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Financial Literacy – A Barrier to Seek Financial Advice but not a Shield Against Following it

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Julia Sprenger¹

Financial Literacy – A Barrier to Seek Financial Advice but not a Shield Against Following it

Abstract

The current study examines individual decision making in the field of personal finance. How do people arrive at a financial decision? A laboratory experiment investigates the way external information is integrated into the decision-making process. Financial literacy shows to lower demand for financial advice but it does not immunize against sunk cost fallacies: High financial literate subjects are not less likely to follow financial advice than less literate subjects, even when the quality of advice is moderate. Overconfidence biases the perceived need for information. Both results point to difficulties in making an informed choice.

JEL Classification: C91, G02, D83

Keywords: Financial literacy; overconfidence; financial decision making; experiment; advice

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1 Introduction

For many financial decisions people have the option to seek external information. They can for example ask a financial consultant or an acquaintance for advice (personal information) or they can compare different product information sheets (impersonal information). This paper seeks to shed light on the way external information is integrated into the decision making process and influences the decision outcome. It links information acquisition behavior to both financial literacy and confidence.

The use of personal and impersonal information is examined with a laboratory experiment. In the experiment participants have to make a range of financial decisions that require the critical evaluation of various financial products. The quality of the decision determines the participant's payoff. To prepare their decision participants can make use of additional information. This is displayed on demand only and its usage is charged. In treatment 1, participants can acquire explanations of specific terms from the field of finance. In treatment 2, participants can acquire an explanation or a recommendation for a certain option (expert or naïve advice).

The objective of treatment 1 is to analyse the link between confidence and information acquisition strategy. Do underconfident participants prefer an information strategy that includes external sources of information whereas overconfident participants are more likely to favour an information acquisition strategy based on internal sources of information only?

The objective of treatment 2 is to analyse the subject's conduct towards advice. Do high levels of financial literacy a) discourage advice seeking and b) postpone the use of advice? If the answers to a) and b) are affirmative, financial literacy seems to promote a critical conduct towards advice *ex ante*. This leads to the question if the critical conduct is maintained *ex post* as well: Do high levels of financial literacy reduce compliance?

The paper contributes to the existing literature in several ways:

First, the paper considers financial literacy and confidence detached from one another. Previous studies often assume that both variables point in the same direction: Greater knowledge leads to greater confidence about one's ability to make good decisions and thus to lower search efforts (see e.g., Hoffmann & Broekhuizen, 2009). Empirical studies reveal that in the field of finance this is not generally true: Subjects with high financial literacy can be underconfident and subjects with low financial literacy can be overconfident (OECD, 2005; ANZ, 2011), suggesting to disentangle both variables.

Second, the paper offers an integrated perspective on advice comparing the conduct towards advice before and after receiving it. So far many papers have focused either on the *ex ante* perspective (advice seeking, see e.g., Yaniv & Kleinberger, 2000; Gino et al., 2012) or on the *ex post* perspective (compliance, see e.g., Gino & Moore, 2007; Feng & MacGeorge, 2006). A comprehensive approach allows for analyzing the operating range of influence factors, revealing if an effect on *ex ante* conduct has enough power to alter *ex post* conduct as well.

Third, the paper examines the impact of financial literacy on compliance relative to the impact of contextual factors such as availability, quality, and cost of advice. So far both influence factors have been analyzed separately (Gibbons, Sniezik & Dalal, 2003; Yaniv & Kleinberger, 2000; Gino, 2008). Contrasting financial literacy and contextual factors allows for evaluating which factor has a stronger impact on compliance.

In the first place, the results are relevant in the context of financial consulting, revealing if the assumption that high financial literacy protects individuals against financial advice of minor quality proves adequate or if this assumption¹ is too naïve. The latter would imply that high standards in financial consulting need to be monitored and audited externally.

In addition to that, the results are relevant in the context of consumer empowerment (Chater et al., 2010; Howells, 2005; Broniarczyk & Griffin, 2014; Brennan & Coppack, 2008), revealing if overconfidence biases the perceived need for external information. To recognize such a bias allows for identifying groups especially vulnerable to overreliance on internal sources of information.

The rest of the paