter and questionnaire were originally in German.

Dear participants,

Before starting with the questionnaire please carefully read the following instructions.

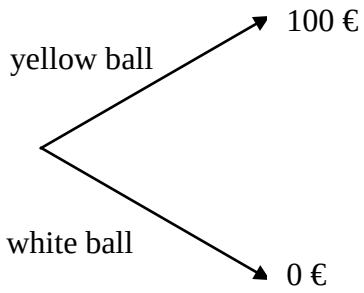
In the questionnaire we will show you different lotteries. We will ask you for indifference statements.
Indifference between two alternatives means that you do not care which of the alternatives you receive. For example, image you sit in front of two sundaes, one with strawberry the other one with vanilla ice cream. If you don't care which sundae you get you are indifferent between the alternatives strawberry sundae and vanilla sundae.
Hence indifference between a lottery and a payment for sure means that you do not care if you play the lottery (and get the resulting outcome) or if you receive the payment for sure.

As a thank you for taking part in our survey, we randomly draw 5 participants who receive 10 € each.

If you want to take part in the drawing please fill in your matriculation number.
Matriculation number: _____
This cover sheet will be removed before the analysis. We assure that your data is analyzed anonymously.

Thank you very much for your assistance and enjoy the questionnaire.

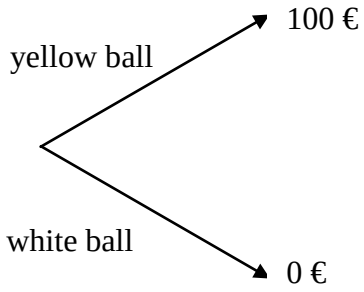
The following **lottery** either pays **100 €** or **0 €**. Imagine an urn containing **100 balls**, **50** of them are **yellow** and **50** of them are **white**. One ball is drawn, if it is yellow the lottery pays 100 €, if it is white the lottery pays 0 €.



Please state for which amount that **you** would receive for sure **you** would be indifferent between receiving the sure amount and playing the lottery. _____ €

What do you think, for which amount **the participants in this questionnaire** (thus students attending the exercise course in Banking) are **on average** indifferent between receiving the sure amount and playing the lottery? _____ €

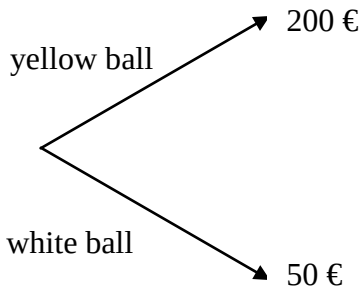
The following lottery either pays **100 €** or **0 €**. Imagine an urn containing **100 balls**. The balls are of **yellow** and **white** color, but the **proportions are unknown**. One ball is drawn, if it is yellow the lottery pays 100 €, if it is white the lottery pays 0 €.



Please state for which amount that **you** would receive for sure **you** would be indifferent between receiving the sure amount and playing the lottery. _____ €

What do you think, for which amount **the participants in this questionnaire** (thus students attending the exercise course in Banking) are **on average** indifferent between receiving the sure amount and playing the lottery? _____ €

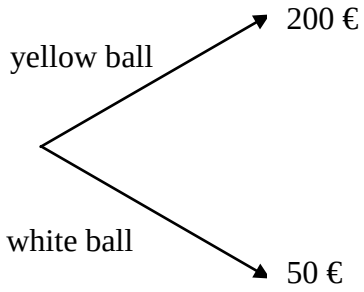
The following **lottery** either pays **200 €** or 5**0 €**. Imagine an urn containing **100 balls**, **50** of them are **yellow** and **50** of them are **white**. One ball is drawn, if it is yellow the lottery pays 200 €, if it is white the lottery pays 50 €.



Please state for which amount that **you** would receive for sure **you** would be indifferent between receiving the sure amount and playing the lottery. _____ €

What do you think, for which amount **the participants in this questionnaire** (thus students attending the exercise course in Banking) are **on average** indifferent between receiving the sure amount and playing the lottery? _____ €

The following lottery either pays 2**00 €** or 5**0 €**. Imagine an urn containing **100 balls**. The balls are of **yellow** and **white** color, but the **proportions are unknown**. One ball is drawn, if it is yellow the lottery pays 200 €, if it is white the lottery pays 50 €.



Please state for which amount that **you** would receive for sure **you** would be indifferent between receiving the sure amount and playing the lottery. _____ €

What do you think, for which amount **the participants in this questionnaire** (thus students attending the exercise course in Banking) are **on average** indifferent between receiving the sure amount and playing the lottery? _____ €

Some final questions about you:

Gender:

female ○

male ○

Age: _____ years

Line of studies: _____

Thank you very much for your assistance!

3.7 Appendix B: Order Effects

The table shows differences in certainty equivalents subject to the order of the questions (self before other: predictions follow statements of own certainty equivalents, other before self: statements of own certainty equivalents follow predictions). Panel A shows differences in stated own certainty equivalents, Panel B in predicted certainty equivalents.

Computer-based Questionnaire (199 observations)						
Lottery outcomes (€)	**(1000,0)**	**(200,0)**	**(50,0)**	**(1000,0)**	**(200,0)**	**(50,0)**
Probabilities (%)	**50/50**	**50/50**	**50/50**	**?/?**	**?/?**	**?/?**
Panel A: Certainty Equivalent Self						
self before other						
Mean	419.83	91.38	27.52	336.17	79.77	23.17
Median	500.00	100.00	25.00	300.00	75.00	22.50
Std.Dev.	184.50	30.50	9.23	250.69	48.61	12.19
Min.	0.00	0.00	5.00	0.00	2.00	0.50
Max.	1000.00	200.00	50.00	1000.00	200.00	50.00
other before self						
Mean	457.95	95.08	24.67	385.10	83.19	22.85
Median	500.00	100.00	25.00	400.00	85.00	25.00
Std.Dev.	187.48	36.59	7.35	207.69	41.59	9.92
Min.	0.00	5.00	5.00	3.00	1.00	0.10
Max.	1000.00	200.00	50.00	1000.00	200.00	50.00
Wilcoxon rank-sum test	not sig	not sig	$p<0.10$	$p<0.05$	not sig	not sig
Panel B: Certainty Equivalent Other						
self before other						
Mean	442.42	94.39	25.28	405.67	85.79	22.49
Median	500.00	100.00	25.00	400.00	80.00	20.00
Std.Dev.	161.13	31.67	8.15	241.17	43.85	10.21
Min.	50.00	20.00	10.00	10.00	10.00	5.00
Max.	1000.00	200.00	50.00	1000.00	200.00	50.00
other before self						
Mean	408.79	92.04	24.56	377.18	77.71	22.21
Median	500.00	100.00	25.00	400.00	75.00	20.00
Std.Dev.	166.90	24.92	7.19	214.32	35.52	9.46
Min.	20.00	10.00	3.00	10.00	2.00	1.00
Max.	750.00	150.00	50.00	1000.00	200.00	50.00
Wilcoxon rank-sum test	not sig	not sig	not sig	not sig	not sig	not sig

3.8 Appendix C: Median Split

The table shows the results of a median split of the data. Panel A states results for the paper-based questionnaire and Panel B for the computer-based questionnaire. The last column (Wilcoxon) states the probability the two subgroups are drawn from the same distribution. Observations equal to the median are included in the first group.

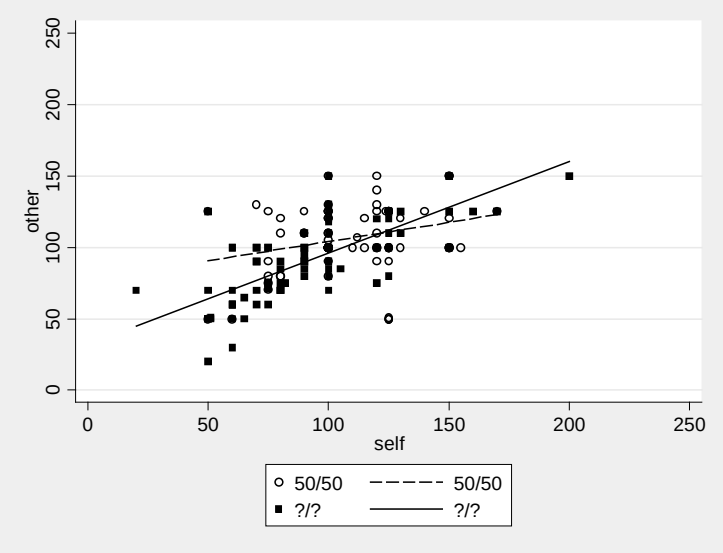
		Total		**(CE self ≤ Median CE self)**			**(CE self > Median CE self)**			**Wilcoxon**
		CE self	**CE other**	**CE self**	**CE other**	**Obs.**	**CE self**	**CE other**	**Obs.**	**(p-value)**
Panel A: Paper-based Questionnaire										
Lottery (100,0)										
50/50	Mean	44.46	42.55	40.70	40.56	70	63.29	52.50	14	<0.01
	Median	50.00	45.00	40.00	40.00		60.00	50.00		
?/?	Mean	34.33	35.12	20.35	25.33	48	52.97	48.17	36	<0.01
	Median	30.00	30.00	25.00	21.00		50.00	50.00		
Lottery (200,50)										
50/50	Mean	110.19	106.82	90.88	103.02	42	129.50	110.62	42	<0.06
	Median	113.50	106.00	100.00	100.00		125.00	120.00		
?/?	Mean	90.46	90.06	68.63	74.31	48	119.58	111.06	36	<0.01
	Median	90.00	90.00	70.00	70.50		120.00	114.00		
Panel B: Computer-based Questionnaire										
Lottery (1000,0)										
50/50	Mean	440.33	424.34	381.38	416.77	159	674.65	454.43	40	<0.08
	Median	500.00	500.00	444.00	500.00		650.00	500.00		
?/?	Mean	362.48	390.35	172.71	276.91	94	532.37	491.90	105	<0.01
	Median	350.00	400.00	200.00	250.00		500.00	500.00		
Lottery (200,0)										
50/50	Mean	93.37	93.13	81.47	88.48	154	134.11	109.02	45	<0.01
	Median	100.00	100.00	90.00	100.00		125.00	100.00		
?/?	Mean	81.61	81.44	49.55	64.15	106	118.15	101.16	93	<0.01
	Median	80.00	80.00	50.00	60.00		100.00	100.00		
Lottery (50,0)										
50/50	Mean	25.99	24.89	23.31	23.99	130	34.10	28.87	69	<0.01
	Median	25.00	25.00	25.00	25.00		30.00	25.00		
?/?	Mean	23.00	22.34	17.18	18.20	101	31.14	26.60	98	<0.01
	Median	24.00	20.00	15.00	20.00		27.00	25.00		

The table shows the results of a median split of the data. Panel A states results for the paper-based questionnaire and Panel B for the computer-based questionnaire. The last column (Wilcoxon) states the probability the two subgroups are drawn from the same distribution. Observations equal to the median are included in the second group.

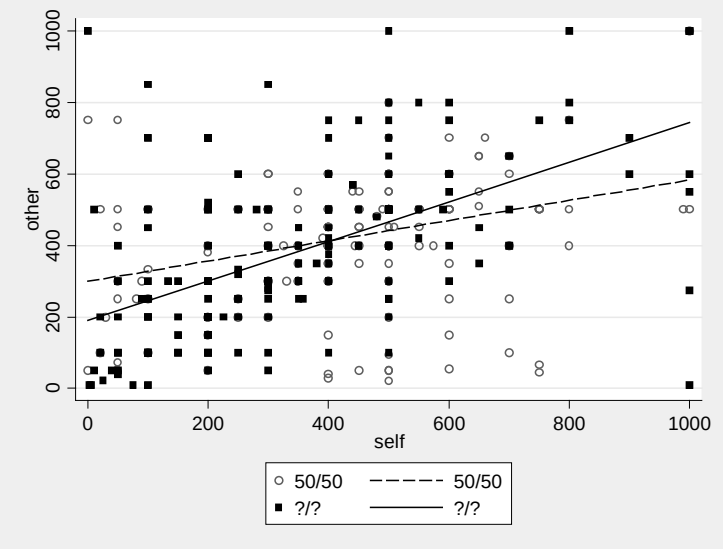
		Total		(CE self < Median CE self)			(CE self ≥ Median CE self)			Wilcoxon
		CE self	CE other	CE self	CE other	Obs.	CE self	CE other	Obs.	(p-value)
Panel A: Paper-based Questionnaire										
Lottery (100,0)										
50/50	Mean	44.46	42.55	33.73	37.33	40	54.23	47.30	44	<0.01
	Median	50.00	45.00	35.00	40.00		50.00	50.00		
?/?	Mean	34.33	35.12	13.46	21.75	28	44.77	41.80	56	<0.01
	Median	30.00	30.00	10.00	15.00		40.00	40.00		
Lottery (200,50)										
50/50	Mean	110.19	106.82	90.88	103.02	42	129.50	110.62	42	<0.06
	Median	113.50	106.00	100.00	100.00		125.00	120.00		
?/?	Mean	90.46	90.06	64.35	70.43	40	114.20	107.91	44	<0.01
	Median	90.00	90.00	65.00	70.00		100.00	105.00		
Panel B: Computer-based Questionnaire										
Lottery (1000,0)										
50/50	Mean	440.33	424.34	292.74	375.87	91	564.69	465.19	108	<0.01
	Median	500.00	500.00	350.00	400.00		500.00	500.00		
?/?	Mean	362.48	390.35	140.47	261.67	75	496.77	468.19	124	<0.01
	Median	350.00	400.00	150.00	200.00		500.00	450.00		
Lottery (200,0)										
50/50	Mean	93.37	93.13	64.77	77.54	81	113.01	103.82	118	<0.01
	Median	100.00	100.00	75.00	80.00		100.00	100.00		
?/?	Mean	81.61	81.44	43.32	60.51	88	111.96	98.04	111	<0.01
	Median	80.00	80.00	50.00	50.00		100.00	100.00		
Lottery (50,0)										
50/50	Mean	25.99	24.89	21.21	20.54	58	29.45	27.79	141	<0.01
	Median	25.00	25.00	20.00	20.00		25.00	25.00		
?/?	Mean	23.00	22.34	16.98	17.99	98	30.93	26.55	101	<0.01
	Median	24.00	20.00	15.00	20.00		26.00	25.00		

3.9 Appendix D: Lottery Plots

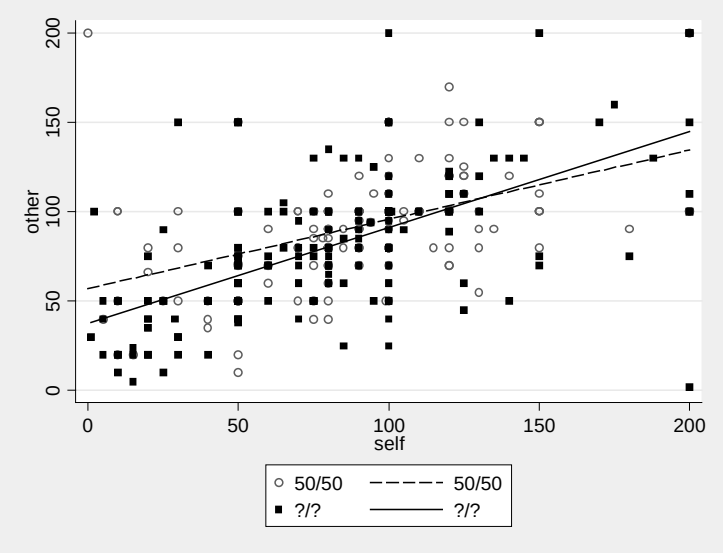
The figure shows a plot of own (self) versus predicted (other) certainty equivalents for the lottery with outcomes 200 and 50. The hollow circles and the dashed regression line picture the prediction for the lottery with 50/50 probabilities and the black squares and the solid regression line picture the prediction for the lottery with ?/? probabilities.



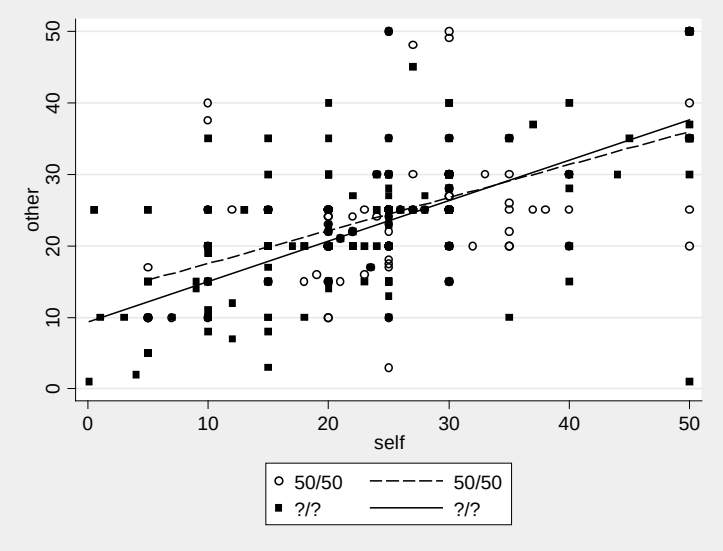
The figure shows a plot of own (self) versus predicted (other) certainty equivalents for the lottery with outcomes 1000 and 0. The hollow circles and the dashed regression line picture the prediction for the lottery with 50/50 probabilities and the black squares and the solid regression line picture the prediction for the lottery with ?/? probabilities.



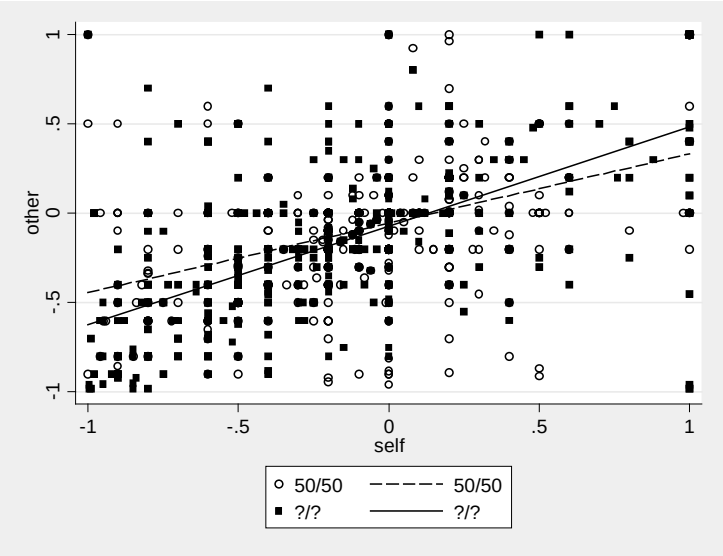
The figure shows a plot of own (self) versus predicted (other) certainty equivalents for the lottery with outcomes 200 and 0. The hollow circles and the dashed regression line picture the prediction for the lottery with 50/50 probabilities and the black squares and the solid regression line picture the prediction for the lottery with ?/? probabilities.



The figure shows a plot of own (self) versus predicted (other) certainty equivalents for the lottery with outcomes 50 and 0. The hollow circles and the dashed regression line picture the prediction for the lottery with 50/50 probabilities and the black squares and the solid regression line picture the prediction for the lottery with ?/? probabilities.

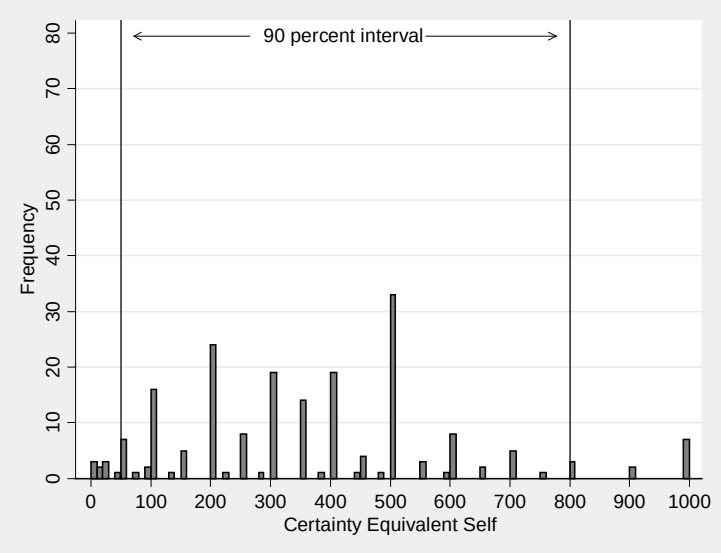


The figure shows a plot of own (self) versus predicted (other) certainty equivalents (combination of 3 lotteries from the computer-based questionnaire, certainty equivalents normalized by the expected value). The hollow circles and the dashed regression line picture the prediction for the lotteries with 50/50 probabilities and the black squares and the solid regression line picture the prediction for the lotteries with ?/? probabilities.



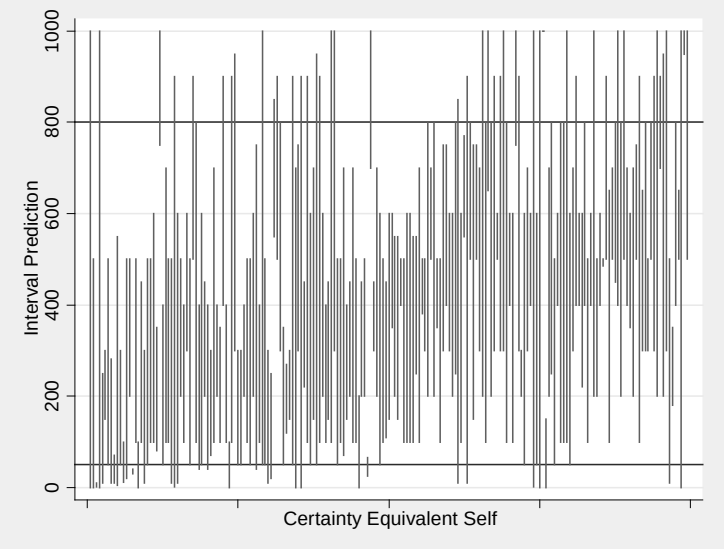
3.10 Appendix E: Histograms and Twoway Graphs

The figure illustrates the distribution of own certainty equivalents for the lottery with outcomes 0 and 1000 with ?/? probabilities. The vertical lines indicate the 90 percent interval (50-800).

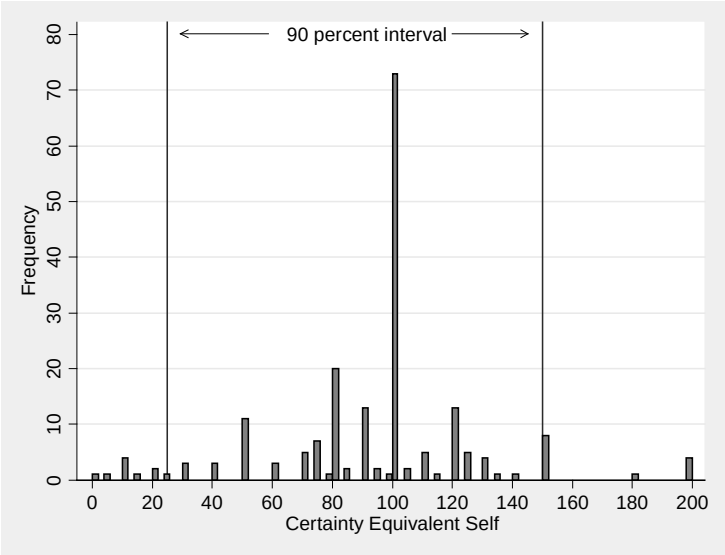


The figure illustrates the predicted 90 percent intervals for the lottery with outcomes 0 and 1000 with ?/? probabilities.

The intervals are ordered by the size of the own certainty equivalents (x-axis from low to high). The horizontal lines indicate the true 90 percent interval (50-800).

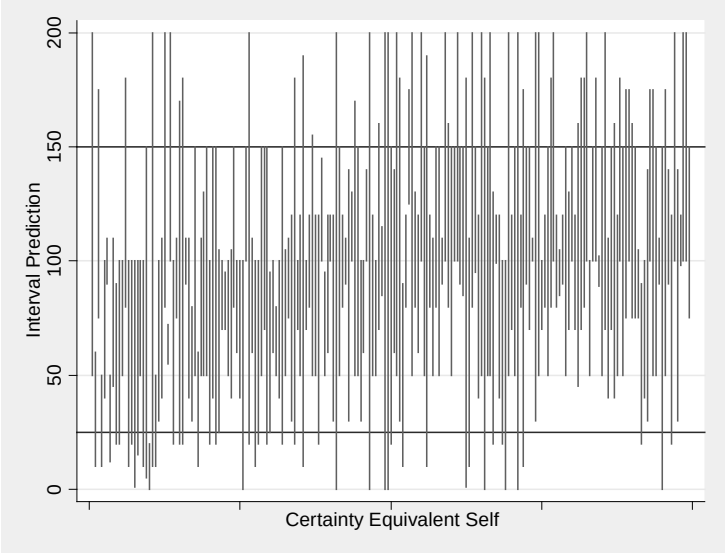


The figure illustrates the distribution of own certainty equivalents for the lottery with outcomes 0 and 200 with 50/50 probabilities. The vertical lines indicate the 90 percent interval (25-150).

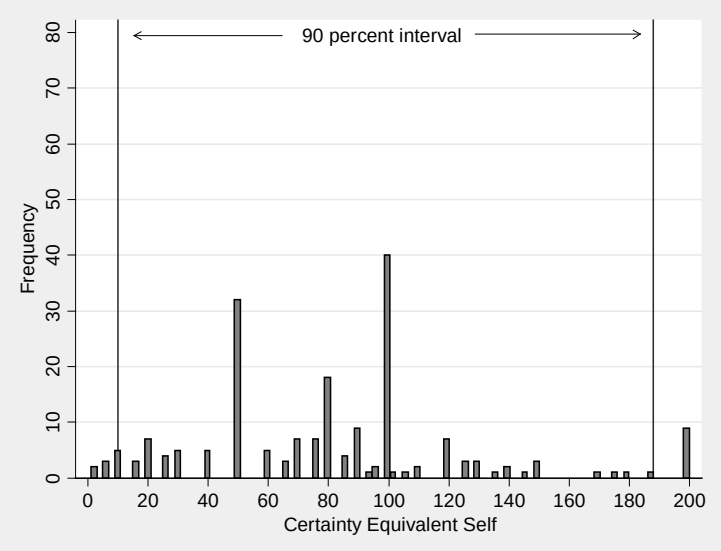


The figure illustrates the predicted 90 percent intervals for the lottery with outcomes 0 and 200 with 50/50 probabilities.

The intervals are ordered by the size of the own certainty equivalents (x-axis from low to high). The horizontal lines indicate the true 90 percent interval (25-150).

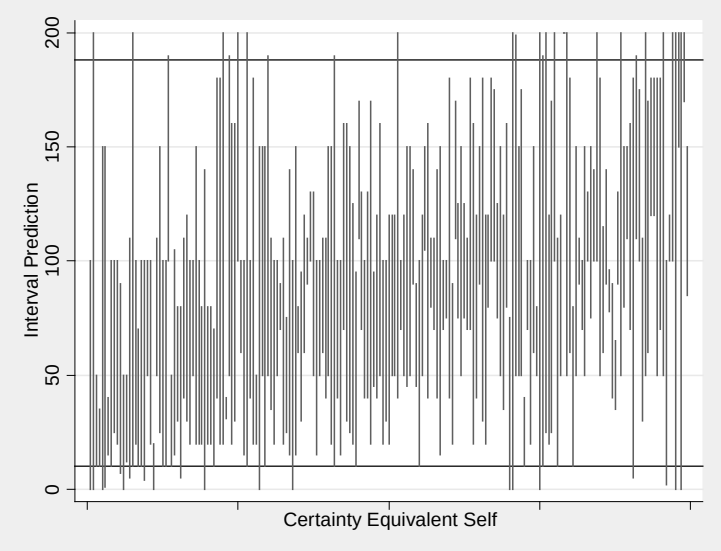


The figure illustrates the distribution of own certainty equivalents for the lottery with outcomes 0 and 200 with ?/? probabilities. The vertical lines indicate the 90 percent interval (10-188).

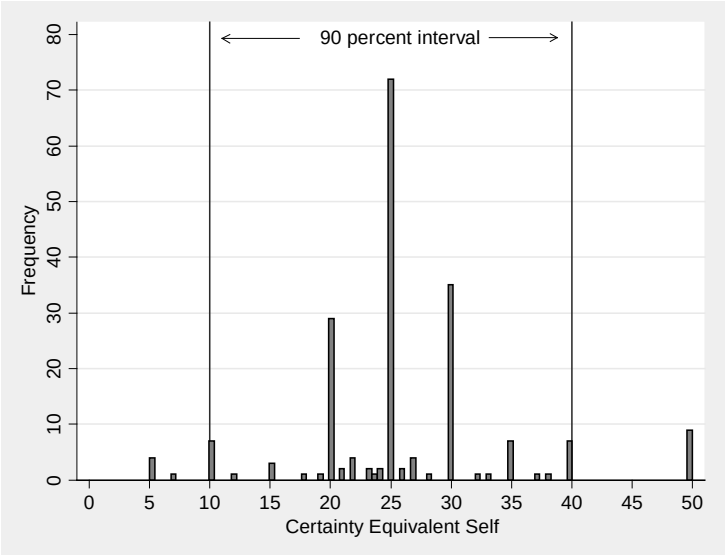


The figure illustrates the predicted 90 percent intervals for the lottery with outcomes 0 and 200 with ?/? probabilities.

The intervals are ordered by the size of the own certainty equivalents (x-axis from low to high). The horizontal lines indicate the true 90 percent interval (10-188).

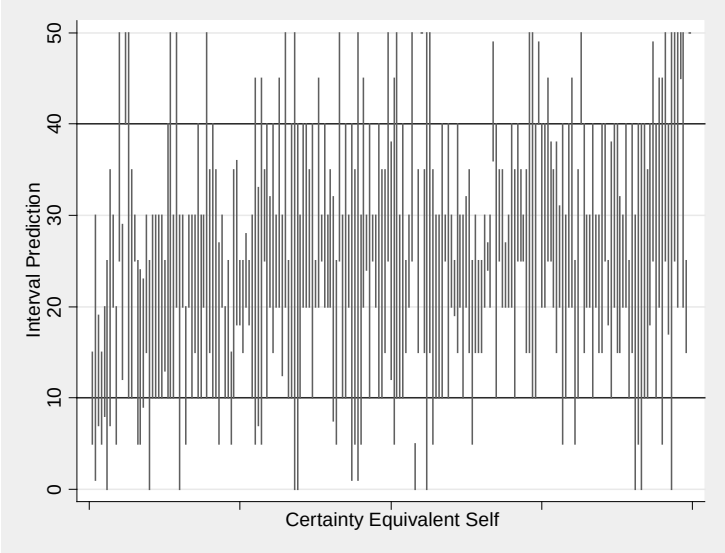


The figure illustrates the distribution of own certainty equivalents for the lottery with outcomes 0 and 50 with 50/50 probabilities. The vertical lines indicate the 90 percent interval (10-40).

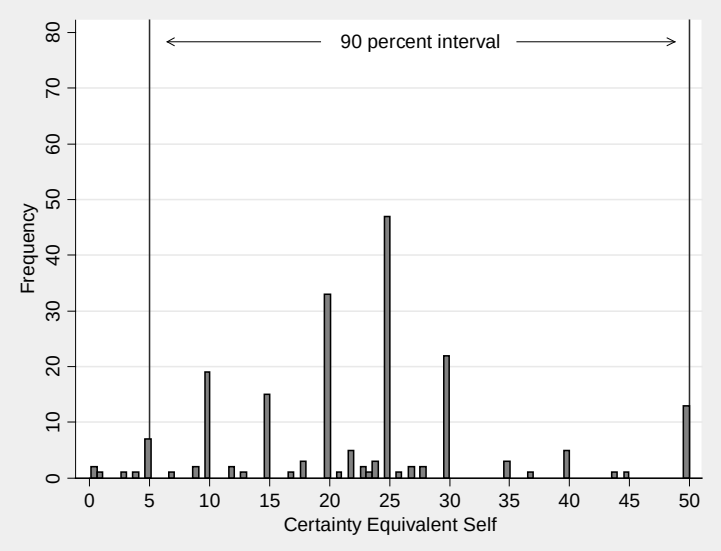


The figure illustrates the predicted 90 percent intervals for the lottery with outcomes 0 and 50 with 50/50 probabilities.

The intervals are ordered by the size of the own certainty equivalents (x-axis from low to high). The horizontal lines indicate the true 90 percent interval (10-40).

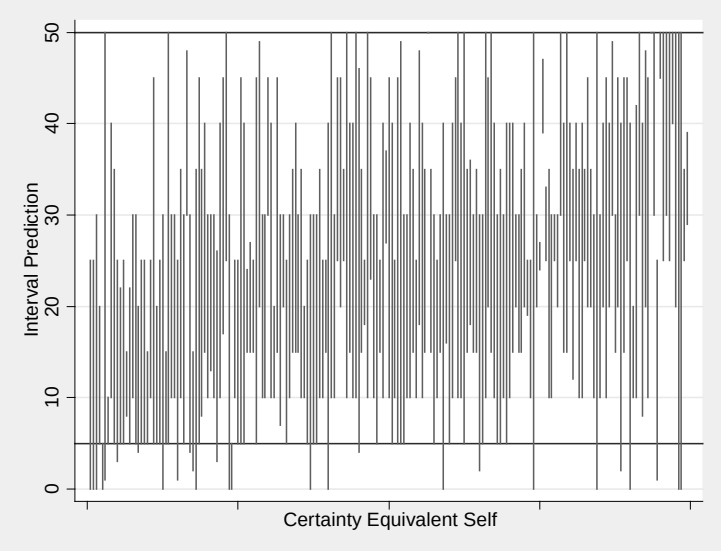


The figure illustrates the distribution of own certainty equivalents for the lottery with outcomes 0 and 50 with ?/? probabilities. The vertical lines indicate the 90 percent interval (5-50).



The figure illustrates the predicted 90 percent intervals for the lottery with outcomes 0 and 50 with ?/? probabilities.

The intervals are ordered by the size of the own certainty equivalents (x-axis from low to high). The horizontal lines indicate the true 90 percent interval (5-50).



Chapter 4

German Household Portfolios

4.1 Introduction

The responsibility of German households for private savings for old age is as high as never before, as demographic changes of the population structure cause financing problems of the social pension fund. The good news is that financial assets of private households are indeed increasing.[12] In addition, the legislator is trying to support private savings with the help of governmentally subsidized pension plans such as the German "Riester-Rente" (a private pension plan that is state-aided by financial and tax benefits; the labeling "Riester" goes back to the German politician Walter Riester). The bad news is that most households are unsure about financial matters (see e.g. Cole and Shastry (2009) or Lusardi and Mitchell (2006)).

Hence, it is not surprising that many investors ask for investment advice. In fact, the majority of private investors is relatively uninformed and relies on professional investment advice (see e.g. Allen (2001), or for German investors e.g. Bluethgen et al. (2008)). However, when doing so, most of the people are not really aware of the costs of advice. In a questionnaire study from 2008 with 111 German participants, more than 60 percent of respondents indicated that they thought, financial advice was without costs, not realizing the commissions they had to pay when buying a product.[13]

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[12] See German Federal Bank, Time series CEB00I: Financial assets D: Total C: Private Households.
[13] Master thesis supervised by Borgsen and Weber (2008).

This biased perception combined with a lack of financial knowledge provides a basis for poor advice. The predominant compensation system in Germany is commission-based advice. There are only few fixed fee offers, e.g. where people pay per hour independently of the conclusion of a contract. One example for an alternative advice concept is the advice offered by consumer centers. These consumer centers exist in all German federal states and deal with all kind of consumer affairs. They offer financial advice concerning asset allocation and retirement savings. We have obtained data about these counseling interviews from the consumer center in Baden-Wuerttemberg for the years 2006 to 2008. With our study, we want to add to the literature on positive household finance, more concretely on the determinants of why people ask for advice and on the correlates and determinants of participation in asset markets. With our unique dataset, we are able to study German household portfolios. This is especially interesting as there are only very few studies using German data. Financial affairs are a highly sensitive issue, making relevant data hard to obtain. Most of the existing studies analyze household portfolios in the U.S., especially the data from the Survey of Consumer Finances (SCF) is popular.

The remainder of this chapter is organized as follows: First, we give an overview of related literature and our hypotheses in Section 4.2. We summarize the results of studies analyzing household finance with the focus on actual investment behavior of individual investors. Section 4.3 describes our dataset and the role of the consumer center. Section 4.4 includes the results concerning the portfolios of German households. First, we give some descriptive statistics of our sample and deal with the question of which people are aware of the advice offered by the consumer centers and which people ask for advice. Second, we analyze the composition of the typical portfolio and participation decisions in specific asset types, e.g. participation in the stock market and determining factors. Third, we look at household diversification over asset types. Section 4.5 analyses the influence of the existing portfolio on the risk preferences concerning a new investment. Section 4.6 concludes.

4.2 Related Literature and Hypotheses

We want to describe German household portfolios and provide answers to the following questions: What does the typical portfolio look like? Which asset types are often and which only rarely held? How do demographic characteristics influence the structure of the portfolio?

What are the determinants for the decisions of holding a specific asset type and diversifying over several asset types?

Asset allocation decisions belong to the wide domain of household finance. There are two approaches to household finance: On the one hand, there is normative research aiming to derive how people should rationally behave. On the other hand, there is positive household finance which looks at empirical data and investigates people's actual behavior. With our study we want to contribute to the latter field of research. Nevertheless, we first want to give a short overview on some current challenges of normative household finance.

The asset allocation decision is very complex as the financial planning is not a single period decision but households have to plan over their whole lifetime. In contrast to the traditional mean-variance framework Merton (1971, 1973) uses a framework for long-term planning with investment opportunities varying over time. In this framework, reinvestment opportunities are risky, so people should hedge against shocks to any state variable that affects expected returns of investment opportunities. The literature using the complex Merton model focuses on several branches: on shocks to the real interest rate as the one variable that captures all changes in investment opportunities (Wachter (2003), Campbell and Viceira (2002)), on the equity premium following an exogenous time-series process (Campbell and Viceira (1999), Kim and Omberg (1996)) or on general multivariate processes that determine both interest rate and equity premium (Campbell and Viceira (2003), Lynch (2001)). These models help in understanding differences between predictions of the mean-variance model and real world decisions. For example, contrary to the mutual fund separation theorem (Tobin (1958)), conservative investors often hold a higher fraction of bonds than stocks in their portfolio (Canner et al. (1997)). Campbell and Viceira (2001) show that this can be a rational strategy if the bonds serve as a hedge against varying interest rates.

In addition, in contrast to short-term investments, the risk properties of long-term investments depend critically on the assumptions about inflation. If inflation is a random variable, then bonds are also a risky investment.

Another assumption that does not hold in reality is that all wealth is liquid and easily tradable. Especially for younger people, human capital is the largest component of their wealth. The literature disagrees about how to deal with this non-tradable asset and its risk properties. In the special case of perfect correlation with tradable assets, labor risk is hedgeable (Bodie et al. (1992)). But the typical risk associated with labor income is idiosyncratic and therefore not

hedgeable. This can lead to a higher risk aversion in investing (e.g. Viceira (2001)) or it may increase risk tolerance when households have the flexibility to increase their labor supply when investment returns decrease (e.g. Farhi and Panageas (2007)). Recent studies also consider education as a risky asset that is chosen together with risky financial assets (Saks and Shore (2005), Palacios-Huerta (2003)).

In addition to normative research, there are a lot of empirical studies about positive household finance. Most of these studies analyze U.S. households based on data from the Survey of Consumer Finances (SCF). There are taxable and tax-deferred accounts in the U.S., and consequently, one strand of the research focuses on tax-minimizing portfolio strategies rather than on asset location. For an overview of literature about tax-minimizing strategies, see for example Poterba (2002). Bodie and Crane (1997) find in a survey with TIAA-CREF[14] members that households choose similar assets in their taxable and tax-deferred account. Our study, however, is focused on asset allocation, the research field of which can be split into studies considering the total wealth composition or at least several asset types on the one hand and studies using data from a single bank or broker and thus focusing on the investment portfolio on the other hand.

Bertaut and Starr-McCluer (2002) use data from the SCF plus aggregated data from the Federal Reserve Board‘s Flow of Funds accounts. They find that the typical portfolio consists of a checking account, a savings account, and a tax-deferred retirement account. In 1998, less than 50 percent of account holders owned some form of stocks (either directly or indirectly via stock mutual funds or amounts of stock in retirement accounts).

The SCF 2001 indicates that only 52 percent of U.S. households hold stocks (either directly or indirectly, Gomes and Michaelides (2005)). In 2004, the survey reports a participation rate of 49 percent (Bucks et al. (2006)).

Carroll (2002) analyses portfolios of the rich (defined as the top one percent of households by net worth) and finds that these are heavily skewed toward risky assets, particularly own privately held businesses. From 1962 to 1995, on average 74 percent of the rich households owned stocks (compared to 16 percent of the rest) and 38 percent held mutual funds (compared to 8 percent). Campbell (2006) studies household participation decisions over quartiles of the wealth distribution. Households in the bottom quartile of the wealth distribution hold

[14] TIAA-CREF is a Fortune 100 financial services company that is the leading retirement system for people who work in the academic, research, medical and cultural fields. For further details see http://www.tiaa-cref.org/.

only liquid assets and vehicles. Only few households hold private equity and real estate. In the upper quartile, the share of households participating in the private equity market increases significantly but is far from universal. Ownership of real estate increases to a participation of over 90 percent.

The results for other countries are similar. The German Institute for Share Promotion annually publishes the amount of stock holders. At the end of 2008, there were only 3.584 million direct stock holders in Germany and 6.601 million people that owned investment funds[15], yielding a total of 8.792 million investors owning stocks and/or investment funds. This number reached its maximum in 2001, when 12.853 million people in Germany owned stocks and/or investment funds. This corresponds to very low shares of participating households. In 2008, about 5.5 percent of the population directly hold stocks and about 13.5 percent hold stocks and/or investment funds. Calvet et al. (2007) study Swedish households with data supplied by the government's statistical agency (Statistics Sweden). The dataset contains disaggregated wealth and income data of the entire population of Sweden. They find two main sources of inefficiency in the portfolios: on average, the risky assets are under-diversified and many households do not participate in risky assets at all. Guiso and Jappelli (2002) use the Bank of Italy Surveys of Household Income and Wealth and confirm the low participation share for Italy. They find that transaction accounts (e.g. checking and savings accounts), short-term government bonds and bonds issued by the national postal service are most popular. In 1998, only 18.7 percent of the households participated in the stock market - either directly (7.3 percent) or indirectly. Banks and Tanner (2002) analyze U.K. households with data drawn from the Family Expenditure Survey and find that in 1998 a share of 31.4 percent holds stocks (directly only: 21.6 percent). In France, 17 percent of the households held stocks directly in 2000 (Arrondel and Masson (2003), data from the EPCV[16]). Alessie et al. (2002) use the Center Saving Survey for the Netherlands. They find that in 1998, 35.1 percent participated in the stock market (directly only: 15.4 percent). Iwaisako (2003) uses data about Japanese household asset allocation from three different data sources. In contrast to the United States and Europe he shows that stock market participation by Japanese households is also very low but additionally followed a declining trend in the last decade: in 1990 30.2 percent held stocks (directly only: 26.5 percent) compared to 25.2 percent in 1999 (directly only: 23.6 percent).

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[15] See Deutsches Aktieninstitut (2009).
[16] Survey included as part of the continuous surveys on household living conditions (Enquête Permanente sur les Conditions de Vie des Ménages).

The literature identifies several determinants of the participation decision: Among others, stock market participation is increasing in income as well as education (e.g. Bertaut and Starr-McCluer (2002)), age (e.g. Cole and Shastry (2009)), gender and marital status (e.g. Agnew et al. (2003)), financial literacy (e.g. Lusardi and Mitchell (2007)), experience with the stock market (e.g. Malmendier and Nagel (2009)), familiarity (Massa and Simonov (2006)), and awareness (Guiso and Jappelli (2005)). The determinants are similar to those of the diversification decision: Age, income, and financial literacy explain a considerable part of the extent of portfolio diversification (see e.g. Alessie et al. (2002), Bertaut and Starr-McCluer (2002), Eymann and Boersch-Supan (2002)).

The non-participation rate in the stock market (the so-called stockholding puzzle) is criticized by normative theory.[17] According to Mehra and Prescott (1985), every investor should invest a part of his wealth into risky assets because historical returns and thus expected future returns far exceed those of other asset types. Campbell (2006) also states that every investor should own some equity as long as a premium for the incurred risk is paid. Haliassos and Bertaut (1995) consider several determinants such as risk aversion and belief heterogeneity, but these factors cannot explain the departures from expected utility maximization. Guiso et al. (2008) claim that a lack of trust may explain the non-participation in financial markets. However, a limited participation may also have rational reasons. Vissing-Jorgensen (2002) finds that already small fixed costs of participation (275 USD in 2003) would be sufficient to explain the non-participation decision of 75 percent of the households.

Apart from the above-mentioned studies, there are also studies with datasets from a special bank or broker that focus on the securities portfolio. We only mention a few studies, which might be interesting for our analyses as they use German datasets.

Glaser (2007a) studies data from a German online broker implying that almost all investors in this sample trade stocks. The median investor is under-diversified with only five stocks in his portfolio, but diversification is increasing from 1997 (3 stocks) to 2001 (8 stocks).

Dorn and Huberman (2005) use data from a German retail broker plus responses to an additional survey. They find that more risk tolerant and less experienced investors hold less diversified portfolios.

[17] For empirical evidence see e.g. Haliassos (2002) or Guiso et al. (2008).

Bluethgen et al. (2008) differentiate between advised and non-advised clients from a German retail bank. The portfolios are in general too concentrated, investors hold only few stocks and investments are geographically concentrated. In contrast, advised clients are better diversified: their allocation to funds is larger than to individual stocks and, additionally, they are more diversified into international equities than self-directed clients. As advised clients also pay higher transaction costs, it is not possible to say ex ante whether they are better off or not. Being male, risk tolerance, and income are all positively correlated with the equity fraction of the respective portfolios. Contrarily, wealth is negatively correlated with equity holdings. The findings in other countries are similar to those in Germany, e.g. for U.S. households Goetzmann and Kumar (2008) also show that the portfolios are under-diversified. The level of under-diversification is higher for younger, low-income, less educated, and less sophisticated investors.

We expect to find some of the above results in our dataset as well. We hypothesize that the majority holds safe assets, e.g. in form of a call money or savings account. A sizable part owns real estate. Less than half of the people participate in the stock market, either by holding shares directly or indirectly through investment funds.

Furthermore, we want to analyze the influence of demographic variables, knowledge, experience, and risk attitude on the allocation. We for instance hypothesize that stock market participation (either directly or indirectly through investment funds) is positively correlated with being a couple or male, age, income, and financial literacy measured through knowledge/experience. Higher background risk (self-employed households) should also influence the stock market participation decision.

4.3 Data

The Federation of German Consumer Organisations is the umbrella organisation of consumer centers, making up a network promoting consumers' interests with more than eight million individual members. Member organisations include the consumer centers in the 16 federal states and 25 other associations dealing with consumer policy. The Federation is part of an international network of consumer organisations and one of Europe's largest consumer lobbies. It represents consumers' interests vis-à-vis politicians and policy makers, the private sector, and the public sphere. The consumer centers are non-profit organisations. Their work is supported by federal state funding, municipal, and district support for the individual advice

centers and by project funding from the national government. The consumer centers also contribute to this funding with charges for consultation services and the sale of consumer advice guides. Consumer centers are located in all the German federal states and offer their services in about 200 advice centers, providing consumers with information and consultation. The goal of their work is to inform, advise, and support consumers with regard to issues of private consumption as well as providing an overview of the market and helping consumers deal with complex market conditions. They also identify health and environmental aspects that could influence purchasing decisions. Their consultation offer includes advice in the centers and via telephone or internet on legal and economic issues affecting the private household, with a focus on credit law, debtor arbitration, and insolvency declaration, on banking and investment, on insurances, on patients‘ rights, and health services, on passenger rights, on building finance, on energy, on nutrition, and on telecommunications. More concretely, they for instance provide information on contracts of sale and service agreements or false promises made by prize game organisations, the legitimacy of telecommunications and energy charges, the best pension plans, health insurance, and other types of insurance. Note, however, that it is not the intention of the consumer center to compete against the market offer; they rather want to raise public attention for possible market frictions, e.g. information asymmetry. On the individual level, consumer counseling is aimed at solving the concrete problem of the consumer. On the aggregated level, the consumer center aims to contribute their experience gained through the counseling to the lobby group. If necessary, they also aim to influence the legislation (see Benner and Weiser (2009)).

Our data is provided by the Verbraucherzentrale Baden-Wuerttemberg e. V. (consumer center Baden-Wuerttemberg). In the financial sector, they offer general insurance advice, construction loan advice, and a general counseling interview dealing with financial investments and old-age provisions. During these general interviews, a protocol containing all relevant information is written. We use these protocols to generate a new unique dataset. We have personal information about the person or couple seeking for advice, e.g. age, occupation, monthly net income etc., and information about the holdings in different asset types.

The demand in Germany for this independent advice is high. In the beginning of 2008, the waiting time for an interview was several months. One obvious reason for this is the currently high uncertainty among investors because of the financial crisis. Additionally, the general need for private savings for retirement is high as the state is retreating more and more from the responsibility. The advice offered by the consumer center seems to be reliable to the con-

sumers. In contrast to most private institutions, they do not offer commission-based advice but advice that is independent from the typical conflict of interest.

The ideal dataset (see Campbell (2006)) would be representative for the entire population. The observations should especially vary in wealth and age as these are important explanatory variables for financial behavior. In addition, the data would include information about total wealth and its breakdown into subcategories to measure diversification among asset types. Diversification within asset types would be measurable with a further breakdown of the asset types to individual assets. Finally, the dataset would not only be a one shot observation but contain panel data over time. It is also important that the data is as exact as possible. A typical problem with bank or brokerage data is that many households are clients of different financial institutions simultaneously so that account record data typically does not cover the household's total wealth.

Fortunately, our data includes information about total wealth. Note, however, that our data is self-reported by the consumers coming to the agency. It is therefore not as exact as account record data from a bank would be, for example; especially the data on different asset types is not very detailed. People are asked on a general basis, without further specifications, how their existing financial wealth is invested. Obviously, this method is quite error-prone, e.g. people (purposefully or not) forget about special asset types or are unsure about the amounts. Moreover, in many cases the answers are not specified, e.g. answering "investment funds" does not help decide whether this is an investment fund investing into stocks, bonds, real estate, or a mix of several asset types. The category of "stocks" does not specify the name of the company nor the number of different stocks in the portfolio. As we have this problem with all asset types, the classes are rather broad and overlapping. Thus we are unfortunately not able to analyze portfolio diversification within different asset types and instead use a simple naive measure of diversification over asset types.

The main benefit of our data set is that we principally have information about all components of wealth, in contrast to data from a single bank or broker, thus allowing us to add to the very few empirical studies about household portfolio choices in Germany.

4.4 Household Portfolios: Results and Discussion

4.4.1 Descriptive Statistics

Table 4.1: Descriptive statistics

The table reports descriptive statistics of our dataset: age, risk1 (maximum percentage of loss tolerated over the investment period), risk2 (maximum percentage of loss tolerated at the end of the investment period), monthly net income and expenditures for single women, single men, couples, other households (siblings), and for all households together.

	Obs.	Mean	Median	Std.Dev.	Min.	Max.
Women						
Age	315	45.38	44.00	12.81	19.00	89.00
Risk1	313	10.69	10.00	12.32	0.00	80.00
Risk2	314	2.12	0.00	5.62	0.00	50.00
Income	296	2,055.57	1,833.50	1,014.41	493.00	6,881.00
Expenditures	289	1,611.36	1,420.00	793.98	100.00	6,805.00
Men						
Age	198	41.52	39.00	12.44	19.00	74.00
Risk1	196	15.45	15.00	13.86	0.00	70.00
Risk2	199	3.27	0.00	6.21	0.00	30.00
Income	195	2,509.83	2,087.00	2,332.10	300.00	30,000.00
Expenditures	184	1,816.00	1,500.00	1,829.73	0.00	23,000.00
Couples						
Age	309	47.37	45.50	12.00	23.00	78.50
Risk1	308	11.41	10.00	13.97	0.00	100.00
Risk2	310	2.28	0.00	5.72	0.00	40.00
Income	298	3,856.02	3,476.00	1,939.16	500.00	15,000.00
Expenditures	279	2,818.67	2,600.00	1,121.03	807.00	9,123.53
Other						
Age	2	23.00	23.00	2.12	21.50	24.50
Risk1	2	12.50	12.50	17.68	0.00	25.00
Risk2	2	0.00	0.00	0.00	0.00	0.00
Income	2	1,160.00	1,160.00	622.25	720.00	1,600.00
Expenditures	2	1,160.00	1,160.00	622.25	720.00	1,600.00
Total						
Age	824	45.14	43.75	12.64	19.00	89.00
Risk1	819	12.10	10.00	13.45	0.00	100.00
Risk2	825	2.45	0.00	5.81	0.00	50.00
Income	791	2,843.59	2,400.00	1,946.28	300.00	30,000.00
Expenditures	754	2,106.84	1,800.00	1,350.64	0.00	23,000.00

Table 4.1 shows descriptive statistics of our dataset. Out dataset consists of 827 household observations, more precisely we have obtained interview notes from 316 women, 199 men, 310 couples, and 2 siblings. The interviews took place from 2006 to 2008. The mean age in

our sample is 45.14; the age of a couple is determined as the average age of both partners. If we count every individual regardless of marital status, the mean age is 45.74 (as married people in our sample are on average older than singles). Compared to the mean age of the German population in 2007, which is 42.9, our sample is some years older.[18] There are also more women than men in the whole population (51.02 compared to 48.98 percent) but the proportion of women in our sample is significantly higher than in the whole population.

Mean household net income is 2,843.59 Euro per month, net expenditures 2,106.84 Euro. Couples earn significantly more than do single men or women and single men earn more than single women (all t-tests significant at the 1 percent level). It is also plausible and significant that a couple's expenditures are higher than for a single person. The difference between men and women here is not significant. The mean net income of our sample seems to be representative, as the mean household net income in Germany in 2007 was 2,839 Euro.[19]

The above results are in line with the findings of Bluethgen et al. (2008) who analyze a dataset from a large German retail bank also acting as a brokerage house. When a customer places an order, the advisor has to specify whether the order is related to a recommendation or not, allowing for a differentiation between advised and self-directed clients. Self-directed clients are on average 52.31 years old, their mean income is 2,302 Euro and the percentage of women is 50 percent. Advised clients are significantly older at 57.23 years on average but their mean income is about the same at 2,299 Euro. The percentage of women in the advice sample is significantly higher at 57 percent.

Table 4.2: Reasons for the interview

The table reports the reasons for the counseling interview at the consumer center. Multiple answers were permitted.

Interview reason	Obs.	Percentage
Retirement	685	82.83%
Government aid	428	51.75%
General savings	339	40.99%
Real estate	190	22.97%
Purchase	138	16.69%
Generate income	132	15.96%
Children's education	81	9.79%
Other	61	7.38%

[18] Figures from the Federal Statistical Office, see Statistisches Bundesamt (2010).
[19] See Statistisches Bundesamt (2009).

Table 4.2 shows the reasons why people use the advice offer of the consumer center, with multiple answers being possible. About 83 percent want to be informed about possible investments for retirement savings. About 52 percent want to make use of governmental aid. 41 percent state "general savings" as the motive. Other reasons are less popular: 23 percent want to save for real estate, 17 percent for another large purchase. 16 percent require regular income from their investments. Only ten percent want to save for their children's education and seven percent state other reasons.

In the counseling interviews at the consumer center, the risk preference of the consumer is measured via two different questions. The first asks for the maximum loss in percent of the investment amount that could be tolerated over the investment time (risk1) and the second asks for the maximum loss in percent that could be tolerated at the end of the investment period (risk2). Woman in our sample are significantly more risk averse than men ($t(risk1_{men}$-$risk1_{women}) = 3.93$, $t(risk2_{men}$-$risk2_{women}) = 2.13$). Couples have a risk preference somewhere in between, which is plausible as it is half her risk preference plus half his risk preference. The risk preferences of women and couples are not significantly different, but those of men and couples are different in risk1 ($t(risk1_{men}$-$risk1_{couples}) = 3.18$, $t(risk2_{men}$-$risk2_{couples}) = 1.81$). The finding that women are more risk averse than men in financial decisions is very widespread in the literature (e.g. see Weber et al. (2002) or for a meta-analysis Byrnes et al. (1999)). Dohmen et al. (2010a) use a sample of 22,000 German individuals and also confirm that the willingness to take risks is negatively correlated with being female. Compared to the above data and studies, we believe that our sample is not unusual for a sample of advised clients.

Table 4.3 shows financial knowledge and experience of the investors. For each asset type, the consumers are asked to state their knowledge and experience on a 5-point Likert scale (1: very low, 5: very high). The consumer center differentiates between nine different asset types: Savings accounts (also including call money and time deposits), savings bonds (savings with a higher (normally fixed) maturity), federal savings bonds (bonds issues by the Federal Republic of Germany), bonds (bonds except federal bonds), insurance (insurances with investment character, life insurance or annuity insurance), real estate (no differentiation between self occupancy or not), investment funds (all kinds of investment funds including stocks, bonds, money market etc.), stocks, and derivatives.

Table 4.3: Knowledge and experience

The table reports knowledge and experience with different asset classes for women and men (self-reported on a five-point Likert scale from 1: very low to 5: very high). The last column states t-statistics for differences in mean between women and men.

	Obs.	Mean	Median	Std.Dev.	Min	Max	Obs.	Mean	Median	Std.Dev.	Min	Max	t(m-w)
	Knowledge women						**Knowledge men**						
Savings accounts	581	3.51	4	1.11	1	5	482	3.71	4	1.06	1	5	3.02
Savings bonds	582	1.77	1	1.14	1	5	483	1.88	1	1.20	1	5	1.42
Federal savings bonds	580	1.66	1	1.02	1	5	482	1.83	1	1.11	1	5	2.50
Bonds	581	1.20	1	0.63	1	5	482	1.29	1	0.76	1	5	1.89
Insurances	581	2.26	2	0.98	1	5	481	2.52	3	1.00	1	5	4.21
Real estate	579	2.32	2	1.40	1	5	478	2.63	3	1.45	1	5	3.54
Investment funds	579	1.82	2	0.94	1	5	475	2.09	2	1.03	1	5	4.36
Stocks	578	1.48	1	0.88	1	5	477	1.83	1	1.08	1	5	5.68
Derivatives	168	1.10	1	0.37	1	3	142	1.27	1	0.75	1	5	2.38
	Experience women						**Experience men**						
Savings accounts	583	3.72	4	1.22	1	5	482	3.88	4	1.13	1	5	2.12
Savings bonds	581	1.59	1	1.13	1	5	483	1.63	1	1.20	1	5	0.56
Federal savings bonds	581	1.39	1	0.93	1	5	483	1.51	1	1.07	1	5	1.96
Bonds	581	1.16	1	0.60	1	5	479	1.19	1	0.68	1	5	0.84
Insurances	581	2.23	2	1.10	1	5	482	2.50	3	1.18	1	5	3.85
Real estate	577	2.27	1	1.49	1	5	481	2.55	2	1.58	1	5	3.01
Investment funds	580	1.87	2	1.04	1	5	482	2.02	2	1.14	1	5	2.20
Stocks	575	1.49	1	0.96	1	5	480	1.75	1	1.15	1	5	4.03
Derivatives	164	1.04	1	0.23	1	3	138	1.23	1	0.82	1	5	2.74

Both women and men are most experienced and knowledgeable in the area of savings accounts, followed by real estate and insurances. Comparing the means of knowledge and experience, we find that men state higher knowledge and also higher experience in every asset category. This is on the one hand consistent to several studies about financial literacy finding that men are more financially literate than women[20], but on the other hand men are also known to be more overconfident than women in assessing their own knowledge and abilities.[21] We will use the data of financial knowledge and experience in more detail in the following analysis. We also created the variables "general financial knowledge" and "general financial experience", which is the average knowledge/experience over all asset types. Financial knowledge and financial experience tend to go hand in hand, thus they are highly correlated.[22] For our further analysis, we therefore combine the two variables general knowledge and general experience and use this combined variable as a proxy for general financial literacy (FL). For a couple, the financial knowledge/experience is again determined as half of the

[20] See e.g. Lusardi and Mitchell (2008), OECD (2005).
[21] See e.g. Deaux and Farris (1977) or Prince (1993) for the financial domain.
[22] The Pearson correlation (Spearman rank correlation) coefficient is 0.8484 (0.8353).

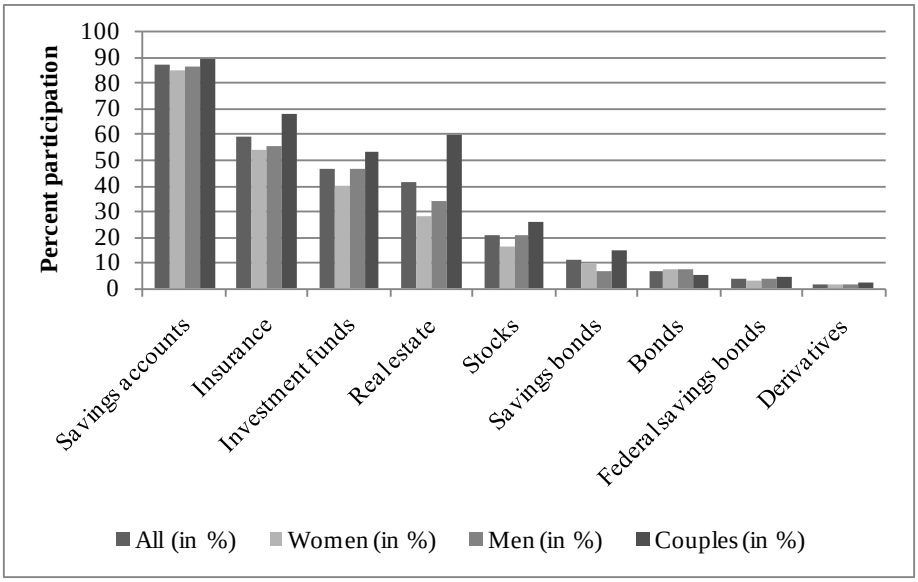
sum of both partners. We generated our financial literacy score as half of the sum of general knowledge plus general experience; hence our resulting FL score also varies between 1 and 5.

The results about knowledge and experience are also consistent with the statements of the consumers about which assets they hold. Figure 4.1 illustrates the holdings for all households as well as separately for single women, single men, and couples. Savings accounts are the most common investment with 87.42 percent of the households hold at least one. 59.49 percent hold insurances, 46.80 percent hold investment funds, and 41.48 percent own real estate. 21.04 percent of the households hold individual stocks. All other asset types are not very common, with about 10 percent or less of the households holding them. The percentage of owners of real estate is representative for Germany, where the overall proportion was 43.2 percent in 2008.[23] In contrast, the participation rates in the stock market as well as in the investment fund market are fairly high compared to the entire German population where only about 5.5 percent hold stocks and about 10.1 percent hold investment funds.[24] A possible explanation might be that these are households asking for investment advice; consequently they must own something of value to invest. Bluethgen et al. (2008) also find that advised people tend to be wealthier than non-advised people and wealth is known to be an explanatory variable for stock market participation. In addition, people soliciting advice, obviously show a higher interest and seem to care about their financial situation. This is comparable to a higher financial literacy or education, which are also prominent determinants for participation into risky asset markets (see e.g. Lusardi and Mitchell (2006), Boersch-Supan and Essig (2002)). Furthermore, Van Rooij et al. (2007) consider the influence of financial literacy on the source of financial advice. They find that people with low financial literacy are more likely to consult family and friends in contrast to those with high financial literacy who are more likely to read newspapers, magazines, and books or rely on financial advisors. Our results are also comparable to Sommer (2005) who analyses the German Income and Expenditure Survey (Einkommens- und Verbrauchsstichprobe, EVS). He finds a participation rate of about 55 percent for insurances, 21 percent for stocks and 30 percent for mutual funds in 2003.

[23] Figure from the Federal Statistical Office, last updated 2008.
[24] See Deutsches Aktieninstitut (2009).

Figure 4.1: Holdings

The figure illustrates the percentage of households holding different asset classes for all households together, single women, single men, and couples.



For almost all asset types, couples have the highest participation rate, single men lie in the middle and single women have the lowest share of participation. This is especially true for stocks and investment funds. The influence of gender and marital status is also documented in the literature; our results are in line with e.g. Agnew et al. (2003) or Sunden and Surette (1998). However, Jianakoplos et al. (2003) find that it is not the marital status per se but the higher financial endowment that is responsible for the differences between single persons and couples. We will more closely examine these effects in the following.

4.4.2 Bivariate Analyses

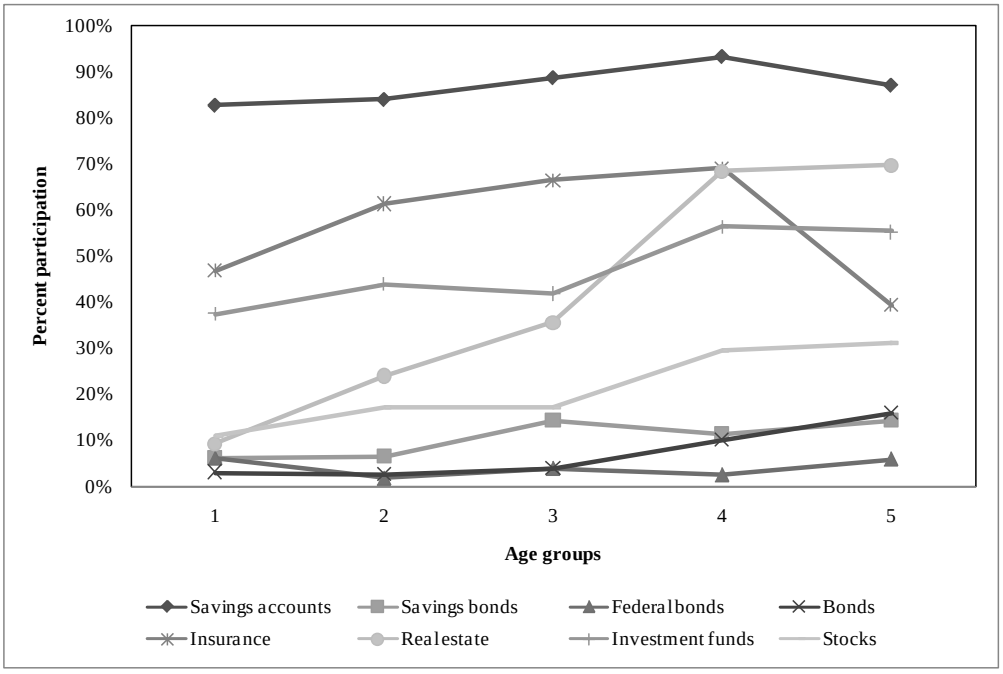
First, we want to have a look at some important determinants that are widely discussed in the literature. We perform bivariate graphical analyses with the explanatory variables age, income, and financial literacy. For each variable, we look at the influence on participation rates over asset types. As derivatives are very uncommon asset types and in addition were not considered in all interviews, we remove them from our further analysis, thus we are looking at eight asset types: savings accounts, savings bonds, federal savings bonds, bonds, insurance policies, real estate, investment funds, and stocks.

4.4.2.1 Age Effects

Figure 4.2: Participation rates by age

The figure shows percentage participation for different asset types by age. A household in the first age group is younger than 30 years, in the second group between 30 and 40 years and so on (see table). We generated groups with equal width (except the first and the last class). We believe that for age, these groups make more sense than would a quintile split.

The table shows the results of mean comparison tests. We tested the participation in the different age groups against the mean participation of the whole sample. A significantly higher (lower) participation at the 10% level is denoted by + (-), at the 5% level by ++ (--), and at the 1% level by +++ (---).



Age group	1	2	3	4	5
Age	≥ 19	≥ 30	≥ 40	≥ 50	≥ 60
	< 30	< 40	< 50	< 60	≤ 89
Observations	64	257	222	149	132
Savings accounts		-		++	
Savings bonds		--	++		+
Federal bonds		-			+
Bonds		---	-	++	+++
Insurance	--		++	+++	---
Real estate	---	---	--	+++	+++
Investment funds	-		-	+++	++
Stocks	--	-	-	+++	+++

Figure 4.2 shows household participation rates for different asset types by age. The vertical axis shows the fraction of households that participate in particular asset types. The horizontal axis shows different age groups. We split the data into 5 age groups (under 30, between 30 and 40, between 40 and 50, between 50 and 60, and above 60, see the table under Figure 4.2).

We think classes with equal width for age make more sense than a quintile split as our observations for age cluster in the middle age groups. Consequently, most households belong to the second and third class as the middle ages are strongly represented. We have least observations, only 64, for the young households under 30.

For bonds, stocks, and real estate we see that the share of households participating is increasing with age. We tested the participation rates against the means of the entire sample (see Figure 4.1). For bonds, the participation rate in age groups 2 and 3 is significantly lower than the mean, whereas in age groups 4 and 5 it is significantly higher; see the table under Figure 4.2 for all test results. The same is true for stocks and real estate; in addition the participation rate in group 1 is also significantly lower in each case. For insurances, the participation proportion is increasing from age groups 1 to 4 but decreasing from group 4 to 5 (groups 1 and 5 have significantly lower, groups 3 and 4 significantly higher participation rates compared to the entire sample). This can be explained by the fact that around age 60+, an increasing share of insurance contracts becomes due. Savings bonds, bonds, and federal savings bonds are in low demand at all age groups, nevertheless there are some significant deviations, e.g. for bonds, age groups 4 and 5 have a significantly higher participation rate and age groups 2 and 3 have a significantly lower one. The participation in the investment fund market is higher in the last two age groups compared to the first three (deviation from the mean significant for groups 1 and 3 and for groups 4 and 5). The age effect is discussed with ambiguous results in the literature. Cole and Shastry (2009), for example, find an increase in stock market participation with higher age for U.S. census data for 2000. Contrarily, Campbell (2006) shows a weak negative effect for age for the SCF 2001 and Bertaut and Starr-McCluer (2002) show a hump-shaped pattern for the SCF 1998. Concerning stock market participation of German households, Boersch-Supan and Essig (2002) also find a hump-shaped age profile for the years 1993 and 1998 (German Income and Expenditure Survey, EVS). Because of the different study periods - our data is from 2006 to 2008 - these results are not necessarily incompatible with each other.

In general, we must be careful when interpreting our age results. It would be wrong to infer from Figure 4.2 that households sell their assets (e.g. savings account, insurances, investment funds) when they grow older. Instead, these households may have started with much lower participation rates at a younger age. Comparably, currently middle-aged households may show a higher future participation to specific asset types because they have grown up in another time. As we only have data for one point in time, we are not able to differentiate be-

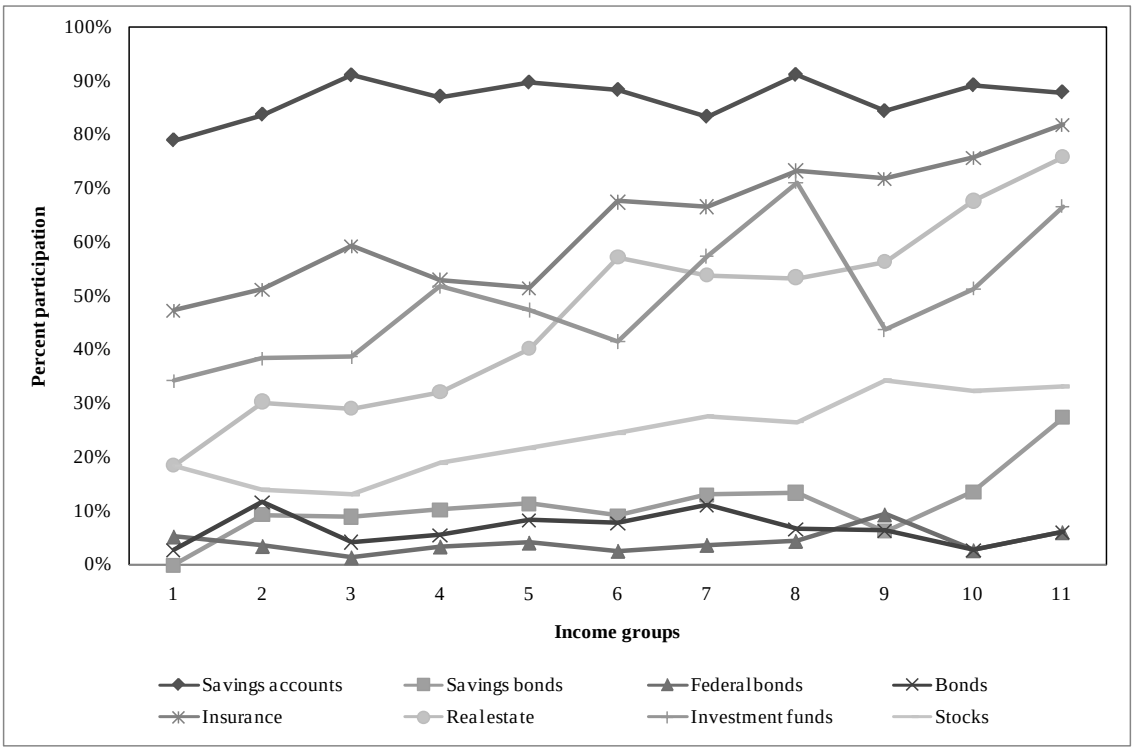
tween age and cohort effects. Sommer (2005) does so by using the cross-sectional German EVS and indeed finds mixed evidence for age and cohorts.

4.4.2.2 Income Effects

Figure 4.3: Participation rates by income

The figure shows percentage participation for different asset types by income. A household in the first income group has a monthly net income up to 1000 €, in the second group an income between 1,000 and 1,499 € and so on (see table). A split of the dataset into quintiles is ineffective here because the data strongly clusters at round numbers like 1,500 or 2,000.

The table also shows the results of mean comparison tests. We tested the participation in the different income groups against the mean participation of the whole sample. A significantly higher (lower) participation at the 10% level is denoted by + (-), at the 5% level by ++ (--), and at the 1% level by +++ (---).



Income group	1	2	3	4	5	6	7	8	9	10	11
Income	<1,000€	1,000€-1,499€	1,500€-1,999€	2,000€-2,499€	2,500€-2,999€	3,000€-3,499€	3,500€-3,999€	4,000€-4,499€	4,500€-4,999€	5,000€-5,999€	≥6,000€
Observations	38	86	145	147	97	77	54	45	32	37	33
Savings accounts	-		+								
Savings bonds	-										+++
Federal bonds			-						++		
Bonds		++					+				
Insurance	-	-		-	-	+		++	+	++	+++
Real estate	---	--	---	---		+++	++	+	++	+++	+++
Investment funds	-	-	--				+	+++			++
Stocks		-	---						++	++	++

Figure 4.3 illustrates participation decisions of households with different income levels. The vertical axis is the same as in Figure 4.2. The horizontal axis shows 11 income groups from lowest to highest. A household in the first income group has a monthly net income of up to 1,000 Euro, in the second between 1,000 and 1,499 Euro and so on (see the table under Figure 4.3). A split of the dataset into quintiles would be ineffective here because most observations are round numbers like 1,500 or 2,000. We have the most observations for middle-income households with a monthly net income between 1,500 Euro and 3,500 Euro. Only 38 households have an income below 1,000 Euro, and for households with an income higher than or equal to 4,500 Euro, we only have about 100 observations.

Concerning savings accounts, savings bonds, federal bonds, and bonds, the income does not seem to matter much. Savings accounts are very popular in all income groups, just as savings bonds, federal bonds, and bonds in general are quite unpopular over all income groups. Real estate ownership increases from 18.42 percent in the lowest income group to 75.76 percent in the highest income group. Again, we tested the participation rate in the individual income groups against the mean of the entire sample (see significance levels in Figure 4.3). For income groups 1 to 4, the participation rate in the housing market is significantly lower, for income groups 6 to 11 significantly higher than the overall mean. The increase in insurances is also substantial. Groups 1, 2, 4, and 5 own significantly less insurance policies, and groups 6 and 8 to 11 own significantly more. Stock market participation increases from 18.42 to 33.33 percent (groups 2 and 3 significantly below, groups 9 to 11 significantly above the average). Investment funds are owned by 34.21 percent in the lowest and by 66.67 percent in the highest income group (groups 1 to 3 significantly below, groups 7, 8, and 11 significantly above the average).

These results are in line with international findings. For the SCF, Bertaut and Starr-McCluer (2002) find that stock market participation (directly and indirectly) increases with income. Campell (2006) also finds strong positive effects of income and wealth. Boersch-Supan and Essig (2002) confirm these effects for direct as well as for indirect stockholdings in Germany.

4.4.2.3 Financial Literacy Effects

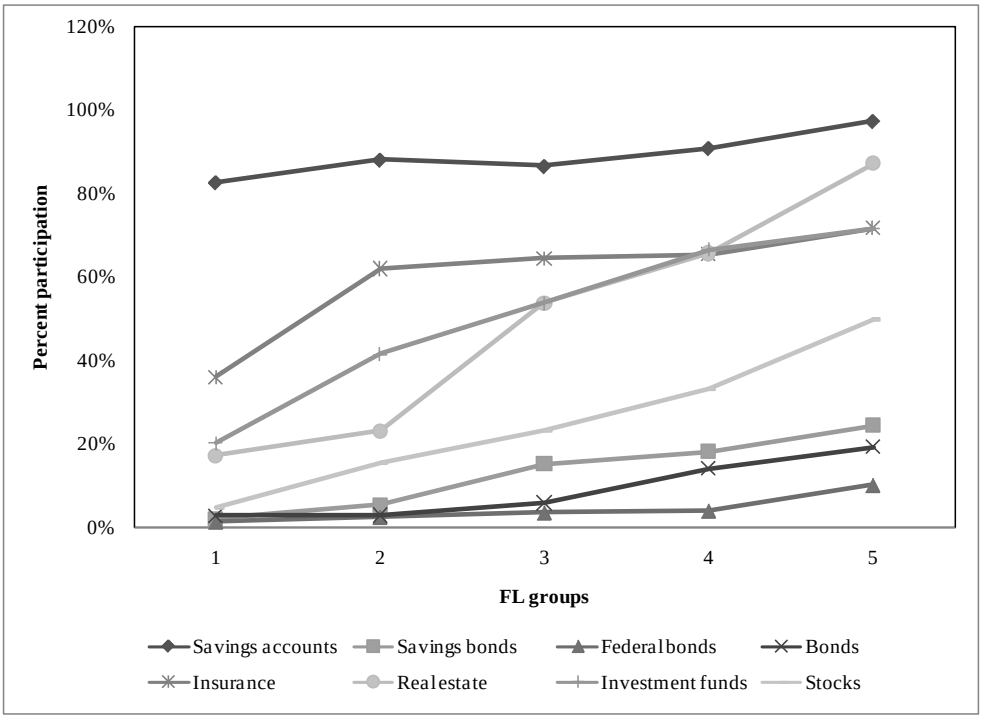
The measurement of financial literacy (FL) is difficult as it is not a natural attribute. Empirical studies therefore use different methods, which may be classified into objective financial literacy indexes using questionnaires to measure financial literacy (e.g. Lusardi and Mitchell (2006)) and subjective self-evaluation indexes reporting people's self-evaluation of their fi-

nancial literacy (e.g. Graham et al. (2009)). In addition, there are also studies that use demographic variables such as wealth, occupation, gender, or age as a proxy for financial literacy (e.g. Dhar and Zhu (2006) or Feng and Seasholes (2005)).

Figure 4.4: Participation rates by financial literacy

The figure shows percentage participation for different asset types by financial literacy (FL). A household in the first FL group has a financial literacy score from 1 to 1.5, in the second group a score of 1.5 to 2 and so on (see table). We generated groups with equal width (except the last one because of too few observations).

The table also shows the results of mean comparison tests. We tested the participation in the different FL groups against the mean participation of the whole sample. A significantly higher (lower) participation at the 10% level is denoted by + (-), at the 5% level by ++ (--), and at the 1% level by +++ (---).



FL group	1	2	3	4	5
FL score	≥ 1	≥ 1.5	≥ 2	≥ 2.5	≥ 3
	< 1.5	< 2	< 2.5	< 3	≤ 5
Observations	144	277	223	99	78
Savings accounts	--				+++
Savings bonds	---	---	++	+++	+++
Federal bonds	-				+++
Bonds	--	---		+++	+++
Insurance	---		+		++
Real estate	---	---	+++	+++	+++
Investment funds	---	--	++	+++	+++
Stocks	---	--		+++	+++

Van Rooij et al. (2007) use five basic (and in addition eleven advanced) financial questions to measure base and advanced financial literacy to construct two indexes. Moreover, they also ask for a self-evaluation. Fortunately, even if the measurement of financial literacy is very heterogeneous, the correlation between objective and subjective indexes is high (Van Rooij et al. (2007)). Mueller and Weber (2010) also find that self-assessed financial knowledge is highly positively related with an objective financial literacy index for a dataset with German households.

For our analysis we use self-reported knowledge and experience with the asset types as a proxy for financial literacy. We generate our financial literacy score as the average of general knowledge and general experience; hence our resulting FL score also varies between 1 and 5. We divide the dataset into five groups with equal width for FL (except the last one) which we think is more suitable than a quintiles split.[25] Figure 4.4 illustrates the results. Most people evaluate their financial literacy at about 2. 144 households have a very low score under 1.5 and only 78 households have a score higher or equal to 3. The influence of financial literacy is strongly positive for all asset types (see significance levels in Figure 4.4). Even the participation rate of unpopular asset types like bonds or federal savings bonds is increasing with higher financial literacy. In the lowest FL group, only 2.78 percent (1.39 percent) own bonds (federal savings bonds) compared to 19.23 percent (10.26 percent) in the highest FL group. The increase in savings bonds is even higher, from 2.08 percent ownership to 24.36 percent. For all asset types, the participation rate of FL group 1 is significantly lower and for group 5 significantly higher than the average, for most types, the effects are even stronger (significant results also for the other groups, see Figure 4.4). Ownership in savings accounts shows the smallest relative increase; the participation rate is over 80 percent in all FL groups; nevertheless, the participation rate increases from 82.64 to 97.44 percent.

Participation rates in the high-risk asset types also increase strongly with financial literacy. In the highest FL group, half of the households participate in the stock market, and 71.79 percent own investment funds. Groups 1 and 2 have significantly lower, and groups 4 and 5 (for investment funds also group 3) have significantly higher participation rates than average. The increase in insurance ownership is highest from group 1 to 2 (group 1 is significantly below

[25] For financial literacy we are also able to perform a reasonable quintile split (not reported) as, unlike for income and age, there is not such a strong clustering of the data at round numbers. We use this quintile split as a robustness check for our splits into classes with equal width. We essentially observe the same results, so it seems that the exact split procedure does not matter very much.

the average, groups 3 and 5 above), for real estate from group 2 to 3 (groups 1 and 2 below the average, groups 3 to 5 above).

The results are in line with the findings in the literature, evidence of the positive influence of financial literacy on the stock market participation decision is huge. For instance, Lusardi and Mitchell (2007) find a strong influence of financial literacy on stock market participation and, more generally, on the ability of planning for retirement. Malmendier and Nagel (2009) confirm a positive influence of experience of stock market returns on stock market participation. Our results are also in line with earlier German studies. For example, Boersch-Supan and Essig (2002) find a strong positive influence of education on stockholdings for German households for the years 1993 and 1998.

Cole and Shastry (2009) focus on discovering causal mechanisms. They find a positive effect for education (longer years of schooling) on FL but no significant difference whether students acquire financial literacy at school. Moreover, they find that cognitive ability is a determinant for market participation (stocks, bonds, mutual funds). It thereby seems that innate abilities are more important than acquired abilities, although both significantly affect market participation.

4.4.3 Multivariate Analyses

In the following we perform multiple regression analyses to test the persistence of the effects of marital status, age, income, and financial literacy to the inclusion of further explanatory variables.

Tables 4.4 to 4.7 show the results of logit regression analyses; the quantitative importance of each potential explanatory variable is also illustrated. We report the participation probability for a reference household (employed couple with mean characteristics in the other variables), and the change in this probability caused by a change in the respective variable (for a dummy variable from zero to one, or a one-standard-deviation change in a continuous or discrete variable). Note that the risk data in our dataset only accounts for the specific risk attitude concerning the new investment and not for the existing portfolio. Nevertheless, we use the information as a proxy for the general financial risk attitude. We think this is justifiable as the impact of the other dependent variables does not change considerably when including our risk measures in the analysis.

Table 4.4 shows the results for the two most popular asset types, savings accounts and insurance policies. As already seen in the bivariate analyses, the influence of age and income on the likelihood of owning a savings account is insignificant. Couples are more likely to have a savings account compared to single women and men. Self-employed households (dummy variable which is equal to 1 for self-employed participants, for a couple equal to 1 if at least one of the partners is self-employed) have a 19 percent lower probability of saving money in a savings account. As seen in Figure 4.4, the influence of financial literacy is positive. The influence of our risk measures is ambiguous. Participants who tolerate a higher loss over the investment period are less likely, and those who tolerate a higher loss at the end of the investment period are more likely to own a savings account. Overall, the pseudo R-squared is rather low at only 0.0517. This might be due to the fact that there is little variation in the data (more than 87 percent of subjects own a savings account). A savings account is free of costs; customers have to pay neither for the account nor for transactions.

Table 4.4: Market participation: savings account and insurance

The table reports determinants of savings account and insurance ownership (logit regressions) for all households. Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is an occupied couple with mean characteristics in the other variables. The column headed "Probability Estimates" reports the probability of participation for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

	Savings accounts				**Insurance**			
Dependant variable	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**
Female	-0.7773	-8.15%	-0.7416	-7.93%	-0.0905	-2.17%	-0.0604	-1.44%
	(0.3510)**		(0.3477)**		(0.2101)		(0.2090)	
Male	-0.6785	-7.53%	-0.6790	-7.71%	-0.3073	-7.44%	-0.2933	-7.08%
	(0.3705)*		(0.3633)*		(0.2232)		(0.2195)	
Age	0.0019	0.02%	0.0083	0.82%	-0.0244	-0.58%	-0.0233	-0.55%
	(0.0097)		(0.0095)		(0.0067)***		(0.0064)***	
Log income	-0.0098	-0.09%	-0.0075	-0.74%	0.4830	11.53%	0.4667	11.11%
	(0.2509)		(0.2462)		(0.1681)***		(0.1654)***	
Self-employed	-1.3172	-18.99%	-1.2516	-18.10%	0.6420	14.18%	0.6512	14.30%
	(0.4172)***		(0.4130)***		(0.3371)*		(0.3363)*	
Financial literacy	0.5498	5.30%	0.4894	4.84%	0.5323	12.71%	0.5458	13.00%
	(0.2151)**		(0.2091)**		(0.1370)***		(0.1345)***	
Risk1	-0.0235	-0.23%			-0.0039	-0.09%		
	(0.0082)***				(0.0064)			
Risk2	0.0518	0.50%			0.0025	0.06%		
	(0.0244)**				(0.0142)			
Observations	778		786		778		786	
Pseudo R^2	0.0517		0.0354		0.0519		0.0514	

The pseudo R-squared is also low for insurances. Age has a negative influence, which can be explained by looking at Figure 4.2: Many households with an average age over 60 years do not own insurance policies anymore as these policies have already become due. In contrast, the effect of income and self-employment is positive. This seems plausible as with higher income and self-employment, and thus more strongly varying income, there is more risk that can be insured. As with savings accounts, the effect of financial literacy is positive.

Table 4.5 shows the results for investment funds and real estate. Again, the influence of financial literacy is strongly significant. Higher income also leads to a higher probability of owning investment funds. In many cases there is a required minimum amount for the investment into investment funds. In addition, there are costs for the securities account and for transactions; it is thus usually not profitable to invest small amounts into these funds. There are no other significant variables for investment funds, which is not surprising as the asset type identifier is not very precise. Investment funds might include stocks, bonds, real estate, the money market, or even hedge funds.

Table 4.5: Market participation: investment funds and real estate

The table reports determinants of investment funds and real estate ownership (logit regressions) for all households. Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is an occupied couple with mean characteristics in the other variables. The column headed "Probability Estimates" reports the probability of participation for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

	Investment funds				**Real estate**			
Dependant variable	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**
Female	-0.0938	-2.34%	-0.0906	-2.26%	-0.7853	-18.09%	-0.7754	-17.85%
	(0.2097)		(0.2077)		(0.2481)***		(0.2452)***	
Male	-0.0432	-1.08%	-0.0381	-0.95%	-0.6739	-15.24%	-0.6810	-15.37%
	(0.2238)		(0.2187)		(0.2659)**		(0.2697)***	
Age	0.0094	0.23%	0.0070	0.18%	0.0642	1.53%	0.0670	1.60%
	(0.0066)		(0.0063)		(0.0081)***		(0.0079)***	
Log income	0.3978	9.92%	0.3623	9.04%	0.5973	14.22%	0.5930	14.11%
	(0.1680)**		(0.1642)**		(0.2039)***		(0.1988)***	
Self-employed	-0.3421	-8.41%	-0.3073	-7.57%	-0.1579	-3.70%	-0.1160	-2.73%
	(0.2925)		(0.2902)		(0.3365)		(0.3361)	
Financial literacy	0.7836	19.54%	0.8236	20.54%	1.5069	35.89%	1.4782	35.17%
	(0.1385)***		(0.1357)***		(0.1786)***		(0.1744)***	
Risk1	0.0094	0.23%			-0.0119	-0.28%		
	(0.0064)				(0.0081)			
Risk2	0.0042	0.10%			0.0353	0.84%		
	(0.0142)				(0.0170)**			
Observations	778		786		778		786	
Pseudo R^2	0.0678		0.0636		0.2892		0.2863	

Note that for real estate, we have no information in our dataset whether the households really live in their own flat or house or whether they own it for investment purposes; we nevertheless find the highest R-squared for this asset type. Couples are much more likely to own real estate than single women or men. For the reference household, a shift from couple to single woman (single man) would reduce the probability of owning real estate by 19.14 (15.37) percent. There is also a significant positive influence of age, income, and financial literacy on owning real estate.[26] These results seem plausible as a lot of people settle down and invest in real estate after having finished their education, having found a partner and planning to have a family etc. (see e.g. Diaz-Serrano (2005)). In addition, the minimum investment amount is quite high and the asset is highly illiquid compared to the other asset types. The second risk measure also turns out to have a positive influence; the existing literature, however, does not agree on this point. Housing is a long-term asset that delivers positive services to their owners (see e.g. Sinai and Souleles (2005), Pelizzon and Weber (2008)). People owning real estate can tolerate a higher loss at the end of the investment horizon because running expenses for housing are normally lower than comparable rent. However, real estate is also an illiquid asset, which might lead to higher risk aversion (see e.g. Cocco (2005), Yao and Zhang (2005)).

Table 4.6 shows the results for stocks and savings bonds. The probability of owning stocks increases with age and self-employed households are less likely to own stocks. The probability for a self-employed household is 16.47 percent lower than for an employed household. This result is consistent with the normative theory. Self-employed households normally do not have a fixed income. If income from human capital is volatile, then it is rational to hedge these deviations with the financial capital and to prefer safer investments. Oftentimes, it is also the case that the own business ties up the main part of the investable wealth. For income, we again find a positive influence. The participation in the stock market goes along with some fixed costs of information etc. that are seen as one reason for the low participation rate. Moreover, there are costs for the securities account and for the transactions. If people do not reach the critical level of income or wealth, investing in stocks is not profitable. Financial literacy also has a significant positive influence. Surprisingly we do not find an influence of the risk attitude measures, which may be due to the special context of the risk questions. Individuals were asked to provide percentages of maximum accepted loss for their concrete planned in-

[26] We do not include total wealth in the analysis because of the low data quality (many missing or incomplete observations). In case we include total wealth it is insignificant but we lose a lot of observations.

vestment, i.e. for the amount they plan to (re)invest. As stated before, this does not necessarily have to reflect the general financial risk attitude of the households.

Table 4.6: Market participation: stocks and savings bonds

The table reports determinants of stocks and savings bonds ownership (logit regressions) for all households. Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is an occupied couple with mean characteristics in the other variables. The column headed "Probability Estimates" reports the probability of participation for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

	Stocks				**Savings bonds**			
Dependant variable	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**
Female	-0.2223	-3.25%	-0.1819	-2.72%	0.0916	0.72%	0.0347	0.28%
	(0.2515)		(0.2483)		(0.3195)		(0.3162)	
Male	-0.3164	-4.46%	-0.2110	-3.09%	-0.7049	-4.80%	-0.8032	-5.45%
	(0.2663)		(0.2583)		(0.3841)*		(0.3766)*	
Age	0.0183	0.27%	0.0150	0.23%	-0.0053	-0.04%	-0.0041	-0.03%
	(0.0081)**		(0.0078)*		(0.0110)		(0.0106)	
Log income	0.4034	5.99%	0.4326	6.56%	0.3788	2.97%	0.3601	2.86%
	(0.1968)**		(0.1930)**		(0.2473)		(0.2427)	
Self-employed	-1.2105	-12.93%	-1.1292	-12.62%	-0.0534	-0.41%	-0.0987	-0.76%
	(0.4011)***		(0.3929)***		(0.4095)		(0.4064)	
Financial literacy	0.8879	13.19%	0.9461	14.35%	1.0311	8.07%	0.9524	7.56%
	(0.1525)***		(0.1496)***		(0.1870)***		(0.1810)***	
Risk1	0.0104	0.15%			-0.0078	-0.06%		
	(0.0075)				(0.0107)			
Risk2	0.0195	0.29%			-0.0116	-0.09%		
	(0.0156)				(0.0234)			
Observations	778		786		778		786	
Pseudo R^2	0.1081		0.1022		0.0878		0.0818	

Table 4.7 shows the results for the two most unpopular asset types: bonds and federal savings bonds. As for all other asset types, higher financial literacy goes hand in hand with a higher probability of owning bonds and/or federal savings bonds. For bonds, as for stocks before, the influence of age is positive and the influence of self-employment negative. As there are fixed costs for investing, it is surprising that we do not find an influence of income; this might be due to the fact that this asset class is rather unpopular and thus even many high-income households do not invest into this asset type.

For federal savings bonds, the second risk measure turns out to have a negative influence. State-issued savings bonds normally pay a lower interest rate than do industry bonds, which is compensated with a lower default risk. Moreover, federal savings bonds have no price risk

over the investment period. After a one-year holding period, they may be returned to the state at any time at a price of 100 percent.

Table 4.7: Market participation: bonds and federal savings bonds

The table reports determinants of bonds and federal savings bonds ownership (logit regressions) for all households. Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is an occupied couple with mean characteristics in the other variables. The column headed "Probability Estimates" reports the probability of participation for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

	Bonds				**Federal savings bonds**			
Dependant variable	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**	**Coefficients (Std. Errors)**	**Probability Estimates (%)**
Female	0.7210	3.19%	0.6863	3.04%	0.1904	0.44%	0.1205	0.34%
	(0.4056)*		(0.3991)*		(0.5191)		(0.5161)	
Male	0.4744	2.14%	0.4437	2.00%	-0.4821	-0.97%	-0.6595	-1.60%
	(0.4314)		(0.4207)		(0.6318)		(0.6245)	
Age	0.0439	0.18%	0.0430	0.17%	-0.0015	0.00%	-0.0015	0.00%
	(0.0126)***		(0.0122)***		(0.0177)		(0.0172)	
Log income	-0.0356	-0.14%	-0.0200	-0.17%	0.2847	0.64%	0.2049	0.57%
	(0.2860)		(0.2790)		(0.3885)		(0.3883)	
Self-employed	-1.7942	-4.02%	-1.8269	-4.08%	-0.0164	-0.04%	-0.0885	-0.24%
	(1.0853)*		(1.0893)*		(0.6887)		(0.6826)	
Financial literacy	1.0122	4.06%	1.0769	4.08%	0.8713	1.95%	0.8043	2.25%
	(0.2109)***		(0.2062)***		(0.2766)***		(0.2717)***	
Risk1	0.0029	0.01%			-0.0046	-0.01%		
	(0.0133)				(0.0175)			
Risk2	0.0271	0.11%			-0.1696	-0.38%		
	(0.0237)				(0.1014)**			
Observations	778		786		778		786	
Pseudo R^2	0.1447		0.1450		0.0794		0.0475	

To summarize, we can confirm our results from the previous bivariate analyses. Higher financial literacy leads to a higher probability of owning any particular asset type, which holds true for all eight asset types. Higher income also has a positive influence; it is significant for four asset types. Higher age leads to a higher participation for stocks, bonds, and real estate. As insurance policies mostly become due at the age of 60+, we find a decrease in participation rates for older people. For some asset types, couples have a significantly higher participation probability. Besides real estate, this is true for savings accounts and savings bonds. Self-employment decreases the probability of owning savings accounts, stocks, and bonds. Note that our results for risk tolerance are not convincing, an issue we will discuss in further detail in Section 4.5.

4.4.4 Diversification

We use two naive measures of diversification over asset types. With our data, we are not able to look at diversification within asset types. Our measures take into account the eight different asset types we have analyzed separately before: savings accounts, savings bonds, federal savings bonds, bonds, stocks, investment funds, insurance, and real estate. Naive diversification only takes into account the number of different asset types. It does not provide information on the exact securities, nor on the number of different securities or the exact quantities. Consequently, according to our measures, a household owning stocks of only one company and savings bonds is equally well diversified as a household with stocks of ten different companies and a savings account.

In the literature, there is no agreement on a single measure of diversification. There are studies that use the total number of securities in a portfolio as a measure of diversification (e.g. Blume and Friend (1975)), or others that also consider correlations among returns (e.g. Goetzmann et al. (2005)). To measure diversification over asset types, the studies oftentimes classify the assets into broader categories according to their riskiness. For instance, Eymann and Boersch-Supan (2002) look at “clearly safe”, “fairly safe”, and “risky” assets, whereas Barasinska et al. (2008) look at “safe”, “relatively risky”, and “risky” assets.

Our first measure also classifies the eight asset types into broader classes. The first measure (diversification 1) is based on four categories (risk-free assets, risky assets, insurance, and real estate). We consider savings accounts, savings bonds, and federal savings bonds as risk-free assets. There is no interest rate risk or price risk, and only a very low default risk as the financial institution or the state guarantees the returns, respectively. In contrast, stocks, bonds, and investment funds are risky assets as their prices are volatile. Even if - for bonds - a fixed interest rate is paid, the price of the bonds varies with changes in the interest level. In addition, the default risk is considerably higher than with savings accounts or (federal) savings bonds. Insurance policies constitute a special case and are thus considered as a separate investment category. A life insurance policy is a long-term contract; investors make high losses if they have to cancel the contract in the first years. The real return upon termination should be positive as insurance companies guarantee a minimum interest rate (on the contributions less charges) but, nevertheless, the expected profit participation is uncertain. We also consider real estate as a separate investment category. Besides the normal investment returns (increases in value, rental income), real estate also provides utility if the investor lives in his own house or

flat. As a robustness check, our second diversification measure (diversification 2) does not classify the asset types but considers all eight asset types separately.

Table 4.8 shows the distribution of households by the number of asset categories/types in their portfolio. Diversification 1 is measured on a scale from 0 (0 asset categories in the portfolio) to 4 (4 asset categories in the portfolio), diversification 2 on a scale from 0 to 8 (0 to 8 asset types in the portfolio). 4 percent of the households do not have any assets in their portfolio. About 16 percent hold assets of only one category in their portfolio. Most households are diversified to a certain degree with two (29 percent) or three asset categories (34 percent) in their portfolio. Only 17 percent of the households hold a fully diversified portfolio with all four categories.

The results for diversification 2 are similar. 28 percent of the households hold four or more different asset types, but keep in mind that this does not necessarily imply full diversification. 11 percent (28 percent minus 17 percent) hold four or more different asset types but these types do not cover all four asset categories.

Table 4.8: Diversification, descriptive

The table shows the distribution of households by the number of assets. Diversification 1 is based on 4 asset categories (risk-free assets, risky assets, insurance, real estate), diversification 2 is based on 8 asset types (savings accounts, savings bonds, federal savings bonds, bonds, stocks, investment funds, insurance, real estate).

	Diversification 1		**Diversification 2**	
# Assets	**# Households**	**Percentage**	**# Households**	**Percentage**
0	31	3.75%	31	3.75%
1	135	16.32%	124	14.99%
2	243	29.38%	208	25.15%
3	280	33.86%	232	28.05%
4	138	16.69%	139	16.81%
5			66	7.98%
6			21	2.54%
7			4	0.48%
8			2	0.24%
	827	100.00%	827	100.00%

Table 4.9 shows the results of an ordered logit regression analysis for diversification measures 1 and 2. The determinants of a higher diversification are similar to those of the participation decisions. Couples have better diversified portfolios compared to single households. This result is consistent with Figure 4.1 showing couples have the highest participation rate over all

asset types except bonds. Older households and those with higher income are also better diversified. The same is true for households with higher financial literacy. The results are in line with a wide variety of studies, even if those use more sophisticated diversification measures (see e.g. Goetzmann and Kumar (2008), Campbell (2006), Dorn and Huberman (2005), or Eymann and Boersch-Supan (2002)).

Table 4.9: Diversification

The table reports determinants of the diversification measures (ordered logit regressions). Diversification 1 is based on 4 asset categories (risk-free assets, risky assets, insurance, real estate), diversification 2 is based on 8 asset types (savings accounts, savings bonds, federal savings bonds, bonds, stocks, investment funds, insurance, real estate). Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Diversification 1		**Diversification 2**	
Female	-0.3650	-0.3900	-0.3293	-0.3378
	(0.1869)*	(0.1881)**	(0.1820)*	(0.1834)*
Male	-0.4902	-0.5004	-0.5979	-0.5896
	(0.1947)**	(0.1978)**	(0.1896)***	(0.1923)***
Age	0.0173	0.0160	0.0194	0.0187
	(0.0057)***	(0.0058)***	(0.0056)***	(0.0058)***
Log income	0.7221	0.7395	0.6635	0.6839
	(0.1469)***	(0.1496)***	(0.1443)***	(0.1467)***
Self-employed	-0.2631	-0.2993	-0.4476	-0.4713
	(0.2648)	(0.2654)	(0.2494)*	(0.2504)*
Financial literacy	1.4023	1.3891	1.6481	1.6273
	(0.1284)***	(0.1310)***	(0.1262)***	(0.1287)***
Risk1		-0.0049		-0.0030
		(0.0057)		(0.0056)
Risk2		0.0204		0.0153
		(0.0123)*		(0.0120)
Observations	786	778	786	778
Pseudo R^2	0.1181	0.1185	0.1196	0.1193

Self-employed households show a lower diversification only for measure 2. As self-employed households typically invest part of their wealth into the own business, this result is not surprising. We only find a weak significant influence of risk. Again we use our risk data as a proxy for the general financial risk attitude. Households tolerating a higher loss at the end of the investment period are better diversified. This result is contradictory to the classical portfolio theory: A highly risk averse household is expected to hold a highly diversified portfolio in order to minimize the variance of returns. Dorn and Huberman (2005) find evidence for this hypothesis with a German dataset. They find that investors with a greater risk tolerance hold

less diversified portfolios. Gomes and Michaelides (2005) also predict that households with low risk aversion accumulate only little wealth to buffer earnings shocks and, consequently, most of them do not invest into stocks. Households with a greater risk aversion accumulate more wealth and consequently acquire more assets. In contrast, King and Leape (1998) find that risk averse investors are less likely to invest into risky assets because they limit their portfolio to safe assets. Barasinka et al. (2008) also find that higher risk aversion does not lead to a more diversified portfolio. Campbell (2006) finds that stock market participation is a hump-shaped function of risk tolerance.

4.5 Household Portfolios and Risk Tolerance

We already mentioned that our risk measures only serve as proxies for the general financial risk attitude. Customers at the consumer center are explicitly asked about their risk preferences (tolerable loss) regarding their current investment; we thus hypothesize that the existing portfolio has an influence on the current investment decision. For instance, a household with a savings account and federal saving bonds is more likely to invest into riskier asset types than a household who already holds stocks and bonds ("diversification over asset types"). But it might also be the other way round: Some households might focus on safe asset types (see e.g. King and Leape (1998)) and thus will still show a high risk aversion even if there are already safe components in the portfolio. Likewise, those who already hold risky assets might also tolerate higher losses in the future ("constant risk tolerance"). Because of the exceptional time dimension in our dataset (existing portfolio given, risk preference questions regarding new investment) we analyze the risk preferences in further detail.

Both practitioners and researchers make use of various methods to measure individuals' risk attitudes, which can be classified in two groups - self-assessment tasks and choice tasks. Asking people to indicate their willingness to take risks on a subjective scale with a single statement (like for example "Please evaluate your investor type" or " Please state your willingness to take risks") is certainly the simplest way of eliciting risk attitudes (see e.g. Dohmen et al. (2010a)). In addition, it is possible to ask subjects multiple questions instead of just a single one and to aggregate the answers to a single risk attitude measure.

Unfortunately, there are several problems associated with these simple self-assessment tasks: First, customers might consciously or unconsciously misjudge their own willingness to take risks. Higbee (1971) shows that subjects exhibit the tendency to systematically either under-

or overestimate their aversion to risks in subjective self-assessment tasks. Analyzing data from the Socio-Economic Panel in Germany, Klos (2008) shows that subjects exhibit the tendency to choose the middle of the scale in survey questions, leading to a biased measurement of risk preferences. The fact that consumers might be prone to misjudging their willingness to take risks in financial decisions calls into question the validity and reliability of these simple self-assessment tasks. Second, some surveys use a single self-assessment question and ask clients to state how risk averse they are in a general context. Amongst others, Slovic (1972a), Weber et al. (2002), and Rettinger and Hastie (2001) illustrate that risk taking behavior is strictly domain specific. As people are not consistently risk averse or risk seeking across all domains, it is not advisable to elicit their risk attitude in a general context. Third, practitioners sometimes use self-assessment tasks with a single question to elicit both the risk attitude and the product types a client wants to invest in. These mixed tasks typically advise highly risk averse customers to invest only into risk-free assets, moderately risk averse clients to invest into risk-free assets and bonds, and customers with a very small degree of risk aversion to invest into a mix of risk-free assets, bonds, and stocks. Those investors that would like to invest in stocks automatically have to state that they are hardly risk averse at all and prefer a speculative investment strategy. This is contrary to the two-fund separation theorem (Tobin (1958)) wherein all subjects invest in a given mix of the market portfolio and a risk-free asset with the subjective risk attitude determining the exact ratio of risk-free to risky assets. Thus, while practitioners using this mixed method would advise moderately risk averse customers not to invest in stocks at all, researchers argue that these investors could be better off, i.e. earn higher returns with the same amount of risk, by investing into a mix of the market portfolio and a risk-free asset. Fourth, practitioners using questionnaires with multiple self-assessment tasks instead of a single one often combine questions asking for investment horizons, investment experience, investment goals, and risk aversion to calculate an aggregated risk attitude score. Again, the problem is that these multiple self-assessment tasks do not measure risk attitude per se but a mix of related variables. For example, a very risk averse and highly experienced customer who has excessively optimistic expectations about future stock returns might end up, according to these questionnaires, with the same portfolio as a risk loving customer who has rational expectations and no expertise in stock investments. Thus, instead of measuring individual risk preferences, these integrated methods also capture differences in beliefs and expertise.

Because of these shortcomings of self-assessment tasks, many researchers make use of more sophisticated choice tasks. The most common method used is the certainty equivalent method within the lottery domain (for an overview, see Clemen (1996)). Subjects are asked to state the sure amount that would make them indifferent between a risky lottery and a risk-free asset. In pair wise comparisons of lotteries, subjects have to repeatedly indicate their preference for one of two possible lotteries (see e.g. Holt and Laury (2002) and Klos and Weber (2003)). Closely related to these lottery tasks are choice dilemma decisions (see e.g. Kogan and Wallach (1964)). In choice dilemma decisions, subjects are asked to judge two situations that are directly related to real life decisions and to choose which of the two situations they would prefer. In addition, researchers rely on hypothetical portfolio choice questions where subjects are asked to construct a portfolio that best suits their risk-return preferences (see e.g. Dohmen et al. (2010a)). However, choice tasks have several disadvantages as well: First, the illustration of many of these tasks is not very precise, requiring people to form their own beliefs about possible outcomes of a task. Hence, it is not clear whether differences in choices stem from differences in beliefs or differences in risk attitudes. Second, most choice tasks in practice are designed as lotteries and not as financial investment decisions. Nosic and Weber (2010) show that risk attitudes inferred from abstract lottery tasks do not necessarily coincide with risk taking behavior in investment decisions. Moreover, Baucells and Villasis (2010) argue that in these lottery tasks, there is a substantial error or noise, which may disguise subjects' true preferences. To overcome some of the problems recent studies present much more complex and time-consuming risk tools that rely on a graphical representation of outcomes (see e.g. Goldstein et al. (2006)). To sum up, all different methods used to elicit risk preferences of an individual have their respective pros and cons and there is no agreement on an optimal method thus far.

The method used by the consumer center is directly related to the current investment. Furthermore, they differentiate between losses "over the investment period" and "at the end of the investment period". Consumers twice have to choose between two statements.

O The assets should at least remain constant over the investment period.

O The assets can decrease by at most xx % (worst case) over the investment period, if there is a good chance of revaluation.

Consumers can check the first statement or check and enter a percentage in the second statement. Note that entering the percentage 0 in the second statement is the equivalent of checking the first statement.

O The assets should at least have remained constant at the end of the investment period.

O The assets can have decreased by at most xx % (worst case) at the end of the investment period. I know there are investments that cannot exclude losses, but also offer the chance of higher returns.

Again consumers can check the first statement or check and enter a percentage in the second statement. The percentage 0 in the second statement is the equivalent of checking the first statement.

Note that these measures are useless from an academic point of view; they are not compatible with rational decision making. The expected utility theory models preferences about risk and return. Thus, it is not possible to obtain a utility function by asking people about tolerable losses without stating corresponding expected returns and probabilities. In the normative theory, higher returns go along with higher risk. If the expected return is 10 percent, then possibly someone can tolerate a loss of 20 percent if the probability for such a loss is 10 percent. It is not clear ex ante that this person would tolerate the same loss if the expected return was only 5 percent.

Nevertheless, the consumer center uses this more intuitive shortfall approach. Perhaps the method can at best be compared with the value function of prospect theory (see Kahneman and Tversky (1979)). If the investment amount serves as a reference point, the percentage of tolerable loss could be the asymptote for the function in the loss domain. Since all methods of eliciting risk preferences have their pros and cons, we are convinced that even the method of the consumer center may deliver further insight into risk preferences of German investors. As already mentioned, our data exhibits an exceptional time structure; we thus want to have a closer look at explanatory factors of the two measures as well as at existing differences.

As gender typically is a driving factor of risk preferences, we split the couples and differentiate between men and women in the following. This is not a problem as we typically have one female and one male observation for a couple.

Table 4.10: Risk preferences, influence of the investment horizon

Part 1 of the table reports risk preferences for women and men: risk1 (maximum percentage of loss tolerated over the investment horizon), risk2 (maximum percentage of loss tolerated at the end of the investment horizon).

Parts 2 and 3 report results of a median split according to the investment horizon. The median investment horizon is 12.125 years. The last column shows Pearson correlation coefficients between risk1 and risk2.

Risk preferences	**Obs.**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Correlation**
All observations							(Risk1-Risk2)
Women							
Risk1	597	10.82	10	13.11	0	100	0.3909
Risk2	600	2.13	0	5.60	0	50	
Men							
Risk1	495	12.95	10	14.17	0	100	0.3950
Risk2	502	2.68	0	5.97	0	40	
Investment horizon < median (12.125 years)							
Women							
Risk1	298	9.86	10	11.95	0	90	0.5045
Risk2	300	2.38	0	5.76	0	40	
Men							
Risk1	242	12.28	10	13.63	0	90	0.4267
Risk2	246	3.00	0	6.49	0	40	
Investment horizon > median (12.125 years)							
Women							
Risk1	299	11.77	10	14.12	0	100	0.3033
Risk2	300	1.88	0	5.43	0	50	
Men							
Risk1	252	13.55	10	14.68	0	100	0.3787
Risk2	255	2.38	0	5.44	0	25	

In the upper part, Table 4.10 shows the correlation for women and men between risk measures 1 and 2. The correlation between risk1 (over) and risk2 (end) is about 0.4 for both men and women - people really seem to differentiate between “over the investment period” and “at the end of the investment period”.[27] We hypothesize that the investment horizon plays an important role. For a short horizon, we expect that risk1 and risk2 move together. This seems plausible because there is no long period between beginning and end of the investment period. To test this relationship, we conduct a median split of the data. The median investment period in our sample is 12.125 years, which is quite high but not surprisingly so, as about 83 percent of the people go to the consumer center to talk about retirement provisions (see Table 4.2).

[27] Unreported Spearman rank correlation coefficients show similar results.

In the lower part, Table 4.10 shows the results for the median split. For a short (below the median) investment horizon, the tolerated risk over the investment period (risk1) is lower than for a long horizon (above the median), with 9.86 percent compared to 11.77 percent for women (difference significant at 10 percent level) and 12.28 percent compared to 13.55 percent for men. On the contrary, the accepted loss is lower for a long horizon, 1.88 percent versus 2.38 percent for woman and 2.38 percent versus 3.00 percent for men.

At first glance, the hypothesized influence of the investment horizon can be found; the correlation is higher for a short investment horizon (below the median), but the difference in correlations is only significant for women. In the following, we analyze the coherence and determining factors of risk1 and risk2 in further detail. Besides the investment horizon, we analyze demographic variables, whether it is a one-time investment or regular savings, which assets the investor already holds and the reason for the counseling interview.

Tables 4.11 and 4.12 show tobit regression analyses for risk measure 1 for women and men. The results are quite similar for women and men. In line with the literature, age has a strong negative influence on risk tolerance (see e.g. Guiso and Paiella (2008)). The older a person the lower the tolerated shortfall over the investment period. As women are on average more risk averse than men it is not surprising that men living in a relationship (married, engaged, cohabitation) are more risk averse than single men. Normally, both partners make decisions together and through the exchange of views, the partners influence each other. More surprisingly, the same is true for women, when in a relationship they are more risk averse as well. It seems that couples do not adapt their risk attitudes to their partner's but independently from gender become more risk averse. Similar effects can be found in Dohmen et al. (2010a). They control for marital status (married or not) and find that married people are more risk averse than single people. They also control for existing children and find a stronger risk aversion, however the effect of marriage is persistent even after controlling for children. Financial literacy influences the risk tolerance positively; the higher the overall literacy about asset types, the higher the accepted loss. These results are in line with the literature, (see e.g. Dohmen et al. (2010b)). We also find a positive influence of self-employment. Surprisingly, we find only a weak influence of monthly net income for men, and for women the influence is not significant. Monthly expenses do not seem to have an impact. We also controlled for total wealth but found no significant impact either. Because of many missing observations for total wealth, we excluded the variable from the further analysis. For men, we find limited evidence that the risk tolerance is higher for one-time investments compared to savings rates and also higher for

longer investment horizons. This seems plausible as for longer horizons there is also more time for a revaluation after possible losses.

Concerning the existing asset categories in the given portfolio, we find the following: If women already hold risky assets (stocks, bonds, investment funds) the risk tolerance for a new investment is higher, whereas the opposite is true for risk-free assets (savings accounts, (federal) savings bonds). The effect for risk-free assets for men is the same. The dummy for risky assets becomes significant only it we drop financial literacy, so the effect seems to be about general financial literacy and not in particular about risky assets. These results are in favor of the "constant risk tolerance hypothesis", i.e. households that already hold safe assets have a higher tendency to choose a safe investment again and, vice versa, households already holding risky assets exhibit a higher risk tolerance for the current investment again.

For women, the risk tolerance is higher when they want to save for retirement. For men, the risk tolerance is lower if they aim at receiving government aid. This might be due to the fact that government aid more concretely means to make use of the "Riester-aid" in the majority of the interviews. This aid is only granted when, among other requirements, the nominal preservation of assets is guaranteed.

We also tested the personal influence of the advisor. From 2006 to 2008, there were eight different advisors working at the consumer center. We hypothesized that the way of explaining the risk statements and the specific style of the advisor could influence the answers; however, we do not find evidence for the advisor's influence in our data. None of the advisor dummies is significant in any of the regressions we performed.

Table 4.11: Risk preference women (over the investment horizon)

The table reports determinants of the risk preference over the investment horizon (tobit regressions) for women. Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Risk1: Risk preference women (over)				
Age	-0.4922	-0.4694	-0.4476	-0.4394	-0.4174
	(0.0900)***	(0.0952)***	(0.0945)***	(0.1040)***	(0.1061)***
Couple	-5.3570	-5.0109	-4.8797	-5.4969	-5.1435
	(2.2327)**	(2.2357)**	(2.2176)**	(2.2209)**	(2.2216)**
Log income	3.2084	3.2248	3.0879	2.7403	2.6575
	(2.8333)	(2.8218)	(2.8182)	(2.9421)	(2.9376)
Log expenses	3.5316	2.6269	2.8204	3.5343	2.7451
	(2.9222)	(2.9304)	(2.8991)	(2.9206)	(2.9374)
Self-employed	4.4233	4.4166	4.8926	4.0065	3.8586
	(2.6835)*	(2.6521)*	(2.6021)*	(2.6924)	(2.6634)
Financial literacy	5.4863	4.3038		5.3543	4.2451
	(1.5295)***	(1.6498)***		(1.5259)***	(1.6498)***
One-time investment	2.1125	1.3998	1.3991	0.8743	0.5716
	(2.2265)	(2.2313)	(2.2252)	(2.3288)	(2.3290)
Investment horizon	0.0066	0.0584	0.0850	0.1560	0.1957
	(0.1431)	(0.1424)	(0.1420)	(0.1589)	(0.1589)
Risk-free assets		-4.7226	-4.7812		-5.3996
		(2.6938)*	(2.6535)*		(2.7156)**
Risky assets		6.3816	7.7586		6.1562
		(1.9488)***	(1.8862)***		(1.9274)***
Real-estate		0.4604	2.4263		0.7509
		(2.3368)	(2.2397)		(2.3434)
Insurance		1.1055	1.5904		0.5657
		(1.8681)	(1.8589)		(1.8675)
Credit		-1.7192	-1.0329		-1.4970
		(2.3434)	(2.3120)		(2.3349)
Reason retirement				5.5771	6.1113
				(2.9205)*	(2.9420)**
Reason governmental aid				-3.5377	-3.4642
				(2.1415)*	(2.1135)
Reason savings				2.1374	1.6418
				(1.9309)	(1.9195)
Reason real estate				3.7094	3.8723
				(2.2833)	(2.2781)*
Reason purchase				2.8170	2.7227
				(2.4589)	(2.4377)
Reason generate income				1.2737	0.8609
				(2.9367)	(2.9131)
Reason children				3.9964	3.4782
				(3.0605)	(3.0336)
Constant	-34.6966	-27.0505	-22.4512	-39.8212	-31.7406
	(15.9393)**	(16.3651)*	-16.1779	(16.5725)**	(16.8750)*
Observations	498	498	512	498	498
Pseudo R^2	0.0177	0.0231	0.0216	0.0221	0.0273

Table 4.12: Risk preference men (over the investment horizon)

The table reports determinants of the risk preference over the investment horizon (tobit regressions) for men. Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Risk1: Risk preference men (over)				
Age	-0.4098	-0.3971	-0.3810	-0.4116	-0.3957
	(0.0974)***	(0.1012)***	(0.1019)***	(0.1100)***	(0.1112)***
Couple	-5.8924	-5.4094	-6.8200	-4.5556	-3.9987
	(2.3929)**	(2.3859)**	(2.3972)***	(2.3955)*	(2.3897)*
Log income	5.2176	5.6405	6.2993	4.5342	5.0153
	(3.0852)*	(3.1081)*	(3.1377)**	(3.1570)	(3.1808)
Log expenses	-2.6647	-2.6803	-2.2132	-2.7021	-2.7788
	(3.0858)	(3.1017)	(3.1358)	(3.0685)	(3.0805)
Self-employed	4.7559	4.9532	4.7639	4.3955	4.5753
	(2.5641)*	(2.5724)*	(2.6022)*	(2.5708)*	(2.5805)*
Financial literacy	6.9480	7.0762		7.0410	7.3469
	(1.6585)***	(1.8233)***		(1.6634)***	(1.8158)***
One-time investment	4.2008	4.4992	5.6460	2.4199	3.0400
	(2.4563)*	(2.4950)*	(2.5008)**	(2.5839)	(2.6120)
Investment horizon	0.1504	0.1588	0.1825	0.3242	0.3239
	(0.1533)	(0.1520)	(0.1531)	(0.1733)*	(0.1720)*
Risk-free assets		-6.9773	-5.7883		-6.9548
		(3.3084)**	(3.3035)*		(3.2928)**
Risky assets		3.2109	4.7664		2.7293
		(2.1326)	(2.0937)**		(2.1195)
Real-estate		-1.8268	2.2021		-2.3361
		(2.5574)	(2.4406)		(2.5915)
Insurance		-2.3224	-2.0202		-2.6271
		(2.1356)	(2.1584)		(2.1560)
Credit		0.4962	-6.9548		1.0506
		(2.4986)	(2.5053)		(2.4806)
Reason retirement				3.9655	4.2198
				(3.0374)	(3.0288)
Reason governmental aid				-5.2352	-5.3990
				(2.3333)**	(2.3128)**
Reason savings				3.8435	3.3416
				(2.1648)*	(2.1437)
Reason real estate				2.6281	2.6174
				(2.4593)	(2.4750)
Reason purchase				2.3401	2.2532
				(2.8093)	(2.7972)
Reason generate income				0.1911	-0.1620
				(3.3479)	(3.3079)
Reason children				3.9128	4.2902
				(3.2132)	(3.2045)
Constant	-10.6927	-8.8316	-7.3205	-10.9263	-9.0163
	(17.3711)	(17.6376)	(17.8455)	(17.8240)	(17.9229)
Observations	420	420	430	420	420
Pseudo R^2	0.0190	0.0223	0.0168	0.0236	0.0269

The results for the second risk measure are not as strong as for the first. Tables 4.13 and 4.14 show the results. For women, the only weakly significant explanatory variable is marital status. Women living in a relationship are more risk averse than single women, the reason for this probably being that only about 16 percent of the women gave a percentage higher than zero; the rest chose the second statement. The variation for men is higher, with 21 percent tolerating a loss higher than zero. The results for men for the second risk measure are comparable to the results for the first one. Age and living in a relationship have a negative influence on the risk tolerance. The higher the income and financial knowledge, the higher the risk tolerance. Self-employment also has a positive influence. If men already hold risky assets classes, their risk tolerance is higher. We again find a significant effect for government aid. If men aim at receiving government aid, they are more risk averse. We also find an influence of existing credit obligations; the risk tolerance is higher if credit obligations exist. We only considered obligations that exceed three times the monthly net income to exclude short-term account overcheckings. At first glance, this might be surprising, as with further obligations one would expect a higher risk aversion. But on closer inspection, this finding is in line with the literature on borrowing. Dahlbaeck (1991) shows that people with a greater risk aversion show a lower willingness to use credit. Individuals with debts accept a greater economic risk because debts go along with costs in the form of interest and repayments that decrease the liquid assets. Moreover, apart from these future financial restrictions, there are also psychological costs of credit use. Livingstone and Lunt (1993) find that people have different psychological attitudes toward debts. Some see debts as a part of everyday life; others see it as a failure. Brown et al. (2005) analyze the relation between credit and psychological well-being and find that households with greater outstanding (non-mortgage) credit are less likely to report total psychological well-being.

Table 4.13: Risk preference women (at the end of the investment horizon)

The table reports determinants of the risk preference at the end of the investment horizon (tobit regressions) for women. Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Risk2: Risk preference women (end)				
Age	0.1074	0.0447	0.0436	0.1142	0.0634
	(0.1434)	(0.1537)	(0.1511)	(0.1676)	(0.1727)
Couple	-5.5015	-6.3470	-7.0947	-5.5644	0.0634
	(3.6796)	(3.7241)*	(3.6551)*	(3.6604)	(3.7054)*
Log income	4.1078	3.0178	2.8129	2.8898	1.6496
	(4.4479)	(4.4718)	(4.4102)	(4.7107)	(4.7608)
Log expenses	2.2046	1.6255	1.9641	2.0180	1.5581
	(4.5897)	(4.6507)	(4.5565)	(4.6115)	(4.6886)
Self-employed	1.8474	2.0490	2.5091	1.8536	2.1137
	(4.3543)	(4.3423)	(4.2065)	(4.3543)	(4.3504)
Financial literacy	1.6043	-0.5332		1.6133	-0.5723
	(2.4415)	(2.6889)		(2.4345)	(2.6855)
One-time investment	-0.1418	0.3349	0.3185	-0.8298	-0.4236
	(3.6464)	(3.6584)	(3.6003)	(3.8439)	(3.8581)
Investment horizon	-0.1225	-0.0517	-0.0471	0.0068	0.1151
	(0.2385)	(0.2399)	(0.2365)	(0.2647)	(0.2679)
Risk-free assets		0.0961	0.6248		0.4570
		(4.5920)	(4.5148)		(4.6483)
Risky assets		2.8180	2.9052		2.5335
		(3.2591)	(3.0965)		(3.2289)
Real-estate		5.3188	5.6311		5.3158
		(3.8006)	(3.6032)		(3.8369)
Insurance		0.1057	0.0882		0.1234
		(3.1364)	(3.0819)		(3.1456)
Credit		2.8964	3.0526		3.3811
		(3.7288)	(3.6324)		(3.7296)
Reason retirement				0.8545	0.2803
				(4.5427)	(4.6100)
Reason governmental aid				-4.6283	-4.8341
				(3.5145)	(3.5087)
Reason savings				-0.0058	0.7414
				(3.1619)	(3.1917)
Reason real estate				2.0728	2.3425
				(3.7754)	(3.7889)
Reason purchase				0.5289	1.3966
				(4.0527)	(4.0798)
Reason generate income				-2.1337	-3.0894
				(4.7384)	(4.7656)
Reason children				6.7252	6.0798
				(4.6953)	(4.7020)
Constant	-74.5280	-59.9997	-62.3511	-64.0260	-50.1450
	(26.0960)***	(26.8644)**	(26.3694)**	(27.0549)**	(27.6990)*
Observations	501	501	515	501	501
Pseudo R^2	0.0073	0.0116	0.0135	0.0118	0.0163

Table 4.14: Risk preference men (at the end of the investment horizon)

The table reports determinants of the risk preference at the end of the investment horizon (tobit regressions) for men. Standard errors are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

	Risk2: Risk preference men (end)				
Age	-0.1783	-0.2111	-0.1992	-0.2797	-0.2938
	(0.1279)	(0.1326)	(0.1307)	(0.1425)**	(0.1451)**
Couple	-7.6394	-7.8439	-8.0937	-5.7991	-5.8840
	(3.1318)**	(3.1343)**	(3.0740)***	(3.0877)*	(3.0965)*
Log income	7.2210	5.5237	6.2348	7.9033	6.1318
	(3.9305)*	(3.9102)	(3.8669)	(3.9956)**	(3.9877)
Log expenses	-2.1463	-1.4633	-1.1824	-2.8616	-2.1899
	(3.7989)	(3.7811)	(3.7416)	(3.7270)	(3.7204)
Self-employed	4.8421	5.5013	5.7492	5.0762	5.6161
	(3.2838)	(3.3138)*	(3.2635)*	(3.2602)	(3.2981)*
Financial literacy	4.1214	1.7484		4.1022	2.0614
	(2.1268)*	(2.3416)		(2.1003)*	(2.3055)
One-time investment	3.3187	4.1664	4.3228	1.2521	2.3822
	(3.2142)	(3.2478)	(3.1805)	(3.3558)	(3.3841)
Investment horizon	-0.2920	-0.2294	-0.1572	-0.0229	0.0415
	(0.2075)	(0.2047)	(0.1999)	(0.2265)	(0.2249)
Risk-free assets		3.5950	4.5737		3.8067
		(4.7188)	(4.6796)		(4.7183)
Risky assets		5.4359	5.9415		4.2481
		(2.8576)*	(2.7549)**		(2.8080)
Real-estate		1.8116	3.4713		1.1802
		(3.3344)	(3.0961)		(3.3480)
Insurance		-1.6690	-1.4569		-1.4318
		(2.8545)	(2.8307)		(2.8691)
Credit		6.4894	6.1232		7.0180
		(3.1319)**	(3.0603)**		(3.0870)**
Reason retirement				-3.5552	-2.9266
				(3.7265)	(3.7043)
Reason governmental aid				-6.3669	-6.3413
				(3.0422)**	(3.0194)**
Reason savings				2.8553	2.9658
				(2.7886)	(2.7693)
Reason real estate				3.2919	3.6422
				(3.0821)	(3.0944)
Reason purchase				0.5602	1.1044
				(3.5042)	(3.5073)
Reason generate income				3.8079	3.0385
				(4.2043)	(4.1959)
Reason children				6.3828	6.1378
				(3.9332)	(3.9051)
Constant	-51.9895	-46.4071	-53.6841	-47.9702	-43.6220
	(22.6727)**	(23.0017)**	(22.9383)**	(22.8723)**	(23.1111)*
Observations	426	426	437	426	426
Pseudo R^2	0.0214	0.0301	0.0295	0.0334	0.0415

4.6 Conclusion

This chapter adds to the literature by introducing a new dataset about German household portfolios. So far, there is little empirical evidence for Germany. We analyze a unique dataset from the consumer center Baden-Wuerttemberg that stems from counseling interviews.

Firstly, this dataset allows us to examine the determinants of asking for advice. We compare our dataset to the German population and to similar datasets. We confirm the results from Bluethgen et al. (2008) who find that people looking for advice are on average older and more likely to be female. Concerning income, our dataset is representative for the German population.

Concerning asset allocation, the results for Germany are in line with international datasets. In terms of participation rates, safe investments with banks, especially savings accounts, still play the most important role in private household portfolios, with more than 80 percent of the households owning at least one. About 60 percent hold some form of life insurance and about 40 percent own real estate. The participation rate in the stock market is about 20 percent and about 45 percent hold investment funds. These participation rates are fairly high compared to the entire German population, with only about 5.5 percent holding stocks and about 10.1 percent holding investment funds.[28] This is characteristic for our dataset. We only observe households that solicit investment advice at the consumer center. This requires a certain interest in financial affairs, which goes along with higher financial knowledge or literacy. Numerous studies confirm a positive influence of financial literacy on participation in risky markets. Moreover, Van Rooij et al. (2007) find that people with high financial literacy are more likely to read newspapers, magazines, books, and to rely on financial advisors.

We perform bivariate analyses for prominent determinants. Participation in different asset types is influenced by marital status, except for very unpopular asset types. Compared to singles, couples more often own savings accounts, insurances, investment funds, real estate, stocks, and savings bonds. The same is true for single men compared to single women (except for savings bonds). For age, we find a positive influence on participation rates for several asset types, except for the oldest group over or equal to 60. This decrease in the oldest group is especially strong for insurances, which however is to be expected as at age 60+, an increasing share of contracts becomes due. In general, the age results are to be interpreted carefully as

[28] See Deutsches Aktieninstitut (2009).

we are not able to differentiate between age and cohort effects. Except for unpopular asset types, income is also a determinant for participation rates. The higher the income, the higher the participation rate. This is especially true for the asset types real estate, stocks, bonds, and investment funds that typically require a minimum investment amount. We do not include total wealth in our analysis because of the low data quality (many missing or incomplete observations). The clearest determinant for participation in asset markets in our dataset is financial literacy (FL) which we measure by knowledge and experience over all asset types. We find increasing participation rates over all asset types; the highest FL group permanently shows the highest participation.

The results from the bivariate analyses are confirmed by multivariate logit regression analyses for all asset types. Higher FL leads to a higher probability of holding an asset for all eight asset types. The influence of income, age, and living as a couple also remains significant for some asset types. The negative influence of age on the participation rate for insurance policies is also confirmed. Moreover, we find lower participation rates for self-employed households for savings accounts, stocks, and bonds.

Most households hold two or three different asset types in their portfolio. The determinants for diversification are similar to our previous results: couples, older, high-income, and employed households on average hold better diversified portfolios compared to singles, young, low-income, and self-employed households.

Our results about household portfolios are broadly in line with international findings as well as with earlier studies of German household portfolios. So far most evidence exists for U.S. households (see e.g. Bertaut and Starr-McCluer (2002), Campbell (2006), or Cole and Shastry (2009)). For non-U.S. countries, see e.g. Calvet et al. (2007), Guiso and Jappelli (2002), or Iwaisako (2003). The (so far) sparse evidence for German households (see e.g. Boersch-Supan and Essig (2002), Eymann and Boersch-Supan (2002), or Sommer (2005)) is extended by our study.

Chapter 5

The Willingness to Follow Financial Advice

5.1 Introduction

Taking advice is a central component of our lives. When making decisions we oftentimes ask for advice, e.g. to improve the quality of our decisions or to share responsibility (see e.g. Harvey and Fischer (1997)). Favored advisors are normally those with higher knowledge of the decision domain, e.g. a doctor is consulted for a medical problem or an accountant for the tax return. In this chapter, we concentrate on advice in the financial domain. Financial assets of private households are increasing[29]; people have to save for old age on their own responsibility. In addition, people face a huge range of complex financial products and services including governmental aid programs (e.g. the German "Riesterfoerderung"). Further complicating the decision problem, private households have a low financial literacy on average (see e.g. Cole and Shastry (2009) or Lusardi and Mitchell (2006)); it is thus not surprising that the demand for financial advice is high. More than 60 percent of U.S. private investors rely on professional investment advice as well as about 70 percent of Italian and more than 80 percent of German investors consult an advisor before making an investment decision (see e.g. Allen (2001), Guiso and Jappelli (2007), and Bluethgen et al. (2008)).

Regulation for investment services aims for an improvement of the quality of financial advice. The Markets in Financial Instruments Directive (MiFID) by the European Parliament and the

[29] See German Federal Bank, Time series CEB00I: Financial assets D: Total C: Private Households.

European Council (2004 and 2006) requires firms performing investment services and activities to elicit their customers' financial situation (e.g. the purpose of the investment, risk preferences) to guarantee the appropriateness of any investment advice (see Article 35 of the MiFID). In addition, the customer has to be made aware of any conflicts of interest, e.g. commissions paid by product providers. In spite of the ongoing regulation, consumerists regularly complain about bad investment advice. For example, in 2009, Stiftung Warentest (a German test facility founded by the parliament) tested financial advisors, with a disappointing result: only three out of 21 banks received the mark "satisfactory" (the German mark 3 on a scale from 1 to 6), two the mark "poor" (5). The remaining 16 banks received the mark "adequate" (4). Stiftung Warentest reports that the banks fail to offer really safe investments such as government bonds. In general, bad investment advice may have several reasons, e.g. missing expertise of the advisor or missing incentives to provide good advice. A prominent subject of critique in Europe is the prevalence of commission-based advice. This leads to a conflict of interest between investor and advisor. Low-cost products, such as exchange-traded funds, are rarely offered to investors because these low-margin products do not pay a commission to distributors (see e.g. Dale (2009)).

But besides this (admittedly important) problem of bad investment advice, the government, consumerists, and others do not pay much attention to another fundamental problem, namely the general acceptance of advice. This is a crucial factor, as the best advice and therefore further regulation is useless if investors are not willing to follow the advice that they are given.

We try to close this gap by analyzing a dataset about real financial decisions. We make use of data from counseling interviews by the consumer center Baden-Wuerttemberg (Verbraucherzentrale Baden-Wuerttemberg e. V.) plus an additional questionnaire to identify determinants of the acceptance of financial advice. All of our questionnaire participants had a counseling interview at the consumer center concerning financial investments and retirement provisions. After the interview, the clients receive a written recommendation consisting of one or more pieces of advice. Subsequently, they are left on their own to implement the strategy, i.e. to choose the concrete products. This is different from a traditional counseling interview at a bank where the advice and the purchase of a product are provided hand in hand. For our analysis we make use of the exceptional structure at the consumer center: in the questionnaire, we present respondents with the recommendation from the previous interviews and ask them whether they implemented the recommended strategy from the consumer center or not. This dataset makes our study quite unique as most existing studies in this domain make use of ex-

perimental data to test the acceptance of advice in a controlled artificial environment (see e.g. Schotter and Sopher (2007) or Van Swol and Sniezek (2005)).

We hypothesize that several factors influence the willingness to follow advice. We analyze person-related attributes of the household making the decision as well as of the advisor. We hypothesize that higher satisfaction with the advisor and the counseling interview increases the willingness to accept advice. As women, older people as well as people with a higher risk aversion are more likely to ask for advice, it might be that they also have a higher willingness to accept advice.

Aside from person-related attributes we investigate the household's motivation of asking for advice. For instance, we hypothesize that a concrete existing problem increases the willingness to follow advice in contrast to a general need for information. Moreover, we investigate option-related attributes. Option-related attributes are those attributes concerning the advice itself, e.g. the investment amount, the specific asset type, and the number of alternatives.

Our main findings in this chapter are as follows. We find that characteristics of the advisor (satisfaction with the advisor and the interview) influence the willingness to follow advice. Here, the likability of the advisor seems to be as important as his expertise. Person-related attributes of the decision maker are of only low significance. Moreover, the original motivation of asking for advice (concrete problem versus general need for information) plays a role. An already existing own investment strategy decreases the willingness to follow advice. We also find that the specific asset type considerably influences the probability of acceptance. Pieces of advice about call money, "Riester" savings plans, or insurance contracts are more likely to be followed. On the contrary, advice related to bonds or bond funds is less likely to be followed. In addition, one-time investments have a higher probability of implementation compared to regular savings plans. Our results partly confirm theoretical predictions and experimental results. To our best knowledge, our study is the first one analyzing a dataset about real financial decisions. Thus, we are able to provide new insights into real world decision making.

The remainder of this chapter is organized as follows: First, we give an overview of the related literature and present our hypotheses in detail in Section 5.2. Section 5.3 describes our dataset as well as the design of the questionnaire. In addition, we give some descriptive statistics of our sample and compare the completed questionnaires with the primary dataset. Re-

sults of our analysis are presented in Section 5.4. Section 5.5 deals with the robustness of the results. Section 5.6 concludes.

5.2 Related Literature and Hypotheses

While there is ample theoretical and experimental literature about the determinants of acceptance of advice, empirical studies in this field are certainly rare. In the general model of Jungermann (1999), the utilization of advice depends on the one hand on person-related attributes, i.e. confidence in the own judgment and the subjective credibility of the advisor, and on the other hand on option-related attributes, i.e. on the assessment of the quality of advice by both the advisor and the decision maker. Harvey et al. (2000) tested the model of Jungermann (1999) with the help of two experimental settings. The results support the predictions from Jungermann. The use of advice is influenced by the own knowledge and by the perceived expertise of the advisor (which is also confirmed by Harvey and Fischer (1997)). In addition, the willingness to accept advice depends on the assessed quality of the advice by the advisor and by the decision maker. Kohlert's (2009) description of general determinants in a decision process is similar to Jungermann's model. Kohlert differentiates between personal and situational determinants, where personal determinants include the individual character of a person, the individual situation, and the social environment, whereas situational determinants include the complexity of a decision situation and the presentation format. The model by Ottaviani (2000) explicitly considers financial advice. In his model, the acceptance of advice depends on whether the decision maker knows about the advisor's objectives and the involved conflict of interest. The advisor possesses private information; he has two objectives, a professional (providing good advice) and a partisan objective (e.g. commissions paid by product providers). The client is uninformed and either naive or rational: A naive decision maker blindly follows the advisor's recommendation (delegation) whereas a rational decision maker is aware of the objectives of the advisor and thus designs a subset of possible actions to constrain the advisor's action (constraint delegation).

Cain et al. (2005) experimentally analyze the effects of disclosing conflicts of interest to the decision maker. They find that decision makers do not care enough about conflicts of interest, in the sense that when receiving biased advice, they do not discount it as much as they should. Moreover, they show that the disclosure of a conflict of interest even increases the bias in

advice: in contrast to a situation with an undisclosed conflict of interest, advisors seem to feel morally licensed to exaggerate even further because the decision maker knows the conflict.

In an experiment with multiple choice items on computer knowledge and operations, Van Swol and Sniezek (2005) find that the only significant predictor whether the decision matches the advisor‘s advice is the confidence of the advisor. All other tested factors (decision maker’s trust in the advisor, advisor accuracy, decision maker’s prior relationship with the advisor, and the power of the decision maker to set payment to the advisor) were insignificant.

Receiving advice often exposes the decision maker to a potential conflict, namely having to combine several opinions - the received advice and the own initial opinion. In laboratory studies, Gardner and Berry (1995), Harvey and Fischer (1997), and Yaniv and Kleinberger (2000) find that people tend to overvalue their own opinion and to discount advice from other sources, although they would have been better of using the advice appropriately. People with higher knowledge discount the advice more than those with lower knowledge. In addition, the weighting of advice from others decreases with the distance from the own opinion (Yaniv (2004)). The overvaluation of the own opinion or signal seems to be quite robust.[30] The same overweighting of the own opinion can also be found when multiple pieces of advice exist (Yaniv and Milyavsky (2007)). Weizsaecker (2008) does a meta-analysis of 13 cascade game experiments and finds similar results. The players only follow others and thereby contradict their own signals if the probability of the own signal being wrong is significant.

Gino and More (2007) examine in two studies the impact of task difficulty on the tendency to follow advice. They find that people tend to underweight advice only in easy tasks; in contrast, they tend to overweight advice if the task is difficult.

In experiments the advice is generally provided for free. Outside the laboratory, how ever, this is oftentimes different. Bogle (2007) finds that people pay high fees to professional investors, even if the stock market can hardly be predicted (see e.g. Malkiel (1995, 2003b)). Based on professional advice people also invest into mutual funds (Freeman and Brown (2001), Freeman et al. (2008)), even if they would be better off buying broad index funds tracking the overall market (see e.g. Gruber (1996), Griese and Kempf (2003), or Malkiel (2003a)).

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[30] Also see the vast literature about overconfidence, e.g. Svenson (1981), Lichtenstein et al. (1982), or Glaser et al. (2005).

Gino (2008) explicitly looks at the influence of costs for advice. She finds that paid-for advice is used to a greater extent than free advice. Gino ascribes this effect to the same psychological forces that describe the sunk costs fallacy (see e.g. Knox and Inkster (1968) or Arkes and Blumer (1985)).

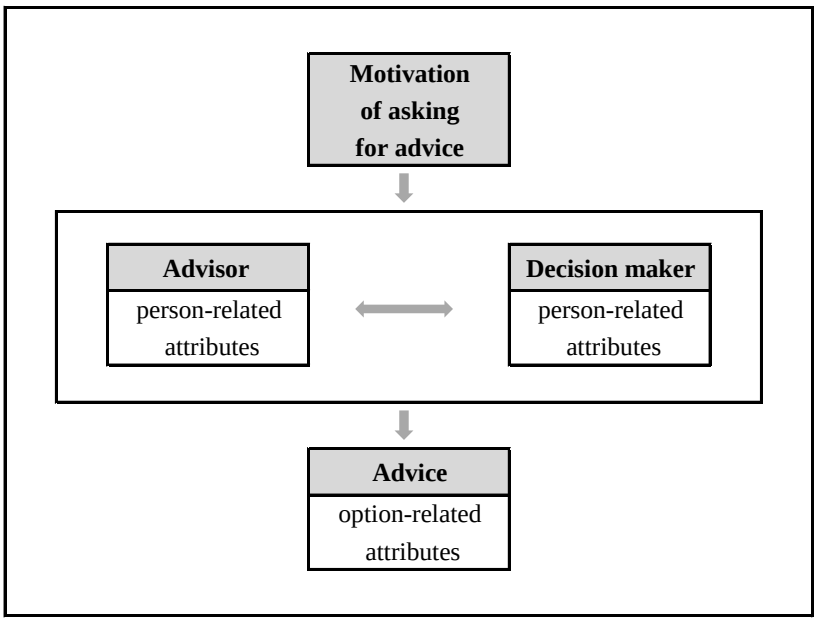
Empirical evidence on the acceptance of advice is quite rare. Feng and MacGeorge (2006) investigate the receptiveness to advice (the extent to which the advice recipient is willing to receive advice, see e.g. Goldsmith and Fitch (1997), MacGeorge et al. (2004)) with the help of questionnaire data. Participants report about receiving advice regarding a personal problem. Feng and MacGeorge find that closeness of the advisor to the recipient has the strongest impact. In addition, expertise and expressivity of the advisor influence the receptiveness, and women are more receptive to advice than men.

We expect to find some of the above results in our dataset. The consumer center Baden-Wuerttemberg offers advice regarding financial investments and retirement provisions, and our data set covers these interviews from 2006 to 2008. After the interview, the clients receive a written recommendation consisting of one or more pieces of advice; for instance, one piece of advice could be: “Open a call money account with 50,000 Euro”. As the consumer center is not a bank, it is not possible for the households to directly implement the recommendation. In addition, the consumer center does not recommend specific products but only asset types; following the interview, the households are left on their own to implement the suggested strategy. As assistance, households are provided with the latest test results relating to the recommended asset type from newspapers or similar sources.

In addition to the interview data, we have data from a questionnaire study. In the questionnaire, we ask people about their financial decisions after the interview with the consumer center. We explicitly state the recommendation given by the consumer center and ask the households whether they followed the advice for each individual element or not. Thus, all households in our sample are advised because they all previously had a counseling interview at the consumer center.

In contrast to the laboratory, in a real decision situation it is not possible to isolate one factor that might influence the willingness to accept advice; we instead test multiple determinants.

Figure 5.1: Potential determinants of the willingness to follow advice



The different potential determinants are summarized in Figure 5.1. Following the model of Jungermann (1999), we consider person-related as well as option-related attributes. Concerning the person-related attributes, we analyze characteristics of the decision maker (gender, financial knowledge, risk tolerance etc.) as well as characteristics of the advisor (expertise, reliability, likability etc.). The characteristics of the advisor (likability, expertise, reliability, and confidence) and the interview atmosphere (satisfaction, time for questions, consideration of the individual situation, and understandability of explanations) should have an influence on the willingness to follow the advice. The higher the satisfaction, expertise etc., the higher the willingness to follow the advice should be. In contrast, we hypothesize that higher own competence of the decision maker should decrease the willingness to listen to an advisor. Being female, older, and more risk averse could increase the willingness to accept advice, as women, older, and more risk averse people more often take the necessary first step, i.e. ask for advice.

Additionally, we consider the household's initial motivation of asking for advice. A concrete problem as the motivation to ask for advice, e.g. what to do with an inheritance, is hypothesized to increase the willingness to accept advice in contrast to a general information need. Furthermore, we hypothesize that an already existing own investment strategy decreases the willingness to follow the advice as this implies a deviation from the own strategy.

Finally, we investigate the option, i.e. the advice itself. We hypothesize that a higher complexity (e.g. exchange-traded fund compared to call money) decreases the willingness to follow advice. Sometimes, the consumer center provides alternative pieces of advice. Naturally, this should lead to a lower acceptance rate of any single piece of advice. We also asked the participants whether they consulted another advisor since the interview with the consumer center. We hypothesize that the consultation of another advisor decreases the willingness to follow the initial advice by the consumer center.

We expect to find confirmative evidence for some effects that have been found in the lab before. Furthermore, as to our best knowledge, there is no study comparable to our analysis; we also hope to provide new insights into the process of financial decision making with advice.

We do not consider the potential influence of conflicts of interest between the decision maker and the advisor at the consumer center as the typical conflict is not given here. The counseling interview costs 140 Euro and lasts approximately two hours. The consumer center does not sell the recommended products; this means there is no conflict of interest through commissions paid by product providers and we thus assume the advisor to act in the best interest of the household asking for advice.

As all households paid a fixed fee, we are not in a position to study the difference between paying and not paying for advice. Instead, we think that in principle the willingness to follow advice must exist for otherwise people would not be prepared to pay 140 Euro for it.

5.3 Dataset and Descriptive Statistics

5.3.1 Dataset

The Federation of German Consumer Organisations is the umbrella organisation of consumer centers. Member organisations include the consumer centers in the 16 federal states and 25 other associations dealing with consumer policy. The consumer centers exist in all German federal states and deal with all kinds of consumer affairs. They are non-profit organisations whose work is supported by federal state funding, municipal, and district support for the individual advice centers and by project funding from the national government.

Our basic dataset is provided by the consumer center Baden-Wuerttemberg e. V. In the financial sector, the consumer center Baden-Wuerttemberg offers general insurance advice, con-

struction loan advice, and a general counseling interview dealing with financial investments and old-age provisions. We use written protocols of these interviews to generate the basic dataset. For a detailed description of the dataset and the role of the consumer centers in Germany, see Section 4.3. At the end of the interview, the household receives the protocol, which includes a recommendation of an investment strategy. The proposal specifies the asset types, e.g. call money or federal savings bonds, investment amounts, and further notes if necessary. In addition, the households are provided with the latest test results relating to the recommended asset types from (for example) "Finanztest" or other journals. After the interview, the households are left on their own concerning the responsibility of implementing the strategy. This procedure is different from a typical counseling interview at a bank. During the interview, the bank normally offers its products directly and thus advice might coincide with a purchasing decision. The clear separation of advice at the consumer center and the later purchase of the assets somewhere else afford us a unique opportunity. We use the recommended strategy by the consumer center to set up a personalized questionnaire.

Because of data privacy reasons, we could not match the basic original dataset to the responses of the questionnaire and we thus also have to elicit personal data within the questionnaire. It is organized as follows: In Part A of the questionnaire, we are interested in the general reasons for the interview and for the choice of the consumer center. Second, we elicit the satisfaction with the interview and the advisor with the help of several items. Moreover, we ask households about the (perceived) benefits of the interview. For comparison, we also ask if the household had a second interview with another advisor since the one with the consumer center. For the satisfaction and benefit questions, we use a 7-point Likert scale with appropriate endpoints in each case (see Appendix A).[31] In Part B, we collect data about gender, age, education, income, financial knowledge, risk tolerance[32], and investor type. We also ask for overconfidence, i.e. we include one question for "better-than-average" and one for "miscalibration" (for the different forms of overconfidence see e.g. Svenson (1981), Lichtenstein et al. (1982), or Glaser et al. (2005)).

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[31] Amongst others Weng (2004), Preston and Colman (2000), and Cicchetti et al. (1985) show that reliability, validity, and discriminating power increases up to 7-point scales. After that additional effects can hardly be observed. In addition, too many scales might overburden subjects (see Viswanathan et al. (2004)).

[32] We use a single self-assessment question to elicit the risk attitude. Amongst others Nosic and Weber (2010), Kapteyn and Teppa (2002), and Weber and Hsee (1998) show that intuitive subjective risk measures are better able to explain risk taking behavior (e.g. portfolio choices) than objective measures such as historical volatilities or more sophisticated measures such as lottery questions.

Part C includes the recommended investment strategy. We ask whether the households totally, partly, or not at all followed the advice provided by the consumer center. Moreover, we ask for the reason(s) not to follow the advice and offer room for suggestions on how to improve the advice offer of the consumer center. See Appendix A for the complete questionnaire.

From the consumer center we received protocols from 824 interviews, which took place from 2006 to 2008. Address data was available for 779 households. Of these 779 households, 212 returned the questionnaire to the consumer center, yielding a return rate of 27.21 percent. This rate is surprisingly high as we did not pay the participants but only included a prepaid envelope and information about the financial crisis as a little “thank-you” for filling in and returning the questionnaire.

5.3.2 Descriptive Statistics

Table 5.1 shows descriptive statistics of our dataset. Out dataset consists of 212 household observations; to be more precise, we have interview notes from 94 women, 47 men, 70 couples, and one observation with missing gender. The mean age in our sample is 46.62 years (median 45 years). The age of a couple is determined as the average of both partners. If we count every individual (regardless of marital status) the mean age is 46.72 (median 45). This composition is not unusual for an advised sample. All households in our sample are advised because questionnaires were sent only to those who previously had a counseling interview at the consumer center. Bluethgen et al. (2008) study a dataset with advised and non-advised individuals from a large German retail bank. They find that advised clients tend to be older, wealthier, more risk averse, and more likely to be female.

Income (gross income per year) is divided into 5 categories, with 1: less than 25,000 Euro, 2: between 25,000 and 50,000 Euro, 3: between 50,000 and 75,000 Euro, 4: between 75,000 and 100,000 Euro, and 5: more than 100,000 Euro. The mean income category for single women is 2.09 and for men it is 2.52. Naturally, couples have a higher household income with a mean of 3.15.

Table 5.1: Descriptive statistics

The table reports descriptive statistics of our dataset. We report age, income class (scale from 1 (lowest) to 5 (highest), with 1: less than 25,000 Euro, 2: between 25,000 and 50,000 Euro, 3: between 50,000 and 75,000 Euro, 4: between 75,000 and 100,000 Euro, and 5: more than 100,000 Euro), education class (scale from 1 (lowest) to 6 (highest), with 1: still in school, 2: Hauptschul-graduation (Lower secondary education), 3: Realschul-graduation (Intermediate secondary education), 4: Abitur (University qualification exam), 5: University degree, and 6: Doctorate degree), financial knowledge (scale from 1 (very low) to 7 (very high)), and financial risk tolerance (scale from 1 (very low) to 7 (very high)) for single women, single men, couples, and for all households together.

	Obs.	Mean	Median	Std.Dev.	Min.	Max.
Women						
Age	93	47.58	48	11.69	21	75
Income class	88	2.09	2	0.87	1	5
Education	93	4.31	5	0.97	2	6
Fin. knowledge	94	4.08	4	1.24	1	6
Risk tolerance	94	2.28	2	1.12	1	5
Men						
Age	46	44.07	43	13.58	21	75
Income class	43	2.51	2	1.10	1	5
Education	47	4.64	5	1.07	1	6
Fin. knowledge	47	4.88	5	1.06	1	7
Risk tolerance	47	3.36	3	1.58	1	7
Couples						
Age	68	47.03	42.75	13.50	26	75
Income class	65	3.15	3	1.08	1	5
Education	69	4.45	5	1.02	2	6
Fin. knowledge	70	4.41	5	0.91	2	6
Risk tolerance	70	2.73	2	1.52	1	6
Other						
Age	0	.	.	.	.	.
Income class	0	.	.	.	.	.
Education	1	3.00	3	.	3	3
Fin. knowledge	1	5.00	5	.	5	5
Risk tolerance	1	1.00	1	.	1	1
Total						
Age	207	46.62	45	12.75	21	75
Income class	196	2.54	2	1.09	1	5
Education	210	4.42	5	1.01	1	6
Fin. knowledge	212	4.37	5	1.14	1	7
Risk tolerance	212	2.66	2	1.43	1	7

Education is divided into 6 categories, with 1: still in school, 2: Hauptschul-graduation (lower secondary education), 3: Realschul-graduation (intermediate secondary education), 4: Abitur (university qualification exam), 5: University degree, and 6: Doctorate degree. Our participants are highly educated; the median household holds a university degree. Women state a mean financial knowledge of 4.08 (on a scale from 1 (very bad) to 7 (very good)), men of 4.88. Couples lie in between with a mean of 4.41. These relatively high means for education

and knowledge can again be explained by the fact that our sample is advised. Van Rooij et al. (2007) find that financial literacy has an influence on the preferred source of financial advice: people with low financial literacy are more likely to consult family and friends in contrast to those with high financial literacy who are more likely to read newspapers, magazines, books, and rely on financial advisors. A two-hour interview at the consumer center costs 140 Euro; in two experiments Godek and Murray (2008) analyze the willingness to pay for advice and find that people who process information rationally (in contrast to processing information experientially) are willing to pay substantially more for advice.

In line with the literature (e.g. see Dohmen et al. (2010a), Weber et al. (2002), or for a meta-analysis Byrnes et al. (1999)) women state a lower risk tolerance (mean of 2.28 on a scale from 1 (very low) to 7 (very high)) than men (mean of 3.36); couples again lie in between (mean of 2.73).

As stated before, we could not match the questionnaire data with the original dataset. Nevertheless, the observations vary in the recommended asset types, amounts, and notes, which we included from the original dataset, thereby enabling us to identify 207 of the 212 returned questionnaires. We do not use this information to match the dataset but for a small check if our dataset might be biased. We create a dummy variable in the original dataset that takes the value one if the household subsequently participates in the questionnaire analysis.

Table 5.2: Comparison of groups

The table compares descriptive statistics of the original dataset for two groups, those who returned the questionnaire (Questionnaire +) and those who did not (Questionnaire -). Age is measured in years, monthly income and expenditures in Euro. Risk1 (risk2) is the maximum loss in percent of the investment amount that could be tolerated over (at the end of) the investment period. Financial knowledge and experience are measured on a scale from 1 (very low) to 5 (very high). The last column states z-statistics of the Wilcoxon rank-sum (Mann-Whitney) test.

	Questionnaire -	**Questionnaire +**	**Wilcoxon rank-sum test z-value**
Observations	620	207	
Age	45.03	45.49	-0.423
Risk1	12.12	11.81	-0.133
Risk2	2.45	2.70	-1.229
Income	2803.66	2960.78	-0.511
Expenditures	2081.12	2192.38	0.189
Financial knowledge	2.06	2.15	-1.423
Financial experience	1.99	2.12	-2.309

About 27 percent of the women returned the questionnaire, compared to about 24 percent of the men and couples. When comparing these figures to our questionnaire data (94 women, 47 men, 70 couples) we conclude that there must be some women who were part of a couple in the original dataset but responded as single women. There are several possible explanations for this; perhaps the couple has since separated or the women simply filled in the questionnaire on her own. Overall, the proportions of returned questionnaires are similar for women, men, and couples and the proportions of the whole sample compared to the subsamples are not significantly different either.

In addition, we find no differences in age, monthly income, expenses, or risk tolerance between the households that participated and those that did not (see Table 5.2). However, we find that questionnaire participants on average have a higher knowledge of financial products (mean of 2.15 compared to 2.06, significant at the 10 percent level) and also more experience with financial products (mean of 2.12 compared to 1.99, significant at the 1 percent level).[33]

The respondents overall seem representative for the whole dataset, with the possible exception of a small bias regarding financial knowledge and experience. We already mentioned that our sample is highly educated as the median household holds a university degree (see Table 5.1) and we will have a more detailed look at the influence of financial knowledge later on in the analysis.

5.4 Results and Discussion

5.4.1 Advice Acceptance

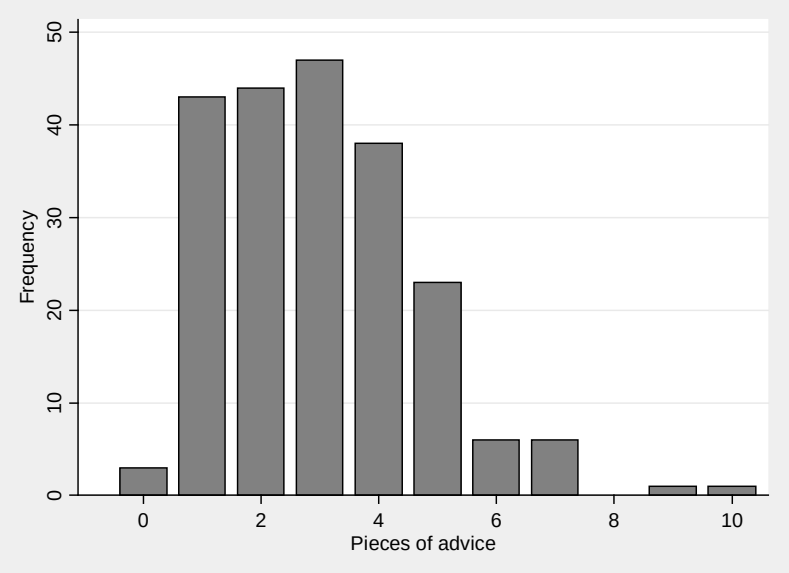
We break down our dataset on the level of a single piece of advice, meaning we treat one piece of advice as one single observation; consequently, there are several observations per household if the recommendation consists of more than one piece of advice. We asked the households whether they followed the advice or not and participants could check yes, partly,

[33] Financial knowledge (experience) is the average knowledge (experience) of eight asset types. The consumer center differentiates between savings accounts (also including call money and time deposits), savings bonds (savings with a higher (normally fixed) maturity), federal savings bonds (bonds issues by the Federal Republic of Germany), bonds (bonds except federal bonds), insurance (insurances with investment character, life insurance or annuity insurance), real estate (no differentiation between self occupancy or not), investment funds (all kinds of investment funds including stocks, bonds, money market etc.), and stocks.

or no for every piece of advice they received. With this method, we are able to include option-related effects (e.g. the recommended asset type) in our analysis.

Altogether, the households received 636 pieces of advice; this means on average 3 pieces of advice per household. Figure 5.2 shows how many pieces of advice were given to the households. 3 respondents did not return the complete questionnaire, thus we have 3 households with 0 pieces of advice. The vast majority (172 households) receives 1 to 4 pieces of advice. 23 households receive 5 pieces of advice; twelve receive 6 or 7 pieces, and only two households 9 or 10 pieces of advice.

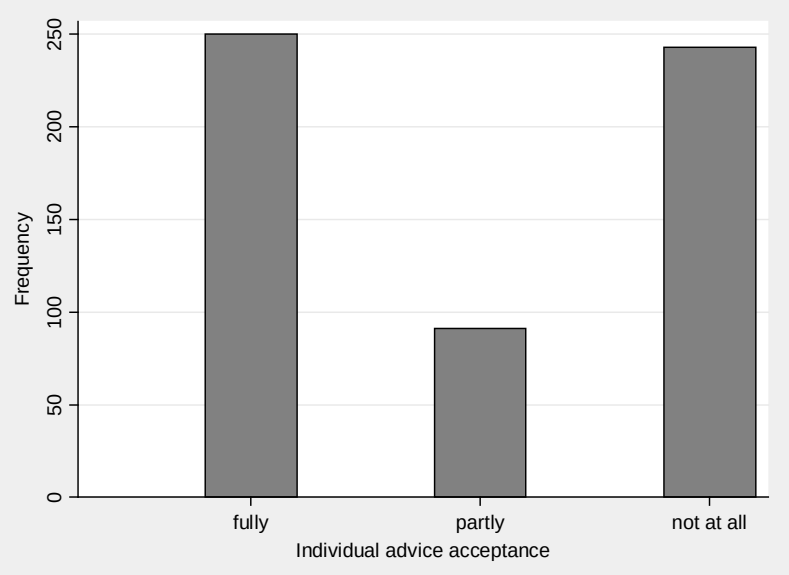
Figure 5.2: Number of pieces of advice



All in all, about half of the advice from the consumer center is followed. Figure 5.3 shows the acceptance: 250 pieces of advice were followed, 243 pieces were rejected. Acceptance in parts is not that common, with only 91 pieces that were followed to some extent. We have 52 missing observations because participants did not always report if they followed the advice or not. There are no figures available for comparable decisions, e.g. from a traditional bank. The figures however indicate that there is indeed variation in the willingness to follow advice.

Figure 5.3: Individual advice acceptance

The figure shows the individual advice acceptance (one piece of advice = one observation).



5.4.2 Influence of Person-Related Attributes of the Decision Maker

In the following, we perform a regression analysis with advice acceptance as the dependent variable to find potential determinants. As our dependent variable has only three ordinal outcomes (1 = fully accepted, 2 = partly accepted, 3 = not at all accepted), we perform ordered logistic regressions. We control the standard errors for clustering in households.[34]

In addition, if we find significant effects, we perform binary logistic regressions for a better understanding of the magnitude of the determinants; for this, we pool observations by "fully accepted" and "partly accepted". We think "partly accepted" is nearer to "fully accepted" than to "not at all accepted" because people in both cases took action due to the advice. Thus, we can code our dependent variable as a binary variable with 0 = (partly) accepted and 1 = not accepted. The results of the binary regression analyses are displayed in Appendix B.

[34] With clustering we relax the assumption that error terms are independent. Clustering provides consistent estimates across a broad range of possible forms of correlations within households (see e.g. Wooldridge (2008)).

Table 5.3: Individual advice acceptance, decision maker

The table reports determinants of the individual advice acceptance (ordered logistic regressions with clustering) for all pieces of advice.

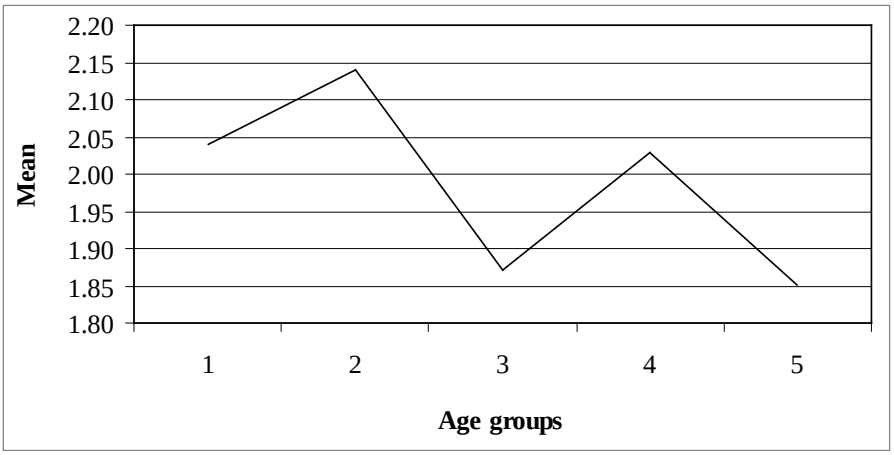
Coding of dependent variable (individual advice acceptance): 1 = fully accepted, 2 = partly accepted, 3 = not at all accepted. Standard errors are adjusted for 186 (186, 188) household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

Individual advice acceptance	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**
Women	-0.0079	-0.0254	0.0082
	(0.2234)	(0.2229)	(0.2189)
Men	-0.0178	0.0060	0.0307
	(0.2814)	(0.2847)	(0.2754)
Age	-0.0179	-0.0169	-0.0190
	(0.0074)**	(0.0074)**	(0.0071)***
Income	0.0315	0.0396	0.0623
	(0.1081)	(0.1110)	(0.1063)
Education	0.0935	0.0795	
	(0.0923)	(0.0951)	
Knowledge	0.0665		0.0553
	(0.0949)		(0.0951)
Risk tolerance	-0.0770	-0.0704	-0.0786
	(0.0695)	(0.0696)	(0.0696)
Observations	527	527	532
Wald Chi^2(#)	9.28	8.24	9.59
p > Chi^2	0.2329	0.2214	0.1431
Pseudo R^2	0.0074	0.0068	0.0076

Table 5.3 shows the results of the ordered logistic regression with demographic variables. As women and older people are more likely to ask for advice (see Bluethgen et al. (2008) and Chapter 4) it may also be that their willingness to follow advice is higher. Bluethgen et al. (2008) additionally state that women and older people are more likely to rely on the received advice, but in their dataset receiving and relaying on advice cannot be distinguished from each other. The advised group consists of customers placing orders with prior recommendations from their advisors. We must keep in mind that our base sample (see Section 5.3 or Chapter 4) is already biased toward more women and older people because all these people primarily asked for advice. This bias is inevitable but also natural in our analysis as the question of whether to follow advice or not can only occur if the decision maker received advice in advance.

Figure 5.4: Acceptance by age

The figure shows mean acceptance for five age groups. A household in the first group is younger than 30 years, in the second group between 30 and 40 years and so on (see table).



Age group	**1**	**2**	**3**	**4**	**5**
Age	≥ 21	≥ 30	≥ 40	≥ 50	≥ 60
	< 30	< 40	< 50	< 60	≤ 75
Observations	50	153	136	119	112
Mean	2.04	2.14	1.87	2.03	1.85
Std. Dev.	0.95	0.91	0.93	0.91	0.92

With regards to our data, we find that older people have a higher willingness to follow advice. Figure 5.4 shows the mean acceptance for different age groups. The relation does not seem to be strictly linear but, on average, the mean acceptance of older age groups is higher. This points in the direction of Bluethgen et al. (2008) but our result is even stronger; with our data-set, we are able to differentiate between the first step that is "asking for advice" and the second one that is "following the advice given". We do not only find that older people are more likely to ask for advice (see Chapter 4) but that they are also more likely to follow the advice they receive. We cannot find this second effect for gender or for risk aversion. Bluethgen et al. (2008) also find that advised people tend to be wealthier - which we cannot comment on as we do not have information about total wealth; when looking at income instead, we do not find an effect regarding the willingness to follow advice.

In line with the experimental literature about acceptance of advice (see e.g. Harvey and Fischer (1997) or Yaniv and Kleinberger (2000)) we hypothesized that we would find an effect of own competence. The existing studies widely agree that people tend to discount advice (except for very difficult tasks) when compared to their own opinion. We do not find this ef-

fect with our data, regardless of whether we used education or financial knowledge as a proxy for own competence; this might be due to the fact that our sample is quite homogenous. Van Rooij et al. (2007) find that people with low financial literacy prefer to ask family and friends for investment advice whereas those with a high financial literacy are more likely to read newspapers, magazines, books, and to rely on financial advisors. Additionally, the households frequenting the consumer center are prepared to pay a fixed fee of 140 Euro for the advice, implying that they not only rely on professional advice but also seem to be aware of the conflict of interest that goes along with commission-based advice, which they could receive for free (at least it would seem so) elsewhere. Moreover, our sample is again biased in the sense that the questionnaire participants have greater knowledge and experience compared to those who did not participate (see Section 5.3) - for instance, the median household in our sample holds a university degree. The differences in financial knowledge might thus be too small to generate a significant difference in the willingness to follow advice. Besides the homogeneity problem, we cannot compare the advice to the initial asset allocation (corresponding to the "own" opinion in the above-mentioned experimental studies) and we hence do not know how much the advice deviates from the own opinion, resulting in a limited comparability of our study with the existing experimental evidence.

The binary logistic regression for the same dependent variables is displayed in Appendix B. The independent variable is 1 if the advice is not accepted and 0 if the advice is at least partly accepted. The probability of the reference household (a couple with mean characteristics in the other dependent variables) for refusal of the advice is 40.95 percent. A one-standard-deviation increase in age decreases this probability by 0.54 percent. Thus, as the standard deviation in age is about 13 years, the effect of age on the willingness to follow advice is statistically significant but economically of no great importance.

With the binary logistic model, we find a weakly significant effect of risk tolerance. Households with a higher risk tolerance are more willing to accept advice - at least to some extent. As we do not find this effect with the ordered logistic model, the pooling of observations must cause it. Of the 91 decisions to partly accept the advice, 53 were made by households with a risk tolerance above the mean (3 to 7) and only 38 by households with a risk tolerance below the mean (1 or 2). There is no comparable evidence for this result in the literature about advice taking; however, Bluethgen et al. (2008) find that people are more likely to ask for advice if their risk aversion is higher. One possible explanation for our finding might be the status quo bias (Samuelson and Zeckhauser (1988)). People with a higher risk aversion might

prefer not to follow the advice and to remain at the status quo because the disadvantages loom larger than the advantages of a new strategy (Kahneman et al. (1991)).

Please note that the Wald's chi-squared statistics for both models are not significant, indicating that the overall explanatory power is low. We will include the demographic variables as control variables in the following analyses and see whether the effects are persisting.

5.4.3 Influence of Person-Related Attributes of the Advisor

All in all, the households rate the advice offer of the consumer center positively. Panel A of Table 5.4 shows the satisfaction with the interview and the advisor at the consumer center. On a 7-point Likert scale (from 1 = very satisfied to 7 = very unsatisfied), people state a mean satisfaction of 2.20. The assessments of the nine items (see Appendix A for the exact wording) are very similar; the median answer for all items is 2. Reliability is assessed highest with a mean of 1.82. Weak points, if any, are the explanations of the asset types (mean 2.37) and the time (mean 2.34).

Table 5.4: Satisfaction with the interview and the advisor

The table reports the results of the questions about the interview and the advisor. Subjects should check on a 7-point Likert scale (from 1 (very satisfied, very likable …) to 7 (very unsatisfied, very dislikable …)).

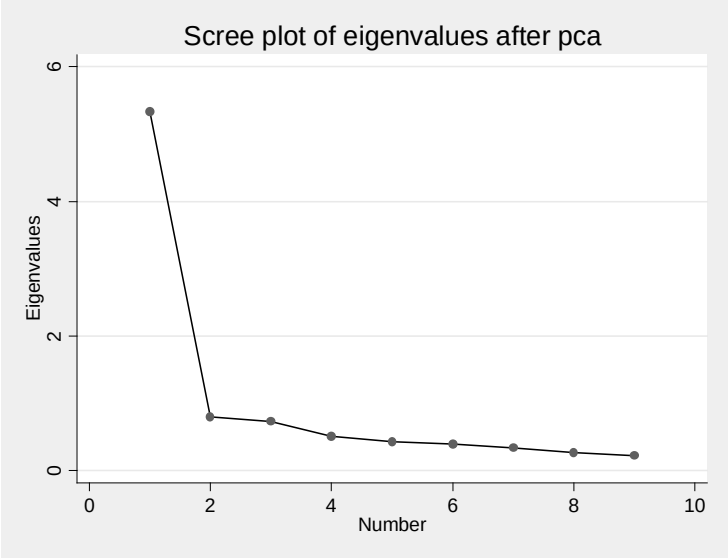
	Obs.	Mean	Median	Std.dev.	Min.	Max.
Panel A: Consumer center						
Satisfaction	211	2.20	2	1.06	1	6
Likability	211	2.17	2	0.99	1	6
Competence	212	2.05	2	1.00	1	6
Reliability	212	1.82	2	0.82	1	5
Individual situation	212	2.12	2	1.06	1	6
Explanations	212	2.37	2	1.17	1	7
Time	212	2.34	2	1.18	1	7
Understandability	212	2.04	2	0.90	1	6
Confidence	208	2.03	2	0.93	1	6
Panel B: Other advisor						
Satisfaction	36	3.19	3	1.62	1	7

To compare the results, we also ask the households about other interviews (see Panel B of Table 5.4). 39 of the respondents had another interview since the consultation of the consumer center. These households are less satisfied with the advice of the consumer center (mean 2.51)

than those without another interview (mean 2.13). This difference is significant at the 5 percent level (z = 1.801 (Wilcoxon rank-sum test)). Still, on average, these households rate the other interview worse (mean 3.19, median 3) than the one with the consumer center. This difference is significant at the 5 percent level (z = 2.062 (Wilcoxon signed-rank test)). To measure the influence of satisfaction on the willingness to follow advice, we first perform a factor analysis with the 9 items in Table 5.4. If we drop all components with eigenvalues under 1.0 (Kaiser criterion, see Guttman (1954) and Kaiser (1960)) we obtain only one principal factor. The Cattell scree test (see Cattell (1966)) also clearly detects only one factor (see Figure 5.5).

Figure 5.5: Cattell scree test

The figure shows the scree plot of eigenvalues after a principal component analysis.



We conclude that the households either evaluate all aspects positively or negatively. They are not able to differentiate between the single items, so for instance likability seems to be as important as expertise of the advisor for the decision maker. To put it differently, people might have difficulties with evaluating the competence of the advisor correctly and thus use attributes that are easier to evaluate, e.g. likability of the advisor or the interview atmosphere, to evaluate the quality of the advice. This is in line with empirical evidence suggesting that the satisfaction of the investor may not necessarily be related to the quality of advice but rather to the likability of the advisor (see e.g. Oehler and Kohlert (2009)). Apparently, all of our 9 items measure a part of the same construct. The average interitem covariance is 0.5384.

Cronbach's Alpha (see Cronbach (1951)) is 0.9068, which denotes a very high reliability.[35] Hence, for our further analyses, we generated the variable "Satisfaction9" which is simply the average of the 9 items. "Satisfaction9" measures the overall perception of the advisor and the interview by the decision maker.

Table 5.5: Individual advice acceptance, advisor

The table reports determinants of the individual advice acceptance (ordered logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 1 = fully accepted, 2 = partly accepted, 3 = not at all accepted. Standard errors are adjusted for 186 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

Individual advice acceptance	**Coefficients (Std. Errors)**
Women	0.0179
	(0.2234)
Men	-0.0546
	(0.2748)
Age	-0.0180
	(0.0071)**
Income	0.0708
	(0.1033)
Education	0.0656
	(0.0887)
Knowledge	0.0726
	(0.0944)
Risk tolerance	-0.0956
	(0.0654)
Satisfaction9	0.3879
	(0.1155)***
Observations	527
Wald $Chi^2(8)$	20.8200
$p > Chi^2$	0.0076
Pseudo R^2	0.0199

Table 5.5 shows the results if we include "Satisfaction9" in our analysis (ordered logistic regression). In line with the theoretical (e.g. see Jungermann (1999)), experimental (e.g. see Harvey et al. (2000) or Van Swol and Sniezek (2005)), and empirical literature (e.g. see Feng and MacGeorge (2006)), we find that the characteristics of the advisor influence the willing-

[35] For early stages of research (predictor tests, hypothesized measures of a construct) Nunnally (1978) considers a reliability of 0.7 or higher as sufficient. For basic research it is oftentimes not necessary to increase reliability beyond 0.8 as correlations change very little by measurement error. However, for applied settings he recommends a minimum reliability of 0.9. As our reliability coefficient is 0.9068, we do not have to worry.

ness of the decision maker to follow the advice. As stated before, we are not able to separate single effects of e.g. expertise, likability, or confidence, as these items are highly correlated and mutually dependent, but the effect of "Satisfaction9" is highly significant. The more positive the advisor and the whole interview are perceived, the higher the willingness to subsequently follow the advice. Again, we find the effect of age; older people have a higher willingness to follow advice.

Appendix B shows the results of the binary logistic regression. The impact of age and risk aversion is similar to the previous regressions. The influence of "Satisfaction9" is highly significant in this model as well. The base probability of 40.78 percent of completely rejecting the advice increases by 9.33 percent if the satisfaction decreases by one standard deviation (= 0.7916). In contrast to the previous two models, the explanatory power is significant now (see Wald's chi-squared statistics).

Besides satisfaction, we also asked households about the benefits of the interview; Table 5.6 displays the results. We measure the benefits of the interview with the help of three statements (see Appendix A for the exact wording). On average, people believe that they did benefit from the interview with the consumer center - most households agree with the statement that their knowledge about pros and cons has improved through the interview. The median answer is 2 (mean 2.55) on a 7-point Likert scale (from 1 = strongly agree to 7 = strongly disagree). Households also state a higher level of confidence concerning financial issues (median 3, mean 2.95). However, on average, the households do not feel confident enough to do without advice in the future. Their median answer is 4 (mean 3.94), implying that the households on average neither agree nor disagree. We also included the results of the benefit questions in the regression model (results not reported) but they do not influence the decision to follow advice or not.

Table 5.6: Benefits of the interview

The table reports the results of the benefit questions. Subjects should check on a 7-point Likert scale (from 1 (strongly agree) to 7 (strongly disagree)).

	Obs.	Mean	Median	Std.dev.	Min.	Max.
Know pros and cons	210	2.55	2	1.21	1	6
Higher confidence	211	2.95	3	1.30	1	7
Ability to self advise	209	3.94	4	1.54	1	7

5.4.4 Influence of Motivation

Table 5.7: Motivation of asking for advice

The table reports reasons for the counseling interview at the consumer centre. Panel A reports the general interview reasons. Panel B reports the reasons for the choice of the consumer center. Multiple answers were allowed.

Reasons	**Obs.**	**Percentage**
Panel A: General interview reason		
General information need	131	61.79%
Uncertainty	86	40.57%
Improvement of current allocation	73	34.43%
First interview	60	28.30%
Reassurance of current allocation	45	21.23%
Concrete reason	42	19.81%
Other advisors unsatisfying	30	14.15%
Other	27	12.74%
Panel B: Reason to consult the consumer center		
Independent advice	186	87.74%
Fixed fee, no commision	86	40.57%
Checkup	53	25.00%
Recommendation of friends	40	18.87%
Print media, TV, Radio	35	16.51%
Comparison to current allocation	33	15.57%
Comparison to other advisors	28	13.21%
Internet	26	12.26%
Other	14	6.60%
Recommendation of consumer center	9	4.25%

Panel A of Table 5.7 shows the reasons why people ask for advice, with multiple answers being possible here. About 62 percent state a general need for information concerning investing and retirement savings. 41 percent are unsure about their asset allocation, 34 percent want to improve their current strategy. For 28 percent, the interview is the first detailed interview about investing. 21 percent want their current strategy to be confirmed. 20 percent have a concrete reason for the interview, e.g. an inheritance. 14 percent are unsatisfied with other advisors and 12 percent state other reasons.

In Panel B of Table 5.7 we list the reasons of the households to consult the consumer center for advice. The vast majority (88 percent) expects independent advice, 41 percent explicitly state that they prefer the fixed fee to the commission-based system of other advisors; all other reasons are less common.

Table 5.8: Individual advice acceptance, motivation

The table reports determinants of the individual advice acceptance (ordered logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 1 = fully accepted, 2 = partly accepted, 3 = not at all accepted. Standard errors are adjusted for 186 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

Individual advice acceptance	**Coefficients (Std. Errors)**
Women	0.0639
	(0.2206)
Men	-0.0323
	(0.2747)
Age	-0.0175
	(0.0085)**
Income	0.0006
	(0.1045)
Education	0.1399
	(0.0893)
Knowledge	0.0740
	(0.0995)
Risk tolerance	-0.0886
	(0.0719)
General information need	0.0878
	(0.1786)
Uncertainty	-0.1451
	(0.1974)
Improvement of current allocation	0.3201
	(0.1943)*
First interview	-0.1511
	(0.2242)
Reassurance of current allocation	0.5080
	(0.1907)***
Concrete reason	-0.3826
	(0.1976)*
Other advisors unsatisfying	0.1787
	(0.2029)
Observations	527
Wald $Chi^2(14)$	30.7400
$p > Chi^2$	0.0006
Pseudo R^2	0.0210

If we include the motivation of asking for advice (see Table 5.8) in our analysis, we find that people who came for reassurance or to improve their strategy are less likely to follow the advice. This is consistent with explanations regarding the competence of the decision maker (see Subsection 5.4.2). As mentioned before, people tend to overvalue the own opinion compared to advice from other sources (see e.g. Harvey and Fischer (1997), or Yaniv and Kleinberger

(2000)). The reasons “reassurance” and “improvement” imply that the households already had an investment strategy before the interview, implying that to follow the advice by the consumer center would not only mean to accept the advice but moreover to deviate from their original own strategy.

Households giving a concrete reason for the consultation show a higher willingness to accept the recommendation. This seems plausible as a concrete problem needs direct attention while the reason “general information need” implies no urgent need for action. This result is also in line with the “concreteness principle” by Slovic (1972b). He posits that people prefer explicitly given information over information that has to be transformed in some way. It may thus be that people also prefer to solve a concrete problem compared to an imprecise one as solving an imprecise problem would require more mental work.

We also included the reasons to consult the consumer center as an advisor to the regression model but they do not influence the decision to follow advice or not; this is most likely because the reasons for consulting the consumer center are too homogenous (88 percent state the reason “independency of the consumer center”).

In order to obtain an idea of the magnitude of the influence of the motivation, Appendix B presents the results of the binary logistic regression. The base probability of 40.67 percent of completely rejecting the advice increases by 13.13 percent if the households state the reason “reassurance”. On the other hand, a concrete reason decreases the probability of rejecting the advice by 13.07 percent. The coefficient of the reason “improvement of the current allocation” is no longer significant. In addition, the estimated magnitude is lower than for the other two reasons, about 6 percent.

5.4.5 Influence of Option-Related Attributes

In the following we consider the advice itself. We look at the number of pieces of advice (see Figure 5.2) and at alternative (conflicting) pieces of advice. This can be either alternative pieces of advice provided by the consumer center for single pieces of advice (see Figure 5.6) or it can be an alternative to the whole recommendation provided by another advisor (dummy variable which is 1 if the household consulted another advisor since the interview with the consumer center).

Figure 5.6: Alternative pieces of advice

The figure shows the number of alternative pieces of advice per piece of advice.

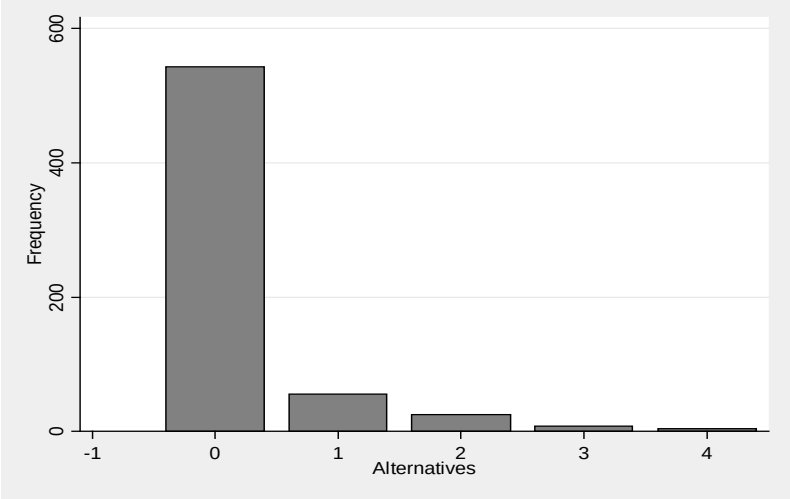


Table 5.9 shows the results of the regression analysis. There are several experimental studies indicating that the number and form of alternative options can influence the preferences for a given alternative (see e.g. Huber et al. (1982) or Tversky and Shafir (1992)). For our data, we expected a lower overall acceptance if the pieces of advice provided by the consumer center are conflicting instead of complementary or if households had another interview. However, we do not find an effect of alternative pieces of advice, nor do we find one for the total number of pieces of advice in the recommendation. With regard to the alternatives, we believe that most likely we did not find an effect because of too few observations, with only 39 households stating that they had another counseling interview. Their mean acceptance is 2.02, compared to a mean acceptance of 1.98 of the other households; this difference is too small to be significant. The recommendation of alternative pieces of advice by the consumer center is also not very common, see Figure 5.6. We use the number of pieces of advice as a proxy for the complexity of advice. As we do not find a significant effect, maybe this proxy is too simple. In the further analyses, we will consider the exact asset types. The results of the binary logistic regression (not reported) confirm these results; we do not find any significant effects of the number of pieces of advice nor of alternative pieces of advice.

Concerning the asset types, we differentiate between call money, savings accounts/bonds, (federal) bonds or bond funds, stocks or stock funds, “Riester” savings plans, insurance contracts, and outstanding debts (see Table 5.10). All in all, 148 pieces of advice are about call

money accounts, 133 about savings, 122 about stocks or stock funds, 110 about bonds or bond funds, 106 about savings in a "Riester" plan (a private pension plan that is state-aided by financial and tax benefits, the labeling "Riester" goes back to the German politician Walter Riester), 30 about insurance contracts, and 11 about outstanding debts. If one piece of advice includes an alternative (e.g. purchase of a bond fund or bank savings bonds instead), more than one type might be correct.

Table 5.9: Individual advice acceptance, number of pieces of advice and alternative pieces of advice

The table reports determinants of the individual advice acceptance (ordered logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 1 = fully accepted, 2 = partly accepted, 3 = not at all accepted. Standard errors are adjusted for 186 (186, 185, 185) household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

Individual advice acceptance	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**	**Coefficients (Std. Errors)**
Women	0.0101	-0.0079	-0.0099	0.0101
	(0.2264)	(0.2235)	-0.223	(0.2261)
Men	0.0056	-0.0178	0.0030	0.0282
	(0.2787)	(0.2814)	-0.2835	(0.2794)
Age	-0.0164	-0.0179	-0.0175	-0.0159
	(0.0075)**	(0.0073)**	(0.0074)**	(0.0074)**
Income	0.0290	0.0315	0.0417	0.0404
	(0.1074)	(0.1081)	-0.1096	(0.1086)
Education	0.0832	0.0934	0.0886	0.0795
	(0.0928)	(0.0938)	-0.093	(0.0946)
Knowledge	0.0681	0.0665	0.0628	0.0636
	(0.0946)	(0.0951)	-0.0953	(0.0949)
Risk tolerance	-0.0689	-0.0770	-0.0838	-0.0773
	(0.0685)	(0.0697)	-0.0704	(0.0695)
Pieces of advice	0.0684			0.0728
	(0.0568)			(0.0589)
Alternatives		0.0001		-0.0284
		(0.1953)		(0.1945)
Other interview			0.073	0.0915
			(0.2433)	(0.2441)
Observations	527	527	524	524
Wald Chi^2(#)	10.36	9.62	9.31	10.92
$p > Chi^2$	0.2410	0.2928	0.3165	0.3640
Pseudo R^2	0.0089	0.0074	0.0076	0.0092

Table 5.10: Asset types

The table reports which asset types the pieces of advice can be assigned to. Multiple types are possible.

Asset type	Obs.	Percentage
Call money	148	21.64%
Savings	133	19.44%
Stocks, stock funds	122	17.84%
Bonds, bond funds	110	16.08%
Riester	106	15.50%
Insurance	30	4.39%
Outstanding debts	11	1.61%
Other	24	3.51%

Table 5.11 shows the results of the regression analysis with dummy variables included for the different asset types. We find that advice about call money is significantly more likely to be followed, which may be due to the fact that call money is an easy product. It is easy to understand and the account is quickly opened. Moreover, it is sensible to have a financial buffer for unforeseen events in form of a call money account. In contrast, for the asset type of bonds or bond funds we find a negative influence. If the advice concerns bonds, the acceptance rate is significantly lower. Bonds or bond funds are a more complex asset type and require a special securities account on part of the individual wishing to trade in them. Additionally, the advantages over bank savings bonds or a simple call money account might be unclear. For “Riester” savings plans, the probability that the advice is followed is higher. Despite the complicated structure of “Riester” products, people seem to follow the advice significantly more often, which might be due to the features of the product itself; “Riester” is a state-aided private pension. About 83 percent of the households in the original dataset (see Table 4.2) stated “retirement provisions” as the purpose of their investment and about 52 percent wanted to be informed about governmental aid. Thus, as “Riester” provides governmental aid by financial and tax benefits, the acceptance is quite high. For advice about insurance contracts, the willingness to follow the advice is also significantly higher. From the 30 pieces of advice about insurance, only 7 are about starting a new contract, the other 23 pieces are about modifications or the termination of the contract. In most cases, the households are advised to stop further payments because the performance after charges is simply too low compared to other direct investments. This argument is easy to understand and in addition, the advice is easy to implement.

Table 5.11: Individual advice acceptance, asset types

The table reports determinants of the individual advice acceptance (ordered logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 1 = fully accepted, 2 = partly accepted, 3 = not at all accepted. Standard errors are adjusted for 186 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

Individual advice acceptance	**Coefficients (Std. Errors)**
Women	-0.1533
	(0.2738)
Men	-0.0344
	(0.3340)
Age	-0.0249
	(0.0087)***
Income	-0.0482
	(0.1338)
Education	0.1058
	(0.1103)
Knowledge	0.0003
	(0.1016)
Risk tolerance	-0.0930
	(0.0823)
Call money	-1.3868
	(0.3158)***
Savings	0.0129
	(0.2584)
Stocks, stock funds	0.2480
	(0.3009)
Bonds, bond funds	0.8362
	(0.3012)***
Riester	-1.0272
	(0.3548)***
Insurance	-1.5755
	(0.4829)***
Outstanding debts	-0.8477
	(0.7372)
Observations	527
Wald $Chi^2(14)$	74.63
$p > Chi^2$	0.0000
Pseudo R^2	0.0912

The magnitude of the specific asset type is considerably high. Appendix B shows the results of the binary logistic regression analysis. If the advice is about call money, the probability of rejecting the advice is by 30.37 percent lower. If it is about “Riester”, the probability is lower by 16.89 percent and the type “insurance” decreases the probability by 31.39 percent. On the

contrary, the probability of rejection is higher by 22.13 percent if the advice is about bonds or bond funds.

The contract form, i.e. purchase or sale of an asset type, freezing or modification of a contract, may also be used to categorize the pieces of advice. We do not find an effect of the contract form, which might be due to the insufficient variation in our data; 566 pieces of advice are about the purchase of an asset type and all other forms are not very common. The main reason for this is that the recommendations of the consumer center tend to focus on a new strategy, i.e. purchases, and do not state explicitly that existing investments should be sold or modified in exchange.

Table 5.12: Individual advice acceptance, one-time investments

The table reports determinants of the individual advice acceptance (ordered logistic regressions with clustering) for one-time investments.

Coding of dependent variable (individual advice acceptance): 1 = fully accepted, 2 = partly accepted, 3 = not at all accepted. Standard errors are adjusted for 99 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

Individual advice acceptance	**Coefficients (Std. Errors)**
Women	0.0510
	(0.3282)
Men	-0.0928
	(0.3863)
Age	-0.0187
	(0.0142)
Income	0.0261
	(0.1537)
Education	0.0408
	(0.1067)
Knowledge	0.1238
	(0.1412)
Risk tolerance	0.0062
	(0.1117)
Log_amount	0.2742
	(0.1043)***
Observations	230
Wald $Chi^2(8)$	11.94
$p > Chi^2$	0.1538
Pseudo R^2	0.0160

We also want to consider the investment amount. We have one-time investments and savings rates. As we do not have the investment horizon of the savings plans, we are not able to calcu-

late standardized values such as the net present value; we thus use two separate models. For the first, we look at one-time investments, of which there are 291 with the minimum amount of 600 Euro and the maximum of 670,000 Euro.

Table 5.12 shows the results for one-time investments only. The higher the investment amount, the lower the willingness to accept the advice. If we include the amount, we no longer find an influence of age, which may be due to the fact that investment amount and age are correlated: older households have (on average) higher investment amounts. In the binary model, we again find an effect of age, which runs contrary to the influence of the investment amount. Note that both models have low explanatory power, as evidenced by the Wald's chi-squared statistics that are not significant.

If we look at regular savings instead of one-time investments, we do not find an effect of the amount. The only noticeable result from the previous analyses is the high difference in the base probabilities in the binary models (see Appendix B). For one-time investments this probability is 33.00 percent, compared to 45.21 percent for regular savings. We conclude that the willingness to accept advice is considerably higher for one-time investments. For the next analysis, we thus introduce a dummy variable, which is set to one if the advice is about a one-time investment.

The results are shown in Table 5.13. We indeed find a significant influence of one-time investments but do not find an effect of age in this model. This is not surprising as one-time investments and age are positively correlated; the mean age of one-time investments is 53.28 years compared to 40.59 years for regular investments.[36] Appendix B shows that the probability of rejecting the advice is by 10.51 percent lower for a one-time investment. The effect can be explained with the help of the behavioral life-cycle hypothesis (Shefrin and Thaler (1988)). According to the behavioral life-cycle hypothesis, households divide their wealth into three mental accounts: current income, current assets, and future income. The probability of spending is highest for current income and lowest for future income; it is the other way round with the propensity to save. One-time investments normally relate to existing assets, i.e. the amount has already accrued. In contrast, regular savings are related to current income. Regu-

[36] Note that there are 19 pieces of advice that include a one-time investment plus a regular investment. In this case our dummy variable is also 1. The results do not change if we use a "one-time investment only" dummy. If we use two dummies, the coefficient of the "one-time investment only" dummy is significant. The separate "one-time plus regular investments" dummy is also positive but not significant.

lar savings thus lead to a reduction of consumption possibilities which is painful for the household.

Table 5.13: Individual advice acceptance, one-time investments (dummy)

The table reports determinants of the individual advice acceptance (ordered logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 1 = fully accepted, 2 = partly accepted, 3 = not at all accepted. Standard errors are adjusted for 186 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

Individual advice acceptance	**Coefficients (Std. Errors)**
Women	-0.0653
	(0.2268)
Men	-0.0667
	(0.2831)
Age	-0.0107
	(0.0086)
Income	0.0109
	(0.1071)
Education	0.0983
	(0.0938)
Knowledge	0.0711
	(0.0954)
Risk tolerance	-0.0697
	(0.0703)
One-time investment	-0.3279
	(0.1903)*
Observations	527
Wald $Chi^2(8)$	11.57
$p > Chi^2$	0.1715
Pseudo R^2	0.0100

For most of the dependent variables, the results also persist if we include all dependent variables in a single regression model; Table 5.14 presents the results of the ordered logistic regression. As in Table 5.13, we no longer find an effect of demographic variables of the decision maker. The higher the general satisfaction with the advisor and the interview, the higher the willingness to follow the advice. A concrete reason for the interview increases the probability that the advice is followed. On the contrary, the intention of reassuring oneself of the own strategy decreases the willingness to follow advice. Again, for call money accounts, “Riester” savings plans, and insurances the acceptance rate is higher while it is lower for bonds or bond funds. A recommendation concerning a one-time investment is more likely to be followed in contrast to regular investments.

Table 5.14: Individual advice acceptance, all variables

The table reports determinants of the individual advice acceptance (ordered logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 1 = fully accepted, 2 = partly accepted, 3 = not at all accepted. Standard errors are adjusted for 185 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

Individual advice acceptance	**Coefficients (Std. Errors)**		**Coefficients (Std. Errors)**
Women	-0.1667	Pieces of advice	0.0984
	(0.2757)		(0.0741)
Men	-0.0897	Alternatives	-0.1044
	(0.3329)		(0.3017)
Age	-0.0062	Other interview	0.0497
	(0.0112)		0.2642
Income	-0.0687	Call money	-1.2089
	(0.1222)		(0.3409)***
Education	0.1099	Savings	0.1638
	(0.1090)		(0.2870)
Knowledge	0.0280	Stocks, stock funds	0.4649
	(0.1067)		(0.3338)
Risk tolerance	-0.1129	Bonds, bond funds	0.9954
	(0.0839)		(0.3271)***
Satisfaction9	0.2763	Riester	-1.0163
	(0.1389)**		(0.3941)***
General information need	0.1629	Insurance	-1.4818
	(0.2215)		(0.4769)***
Uncertainty	-0.2184	Outstanding debts	-0.4517
	(0.2195)		(0.9339)
Improvement of current allocation	0.3398	One-time investment	-0.6980
	(0.2136)		(0.2517)***
First interview	-0.1543	Observations	524
	(0.2544)	Wald $Chi^2(26)$	97.93
Reassurance of current allocation	0.4260	$p > Chi^2$	0.0000
	(0.2191)*	Pseudo R^2	0.1204
Concrete reason	-0.4936		
	(0.2320)**		
Other advisors unsatisfying	0.1511		
	(0.2461)		

Appendix B shows the magnitude of changes in the dependent variables with the help of the binary logistic model. The base probability of totally rejecting the advice (38.56 percent) is decreased by 6.71 percent if the satisfaction increases by one standard deviation. A concrete reason for asking for advice decreases the probability of rejecting the advice by 13.62 percent. The intention of reassure oneself of the own strategy is no longer significant in this model, but the magnitude is around a 10 percent increase. The influence of the specific asset type is still

very high. If the advice is about call money, the probability of rejecting the advice is lower by 26.25 percent. If it is about “Riester”, the probability is lower by 15.98 percent lower and the type ”insurance” decreases the probability by 30.14 percent. On the contrary, the probability of rejecting is higher by 28.29 percent if the advice is about bonds or bond funds. A one-time investment decreases the probability by 18.94 percent. Overall, we find that the changes in the probabilities due to option-related attributes are much higher than those caused by person-related attributes.

As we do not find any effects of demographic variables of the decision maker, we perform the same regression without including these variables. As some participants refused to state private information (e.g. income) we hope to benefit from more observations in this case.

Appendix B shows the results. Contrary to previous results, we find that with more pieces of advice the willingness to follow advice decreases. This is consistent with our hypothesis that higher complexity decreases the willingness to follow advice. Certainly, it is more complex to implement a strategy consisting of several pieces of advice compared to a single piece of advice. An increase in the number of pieces of advice by one standard deviation (= 1.8189) leads to an increase in the rejection probability by 3.80 percent. In addition, we find that the willingness to accept advice is lower by 14.66 percent if the advice is about stocks or stock funds. This result is comparable to the asset type bonds or bond funds. Stocks or stock funds are a more complex asset type and a special securities account is needed.

5.5 Robustness Checks

If households replied at least once that they did not - or only partly - follow a piece of advice, we ask them for the reason. Using this additional information, we would now like to check our hypotheses and detect further determinants of the willingness to follow advice.

Table 5.15 reports the results. The answers are heterogeneous, with 32 households stating that their situation had changed since the interview, 25 having had a competing offer from the house bank (surprisingly, only 10 of these 25 stated that they had had another interview when previously asked in the questionnaire), 24 did not have time so far, 23 considered the recommendation too difficult to implement, and 20 households could not make sufficient sense of the recommendation. 75 households specified other reasons, e.g. the financial crisis, a change in legislation (final withholding tax), other preferences because of planned self-employment,

or simply too little money to invest. Some households also claimed that the recommended index funds were not available at their bank. At the end of the questionnaire we added extra space for further suggestions. Many households would prefer concrete product recommendations instead of advice on broad asset types and would welcome a second interview for further queries. Jungermann et al. (2005) summarize the influence of the information presentation in a decision problem. Decision makers prefer to use information given explicitly while implicitly given information is hardly used at all. Information should be complete and clearly arranged; otherwise it is not taken into account. At the consumer center, the households receive a strategy specifying only the asset types but the recommendation does not include concrete products. Although the households are provided with the latest test results relating to the recommended asset types from, for example, "Finanztest" or other journals, they still need to expend some effort on the implementation process.

Table 5.15: Reasons not to follow

The table reports the households' reasons not to follow the advice. Multiple answers were allowed.

Reason	**Obs.**	**Percentage**
Situation changed	32	15.31%
House bank offer	25	11.96%
No time	24	11.48%
Too difficult, general	23	11.00%
Sense unclear	20	9.57%
Too complex	19	9.09%
Incomprehensible	10	4.78%
Advantages unclear	5	2.39%
Other	75	35.89%

The self-reported reasons confirm our findings concerning the advice itself. Some households state that it is too difficult to follow the advice, either because they do not understand the advice itself or because they are not able to implement it. We find low acceptance for advice concerning bonds or bund funds and concerning stocks or stock funds; the complexity is especially high for these asset types. In addition, the decision for a concrete product is difficult as there exist big differences between the single products (e.g. funds invest in different regions). If the decision for a concrete product is made, an order has to be placed, and a special securities account is needed. We also detect further reasons we cannot control for in our analysis, for example a change in the financial situation.

We also test our applied models for robustness. In addition to the analysis on the level of a single piece of advice, we repeat the same analysis on the household level, meaning we treat one household as one observation. The overall acceptance per household is calculated as follows: as mentioned before, a “yes” receives the value 1, a “partly” the value 2, and a “no” the value 3. If a household received more than one piece of advice, we take the average acceptance.

Figure 5.7 shows the distribution of the overall advice acceptance in our dataset. 45 households completely followed the advice given by the consumer center, 26 did not follow the advice at all. Most households do something in between by following the advice only partly.

Figure 5.7: Overall advice acceptance

The figure shows the overall advice acceptance (one household = one observation, overall acceptance is the average acceptance if several pieces of advice were provided).

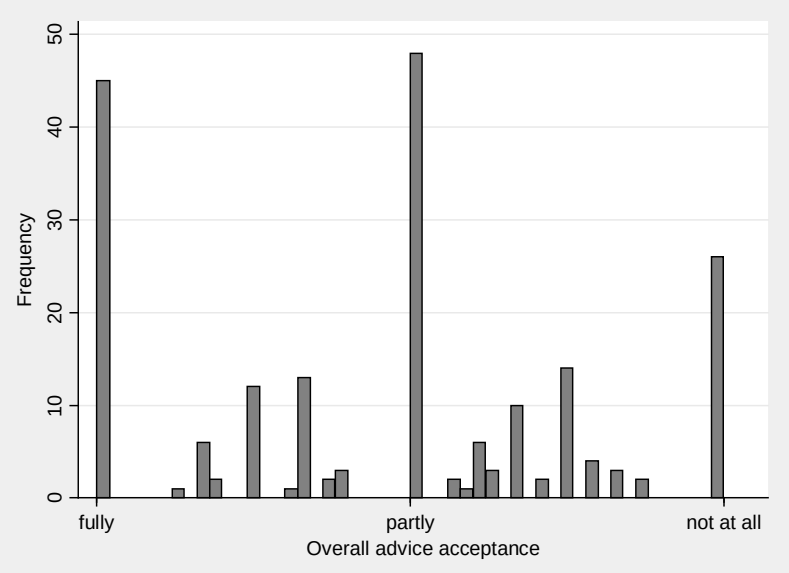


Table 5.16 shows the results for the overall advice acceptance, which are very similar to the analysis on the individual level. As in the binary models, we find weak evidence for a higher risk tolerance increasing the willingness to accept advice (see models 2 and 5). Again, the more positive the perception of the advisor and the whole interview, the higher the subsequent willingness to follow the advice (models 2 and 5). Instead of the positive influence of a concrete reason on the acceptance of advice, we find a weak negative influence of a general need for information. Again, households coming to reassure their own strategy are less likely to

follow the advice (models 3 and 5). We do not find an influence of the total number of pieces of advice nor of alternative advice (models 4 and 5).

Table 5.16: Overall advice acceptance, all variables

The table reports determinants of the overall advice acceptance (tobit regressions) for all households. Standard errors are reported underneath the coefficients in parentheses.

Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

Overall advice acceptance	**Coefficients (Std. Errors)** (1)	**Coefficients (Std. Errors)** (2)	**Coefficients (Std. Errors)** (3)	**Coefficients (Std. Errors)** (4)	**Coefficients (Std. Errors)** (5)
Women	-0.0518	-0.0293	0.0029	-0.0475	0.0176
	(0.1876)	(0.1816)	(0.1804)	(0.1877)	(0.1755)
Men	0.1330	0.1063	0.1348	0.1409	0.1066
	(0.2147)	(0.2080)	(0.2075)	(0.2146)	(0.2022)
Age	-0.0086	-0.0091	-0.0080	-0.0080	-0.0069
	(0.0062)	(0.0060)	(0.0064)	(0.0063)	(0.0063)
Income	-0.0094	0.0149	-0.0326	-0.0142	-0.0159
	(0.0779)	(0.0758)	(0.0751)	(0.0781)	(0.0739)
Education	0.0295	0.0218	0.0833	0.0270	0.0717
	(0.0786)	(0.0760)	(0.0769)	(0.0791)	(0.0752)
Knowledge	0.0246	-0.0091	-0.0316	-0.0228	-0.0143
	(0.0694)	(0.0672)	(0.0682)	(0.0695)	(0.0668)
Risk tolerance	-0.0878	-0.1118	-0.0855	-0.0862	-0.0980
	(0.0571)	(0.0558)**	(0.0563)	(0.0574)	(0.0556)*
Satisfaction9		0.3218			0.2831
		(0.0933)***			(0.0932)***
General information need			0.2172		0.2763
			(0.1534)		(0.1515)*
Uncertainty			-0.1516		-0.1198
			(0.1571)		(0.1528)
Improvement of current allocation			0.2418		0.1734
			(0.1585)		(0.1569)
First interview			-0.1460		-0.0792
			(0.1678)		(0.1639)
Reassurance of current allocation			0.4342		0.4226
			(0.1760)**		(0.1729)**
Concrete reason			-0.2412		-0.2002
			(0.1945)		(0.1916)
Other advisors unsatisfying			0.1273		0.1107
			(0.2067)		(0.2033)
Pieces of advice				0.0414	0.0561
				(0.0476)	(0.0457)
Alternatives				-0.0241	-0.0308
				(0.1637)	(0.1553)
Other interview				0.0670	-0.0066
				(0.1891)	(0.1809)
Constant	2.3147	1.8135	2.1076	2.3526	1.2054
	(0.5877)***	(0.6069)***	(0.6422)***	(0.6195)***	(0.6878)*
Observations	186	186	186	186	186
LR Chi^2(#)	4.27	16.15	19.66	5.13	30.95
p > Chi^2	0.7485	0.0402	0.1413	0.8822	0.0292
Pseudo R^2	0.0090	0.0340	0.0413	0.0108	0.0651

On the individual level - in addition to our ordered logistic regression analyses with clustering - we also estimated ordered logistic regression models with random effects (see Rabe-Hesketh et al. (2004)). A model with random effects provides more efficient estimates in case the exact form of the correlation is known. Our basic results, i.e. the significant coefficients, do not change from the model with clustering to the model with random effects (we tried with different assumptions concerning the form of the correlation). The specific form of the correlation of the error terms within households thus does not seem to have a big impact on our results. We conclude that our model is efficient and the results are robust to the precise functional form of the model. A model with fixed effects is not applicable here because explanatory variables like age and risk tolerance only change between households but not within the household. A model with fixed effects would eliminate the effects at the level of the cluster (see e.g. Wooldridge (2008)).

Besides the binary logistic regressions models, we also estimated probit models; again, the results do not change considerably.

5.6 Conclusion

This chapter adds to the literature on advice taking. We analyze determinants influencing the willingness to follow advice. In spite of the high relevance in everyday life, there is very little empirical evidence on the acceptance of advice - so far, the efforts have concentrated mostly on improving the quality of advice. But if there is a lack of willingness to accept advice, all attempts to improve the quality are of course in vain. For proper regulation of financial advice, a deeper understanding of how people make use of the advice they receive is of the greatest importance. We analyze a unique dataset about real financial decisions using data from counseling interviews by the consumer center Baden-Wuerttemberg plus questionnaire data. With the help of the original dataset, we can analyze determinants for people asking for advice in a first step. We find that people asking for advice are on average older, more highly educated, and more likely to be female (see Chapter 4). With the help of the questionnaire, we analyze the second step - the willingness to follow the advice. We investigate different steps in the decision process.

First, we consider person-related attribute of the decision maker, finding only weak evidence. Older people tend to have a higher willingness to follow advice, but the age effect is economically of no great importance and not persistent to the inclusion of other variables. If we

include a dummy for one-time investments, the coefficient for age is in fact no longer significant. In addition, we find weak evidence for an influence of risk tolerance: in the binary models, more risk averse households have a higher probability to completely refuse the advice. We do not find an influence of financial knowledge on the willingness to follow advice, which might be due to the fact that our sample is fairly homogenous in this aspect: most of the households are highly educated; the median household holds a university degree.

Second, we consider person-related attributes of the advisor. We find that the overall satisfaction with the advisor and the interview of the decision maker (based on nine single attributes) positively influences the willingness to follow advice. The higher the overall satisfaction, the higher the probability that the advice is followed. As the single attributes are highly correlated with each other, disentangling the effects is not possible (with a Cronbach's alpha of 0.9068). We assume that people have difficulties in correctly evaluating the quality of advice; they evaluate attributes such as likability and interview atmosphere (e.g. enough time for questions) instead.

We find that households benefit from the interview with the consumer center. However, on average, the households do not feel confident enough to do without advice in the future. This result is even more striking if we consider the high education of our sample. Along with our assumption that people have difficulties correctly evaluating the quality of advice, this implies a need of protection for investors seeking for advice.

Besides person-related attributes we also analyze the motivation of asking for advice, i.e. the reason why the household initially asked for advice. We find that a concrete reason increases the probability that the advice is followed, in contrast to a general need for information. People who came to improve or to reassure themselves of their own existing strategy show a lower willingness to follow the recommendation of the consumer center.

We also investigate option-related attributes of the advice itself and find strong differences between the specific asset types that are recommended. It is more likely that people follow the advice if it concerns call money, a "Riester" savings plan, or an insurance contract. On the contrary, if the advice concerns bonds or bond funds (less pronounced also for stocks and stock funds) it is less likely to be followed. For one-time investments, the acceptance rate is higher than for regular investments. The impact of the advice itself is surprisingly high and option-related attributes seem to be more important than person-related attributes, but this might be due to too little variation in the data with respect to person-related attributes. On the

one hand, most of our participants are highly educated, yielding little variation in person-related attributes of the decision maker. On the other hand, the interviews at the consumer center all proceed in a similar way and advisors do not face the typical conflict of interest caused by commission-based advice, correspondingly yielding little variation in the evaluation of person-related attributes of the advisor. Further studies of this issue are required to further investigate the impact of person-related versus option-related attributes. This is especially important given that the Federal Ministry of Consumer Protection plans on taking further action to achieve a high standard of financial advice.

Our results are only partly in line with the existing literature. To our best knowledge, there is so far no study concerned with the acceptance of financial advice with real world data. The effects confirm parts of the model of Jungermann (1999) and the experimental evidence (e.g. Harvey and Fischer (1997), Harvey et al. (2000), or Van Swol and Sniezek (2005)).

Our analysis shows that about half of the advice from the consumer center is accepted. We do not have figures for comparable decisions, e.g. from a traditional bank and can thus, not say whether this is a good acceptance rate for financial advice or not. However, our study gives some details about how to improve the acceptance of advice. Difficulties occur particularly with complex products like bond or stock funds. According to the comments given by the participants of the questionnaire, the acceptance rate could be increased by a second interview intended to clarify further questions and check the status of the implementation. This, however, would simultaneously also increase the effort required and subsequently the costs of the advice offer. Another weak point is the form of the recommendation: the households require more explicit advice, i.e. the recommendation of concrete products. At the moment, some of them are overwhelmed with too much imprecise information - and thus with the implementation of the recommendation. It is easier for them to receive the advice and the product in a single step, as is the rule when they go to a bank. This convenience of traditional banks' offer can thus be seen as competing against the product independence of the consumer center.

5.7 Appendix A: Cover Letter and Questionnaire

The following section provides a translation of the cover letter and the questionnaire. Cover letter and questionnaire were originally in German.

Verbraucherzentrale Baden-Württemberg e. V. · Paulinenstraße 47 · 70178 Stuttgart

Beratungsstelle Stuttgart
Paulinenstraße 47
70178 Stuttgart

Fax (07 11) 66 91-50
www.vz-bw.de

InfoTelefon / Terminvereinbarung
0180-5-50 59 99
Mo bis Do 10-18 Uhr, Fr 10-14 Uhr
0,14 EUR/Min. aus dem deutschen Festnetz, aus den Mobilfunknetzen höhere Preise möglich.

Please help us to improve our advice concept!

Dear...,

Ihr Zeichen	Unser Zeichen	Telefon	Datum
	FDL	-48	

Some time ago you had a counseling interview about financial investments and retirement provisions.

To improve our advice concept, we commissioned a study to the University of Mannheim. This study is based on an anonymous survey of those who asked the consumer center for advice.

If you fill in and send back the attached questionnaire, you help us a lot! With your answers we can get important insights to improve the quality of our service.

As a little thank-you for your efforts, please find enclosed some frequently asked questions and answers about the financial crisis.

Kind regards

Niels Nauhauser

Product manager financial services

Telefonische Beratung

Telekommunikation, Freizeit, Haushalt
Mo-Do 10-18 Uhr 0900-1-77 444-1

Ernährung, Kosmetik, Hygiene
Mo-Do 15-18 Uhr 0900-1-77 444-2

Versicherungen
Mo-Do 10-18 Uhr 0900-1-77 444-3

Altersvorsorge, Banken, Kredite
Mo-Do 10-18 Uhr 0900-1-77 444-4

Bauen und Wohnen
Mo-Do 10-18 Uhr 0900-1-77 444-5

Energie
Mo-Do 15-18 Uhr 0900-1-77 444-6

1,75 EUR/Min. aus dem deutschen Festnetz, aus den Mobilfunknetzen höhere Preise möglich.

Patienten UPD 0180-3-11 77 22
Mo-Fr 10-18 Uhr
0,09 EUR/Min. aus dem deutschen Festnetz, aus den Mobilfunknetzen höhere Preise möglich.

Bank für Sozialwirtschaft
BLZ 601 205 00
Konto 87 201 00

Steuer-Nr. 99018/06485

Anerkennung als gemeinnützige Körperschaft durch Finanzamt Körperschaften Stuttgart.
Eingetragen im Vereinsregister Nr. VR 1259 Amtsgericht Stuttgart.

Verbraucherzentrale
Baden-Württemberg e. V.

Vorsitzende des Verwaltungsrates Bärbl Maushart
Vorstand Beate Weiser

Part A: Questions concerning the counseling interview

What was the reason for the interview? (Please check, multiple answers are allowed)

☐ Specific reason (e.g. heritage)

☐ General information needs concerning financial investment and retirement provisions

☐ First detailed counseling interview about retirement provisions

☐ Uncertainty regarding current financial investments

☐ Show improvement potential for current financial investments

☐ Need for reassurance of personal investment strategy

☐ Previous counseling interviews have been unsatisfactory

☐ Further reasons (please specify):

_____

_____

_____

Why did you seek advice from the Verbraucherzentrale (consumer center)? (Please check, multiple answers are allowed)

☐ Recommendation from friends

☐ Recommendation from the consumer center during another counseling interview

☐ Press, radio, television

☐ Online search

☐ I expect independent advice

☐ Other providers do only intend to earn a commission with me, here I pay a lump sum

☐ To compare the offer with other counseling interviews

☐ For checking purposes, show room for improvement

☐ As a comparison to my present strategy

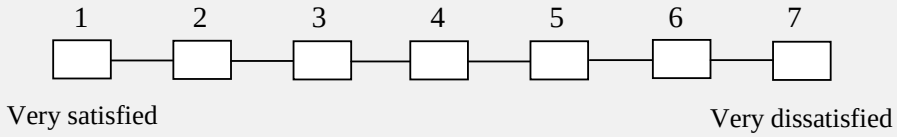
☐ Further reasons (please specify):

_____

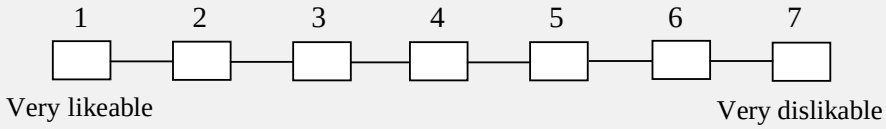
_____

_____

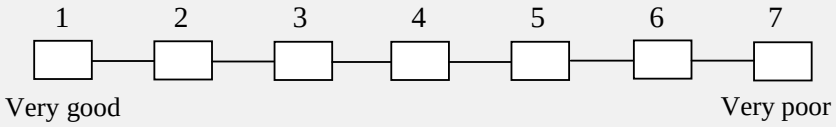
Overall, how satisfied were you with the counseling interview? (Please check)



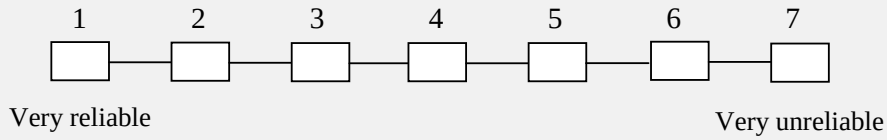
How likeable was the advisor from the consumer center? (Please check)



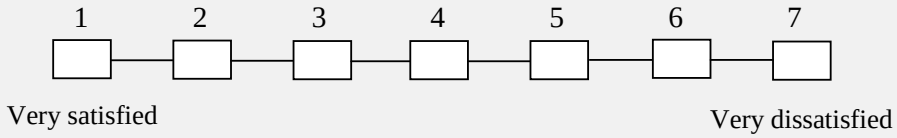
Please assess the expertise of your advisor. (Please check)



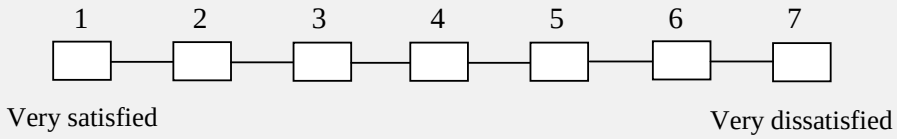
Please assess the reliability of your advisor. (Please check)



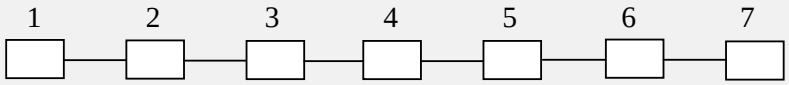
How satisfied were you with the consideration of your personal situation? (Please check)



How satisfied were you with the explanation of the asset types? (Please check)

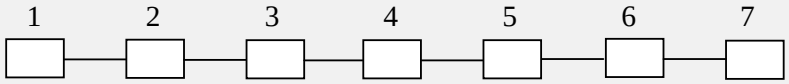


Was there enough time to ask questions and to resolve ambiguities? (Please check)



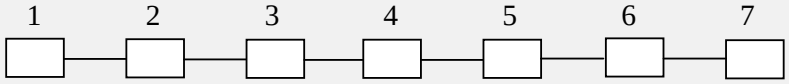
Plenty of time — No time at all

Were the advisor's answers understandable? (Please check)



Very understandable — Not understandable at all

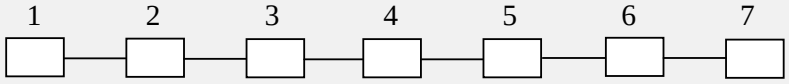
How confident appeared the advisor that the suggested investment strategy was the right one for you? (Please check)



Very confident — Not confident at all

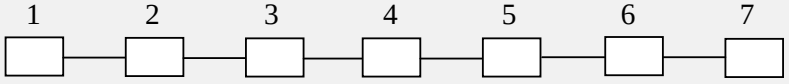
What were the benefits of the interview? Please state how far you agree/ disagree with the following statements!

Now, I know the advantages and disadvantages of financial products much better. (Please check)



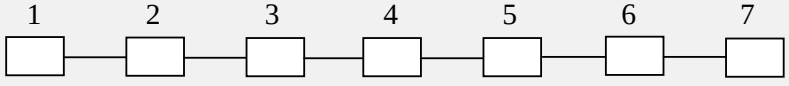
Strongly agree — Strongly disagree

I now feel more confident regarding financial issues. (Please check)



Strongly agree — Strongly disagree

Now, I can counsel myself and don't need to ask for advice anymore. (Please check)



Strongly agree — Strongly disagree

Did you have a further counseling interview since your interview with the consumer center? (Please check)

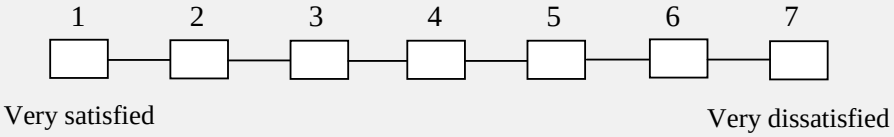
yes ☐ **no** ☐

If yes, where did the interview take place? (Please name it):

_____

If yes, when did the interview take place? (Month, year): _____ _____

Overall, how satisfied were you with this counseling interview? (Please check)



Would you make use of the advisory service of commercial and saving banks regarding your financial investments and retirement provisions again? (Please mark with a cross)

yes ☐ **no** ☐

Statement:

_____
_____
_____
_____
_____

<u>Part B: General information about the household</u>

Gender (Please check):

☐ female

☐ male

☐ couple

Age:

She: _____ years

He: _____ years

Highest educational attainment (Please check):

☐ Still in school

☐ Hauptschul-graduation (Lower secondary education)

☐ Realschul-graduation (Intermediate secondary education)

☐ Abitur (University qualification exam)

☐ University degree

☐ Doctorate degree

How much gross income did your household achieve last year (income before taxes and social contributions)? (Please check)

☐ Less than 25,000 €

☐ Between 25,000 and 50,000 €

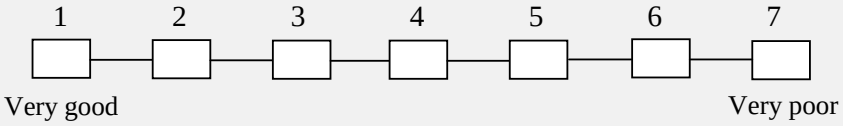
☐ Between 50,000 and 75,000 €

☐ Between 75,000 and 100,000 €

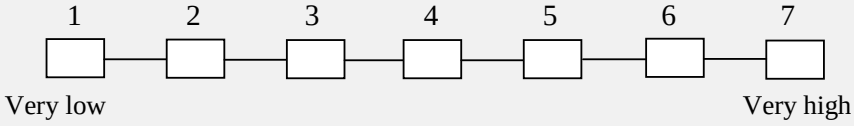
☐ More than 100,000 €

☐ N/A

How do you assess your knowledge regarding financial investments in general? (Please check)

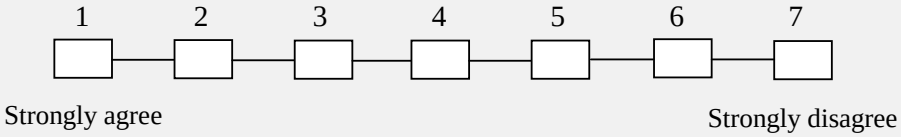


How do you assess your willingness to take risks regarding financial investments? (Please check)

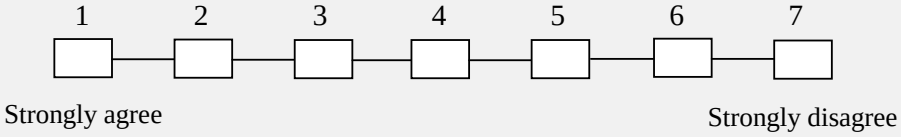


Please state if you agree or disagree with the following statements!

If I don't understand a financial product, I am glad if someone else decides for me. (Please check)



I would never invest in a financial product which I haven't fully understood. (Please check)



What percentage of German private investors do you think have superior abilities (e.g. expertise, skills interpreting information) than you to select those stocks which will develop above-average in the future? Please state a number between 0 and 100 (0 e.g. means that nobody has superior abilities than you. 50 means you're exactly average. 100 means that everybody has superior abilities than you) :

☐ **% of the German private investors have superior abilities than me.**

☐ **Don't know**

The German stock index DAX combines the 30 most important German corporations. On November 21, 2008 the DAX level was 4,127.41 points. Where do you expect the DAX level in 12 months (one year)?

We would like you to clarify your estimation by stating three numbers: An estimated value, a lower bound and an upper bound.

The best estimate (estimated value) for the actual value should be made such that the true value of the DAX should equally likely be above respectively below the estimate (i.e. with a probability of 50% it should not be below your estimate and respectively with a probability of 50% it should not be above your estimate).

With a high probability (95%) the true value of the DAX should not fall short of the lower bound, and with a high probability (95%) not exceed the upper bound.

☐

Estimated value

With 90% probability, the true value of the DAX will be between the following bounds:

☐

Lower bound
The true value of the DAX should not fall short of the lower bound with a probability of 95%.

☐

Upper bound
The true value of the DAX should not exceed the upper bound with a probability of 95%.

☐ **Don't know**

Part C: Statements regarding the implementation of the proposed strategy

At your counseling interview on (date) the consumer center recommended the following investment strategy to you:

Product	**Amount in €**	**Remark**
Call money /fixed deposits	55(rate)	Pay attention to deposit insurance. If you saved a large amount of money in an account that you can do without, an investment in fixed deposits might be considered.
Riester fund investment plan	95(rate)	To receive the whole bonus in 2008, you will have to pay in at least 1,142 €

Please state which products you bought (respectively sold, changed) upon the recommendation of the consumer center in the following table and which pieces of advice you did not follow at all or followed only partly. The last column might be used for further comments (e.g. bought another fund than the recommended one, changed the amount).

Product	**Amount in €**	**Implemented? (please check)**	**Do you remember which product you chose? (please specify)**	**Comment**
Call money /fixed deposits	55(rate)	yes O no O partly O		
Riester fund investment plan	95(rate)	yes O no O partly O		

If you once or several times checked "no" or "partly" in the above table, please explain why you did not follow the advice? (Please check, multiple answers are allowed)

☐ I did not have the time for the implementation

☐ My financial situation has changed

☐ The implementation has been too complex

☐ The recommendation was incomprehensible

☐ Another advisor (e.g. local bank) recommended something else

☐ The recommendation did not seem reasonable

☐ The advantages over the prior investment were not evident

☐ The implementation has been too difficult, the recommendation should have been more precise (many alternatives on the lists of recommendation, products still have to be negotiated with several providers)

☐ Further reasons (please specify):

_____

_____

_____

Do you have further helpful suggestions to improve the advice concept of the consumer center?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

5.8 Appendix B: Regression Analysis

Individual advice acceptance, decision maker

The table reports determinants of the individual advice acceptance (logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 0 = (partly) accepted, 1 = not accepted. Standard errors are adjusted for 186 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is a couple with mean characteristics in the other dependent variables. The column headed "Probability Estimates" reports the probability of not accepting the advice for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

Individual advice acceptance	**Coefficients (Std. Errors)**	**Prob. Est. (p = 40.95%)**
Women	-0.1225	-3.00%
	(0.2601)	
Men	0.0783	1.90%
	(0.2947)	
Age	-0.0224	-0.54%
	(0.0082)***	
Income	0.0495	1.20%
	(0.1173)	
Education	0.1173	2.84%
	(0.1104)	
Knowledge	0.0500	1.21%
	(0.0989)	
Risk tolerance	-0.1461	-3.53%
	(0.0797)*	
Constant	0.2119	
	(0.7939)	
Observations	527	
Wald $Chi^2(7)$	9.28	
$p > Chi^2$	0.2329	
Pseudo R^2	0.0074	

Individual advice acceptance, advisor

The table reports determinants of the individual advice acceptance (logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 0 = (partly) accepted, 1 = not accepted. Standard errors are adjusted for 186 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is a couple with mean characteristics in the other dependent variables. The column headed "Probability Estimates" reports the probability of not accepting the advice for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

Individual advice acceptance	**Coefficients (Std. Errors)**	**Prob. Est. (p = 40.78%)**
Women	-0.0911	-2.20%
	(0.2639)	
Men	0.0592	1.43%
	(0.2901)	
Age	-0.0226	-0.55%
	(0.0079)***	
Income	0.0922	2.23%
	(0.1155)	
Education	0.1005	2.43%
	(0.1060)	
Knowledge	0.0543	1.31%
	(0.0994)	
Risk tolerance	-0.1688	-4.08%
	(0.0757)**	
Satisfaction9	0.3864	9.33%
	(0.1252)***	
Constant	-0.6260	
	(0.8164)	
Observations	527	
Wald $Chi^2(8)$	20.62	
$p > Chi^2$	0.0082	
Pseudo R^2	0.0337	

Individual advice acceptance, motivation

The table reports determinants of the individual advice acceptance (logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 0 = (partly) accepted, 1 = not accepted. Standard errors are adjusted for 186 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is a couple with mean characteristics in the other variables. The column headed "Probability Estimates" reports the probability of not accepting the advice for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

Individual advice acceptance	**Coefficients (Std. Errors)**	**Prob. Est. (p = 40.67%)**
Women	-0.0687	-1.66%
	(0.2500)	
Men	0.0382	0.92%
	(0.2785)	
Age	-0.0215	-0.52%
	(0.0094)**	
Income	0.0087	0.21%
	(0.1132)	
Education	0.1648	3.98%
	(0.1071)	
Knowledge	0.0539	1.30%
	(0.1046)	
Risk tolerance	-0.1624	-3.92%
	(0.0813)**	
General information need	0.0052	0.13%
	(0.2126)	
Uncertainty	-0.2217	-5.32%
	(0.2272)	
Improvement of current allocation	0.2589	6.27%
	(0.2218)	
First interview	-0.2434	-5.80%
	(0.2539)	
Reassurance of current allocation	0.5350	13.13%
	(0.2023)***	
Concrete reason	-0.5646	-13.07%
	(0.2556)**	
Other advisors unsatisfying	0.1474	3.59%
	(0.2367)	
Constant	0.0918	
	-0.9814	
Observations	527	
Wald $Chi^2(14)$	30.1900	
$p > Chi^2$	0.0072	
Pseudo R^2	0.0367	

Individual advice acceptance, asset types

The table reports determinants of the individual advice acceptance (logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 0 = (partly) accepted, 1 = not accepted. Standard errors are adjusted for 186 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is a couple with mean characteristics in the other variables. The column headed "Probability Estimates" reports the probability of not accepting the advice for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

Individual advice acceptance	**Coefficients (Std. Errors)**	**Prob. Est. (p = 39.37%)**
Women	-0.2088	-4.97%
	(0.3115)	
Men	0.0829	1.99%
	(0.3568)	
Age	-0.0263	-0.63%
	(0.0096)***	
Income	-0.0326	-0.78%
	(0.1404)	
Education	0.1356	3.24%
	(0.1309)	
Knowledge	-0.0009	-0.02%
	(0.1064)	
Risk tolerance	-0.1604	-3.83%
	(0.0944)*	
Call money	-1.4720	-30.37%
	(0.3538)***	
Savings	0.0087	0.21%
	(0.2793)	
Stocks, stock funds	0.1435	3.45%
	(0.3273)	
Bonds, bond funds	0.9040	22.13%
	(0.2950)***	
Riester	-0.7632	-16.89%
	(0.3616)**	
Insurance	-1.8330	-31.39%
	(0.6188)***	
Outstanding debts	-1.0451	-20.93%
	(0.9113)	
Constant	1.1597	
	(0.9697)	
Observations	527	
Wald $Chi^2(14)$	69.91	
$p > Chi^2$	0.0000	
Pseudo R^2	0.1245	

Individual advice acceptance, one-time investments

The table reports determinants of the individual advice acceptance (logistic regressions with clustering) for one-time investments.

Coding of dependent variable (individual advice acceptance): 0 = (partly) accepted, 1 = not accepted. Standard errors are adjusted for 99 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is a couple with mean characteristics in the other variables. The column headed "Probability Estimates" reports the probability of not accepting the advice for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

Individual advice acceptance	**Coefficients (Std. Errors)**	**Prob. Est. (p = 33.00%)**
Women	-0.0241	-0.53%
	(0.4191)	
Men	0.1863	4.20%
	(0.4260)	
Age	-0.0282	-0.62%
	(0.0154)*	
Income	0.0933	2.06%
	(0.1765)	
Education	0.1033	2.28%
	(0.1567)	
Knowledge	-0.0077	-0.17%
	(0.1576)	
Risk tolerance	-0.9340	-2.07%
	(0.1333)	
Log_amount	0.2507	5.54%
	(0.1329)*	
Constant	-2.2761	
	(1.4205)	
Observations	230	
Wald $Chi^2(8)$	7.48	
$p > Chi^2$	0.4860	
Pseudo R^2	0.0224	

Individual advice acceptance, one-time investments (dummy)

The table reports determinants of the individual advice acceptance (logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 0 = (partly) accepted, 1 = not accepted. Standard errors are adjusted for 186 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is a couple with mean characteristics in the other variables. The column headed "Probability Estimates" reports the probability of not accepting the advice for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

Individual advice acceptance	**Coefficients (Std. Errors)**	**Prob. Est. (p = 40.88%)**
Women	-0.1942	-4.68%
	(0.2603)	
Men	0.0222	0.54%
	(0.2959)	
Age	-0.0131	-0.32%
	(0.0094)	
Income	0.0247	0.60%
	(0.1153)	
Education	0.1266	2.82%
	(0.1115)	
Knowledge	0.0541	1.31%
	(0.0995)	
Risk tolerance	-0.1384	-3.35%
	(0.0805)*	
One-time investment	-0.4383	-10.51%
	(0.2056)**	
Constant	0.0567	
	(0.7938)	
Observations	527	
Wald $Chi^2(8)$	15.59	
$p > Chi^2$	0.0487	
Pseudo R^2	0.0231	

Individual advice acceptance, all variables

The table reports determinants of the individual advice acceptance (logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 0 = (partly) accepted, 1 = not accepted. Standard errors are adjusted for 185 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The reference household is a couple with mean characteristics in the other variables. The column headed "Probability Estimates" reports the probability of not accepting the advice for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

Individual advice acceptance	**Coefficients (Std. Errors)**	**Prob. Est. (p = 38.56%)**		**Coefficients (Std. Errors)**	**Prob. Est. (p = 38.56%)**
Women	-0.2302	-5.43%	Pieces of advice	0.1472	3.49%
	(0.3096)			(0.0792)*	
Men	0.0782	1.86%	Alternatives	-0.0894	-2.12%
	(0.3486)			(0.2671)	
Age	-0.0057	-0.13%	Other interview	-0.0510	-1.20%
	(0.0120)			0.2868	
Income	-0.0419	-0.99%	Call money	-1.2467	-26.15%
	(0.1306)			(0.3797)***	
Education	0.1171	2.78%	Savings	0.1352	3.23%
	(0.1296)			(0.3030)	
Knowledge	0.0116	0.27%	Stocks, stock funds	0.4231	10.25%
	(0.1146)			(0.3685)	
Risk tolerance	-0.2046	-4.85%	Bonds, bond funds	1.1652	28.29%
	(0.0974)**			(0.3309)***	
Satisfaction9	0.2831	6.71%	Riester	0.7265	-15.98%
	(0.1431)**			(0.3879)*	
General information need	0.0838	1.98%	Insurance	-1.7633	-30.14%
	(0.2680)			(0.6203)***	
Uncertainty	-0.2331	-5.48%	Outstanding debts	-0.7029	-14.92%
	(0.2543)			(1.1405)	
Improvement of current allocation	0.3117	7.42	One-time investment	-0.8168	-18.94%
	(0.2433)			(0.2754)***	
First interview	-0.2072	-4.85%	Constant	-0.6002	
	(0.2992)			(1.3653)	
Reassurance of current allocation	0.4161	10.06%	Observations	524	
	(0.2618)		Wald $Chi^2(26)$	90.44	
Concrete reason	-0.6053	-13.62%	$p > Chi^2$	0.0000	
	(0.3234)*		Pseudo R^2	0.1694	
Other advisors unsatisfying	0.0257	0.61%			
	(0.3037)				

Individual advice acceptance, all except for demographic variables

The table reports determinants of the individual advice acceptance (ordered logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 1 = fully accepted, 2 = partly accepted, 3 = not at all accepted. Standard errors are adjusted for 205 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

Individual advice acceptance	**Coefficients (Std. Errors)**
Satisfaction9	0.2545
	(0.1335)*
General information need	0.2372
	(0.1910)
Uncertainty	-0.1895
	(0.1997)
Improvement of current allocation	0.2960
	(0.1909)
First interview	-0.1501
	(0.2428)
Reassurance of current allocation	0.3267
	(0.2071)
Concrete reason	-0.5387
	(0.2181)**
Other advisors unsatisfying	0.1718
	(0.2179)
Pieces of advice	0.1251
	(0.0516)**
Alternatives	-0.0630
	(0.2862)
Other interview	0.0450
	(0.2559)
Call money	-1.0599
	(0.3184)***
Savings	0.2628
	(0.2697)
Stocks, stock funds	0.6694
	(0.3050)**
Bonds, bond funds	1.0421
	(0.3032)***
Riester	-0.8956
	(0.3483)***
Insurance	-1.2178
	(0.4615)***
Outstanding debts	-0.4554
	(0.8091)
One-time investment	-0.5805
	(0.2171)***
Observations	581
Wald $Chi^2(19)$	110.80
$p > Chi^2$	0.0000
Pseudo R^2	0.1148

Individual advice acceptance, all except for demographic variables

The table reports determinants of the individual advice acceptance (logistic regressions with clustering) for all pieces of advice.

Coding of dependent variable (individual advice acceptance): 0 = (partly) accepted, 1 = not accepted. Standard errors are adjusted for 205 household clusters. They are reported underneath the coefficients in parentheses. Coefficients significant at the 10% level are denoted by *, at the 5% level by **, and at the 1% level by ***.

The column headed "Probability Estimates" reports the probability of not accepting the advice for the reference household, and the change in this probability caused by a unit change in a binary variable and a one-standard-deviation change in a continuous or discrete variable.

Individual advice acceptance	**Coefficients (Std. Errors)**	**Prob. Est. (p = 39.11%)**
Satisfaction9	0.2597	6.18%
	(0.1412)*	
General information need	0.2053	4.86%
	(0.2346)	
Uncertainty	-0.2391	-5.65%
	(0.2304)	
Improvement of current allocation	0.2507	6.00%
	(0.2252)	
First interview	-0.2086	-4.91%
	(0.2794)	
Reassurance of current allocation	0.3417	8.28%
	(0.2388)	
Concrete reason	-0.7028	-15.73%
	(0.3072)**	
Other advisors unsatisfying	0.0926	2.22%
	(0.2720)	
Pieces of advice	0.1597	3.80%
	(0.0613)***	
Alternatives	-0.0161	-0.38%
	(0.2685)	
Other interview	-0.1265	-2.98%
	(0.2744)	
Call money	-1.1624	-24.84%
	(0.3492)***	
Savings	0.2307	5.56%
	(0.2779)	
Stocks, stock funds	0.6003	14.66%
	(0.3225)*	
Bonds, bond funds	1.1487	27.93%
	(0.2963)***	
Riester	-0.7044	-15.64%
	(0.3429***	
Insurance	-1.3800	-25.95%
	(0.5636)**	
Outstanding debts	-0.9551	-19.43%
	(1.0228)	
One-time investment	-0.6315	-14.82%
	(0.2443)***	
Constant	-1.2062	
	(0.5819)**	
Observations	581	
Wald $Chi^2(19)$	96.28	
$p > Chi^2$	0.0000	
Pseudo R^2	0.1594	

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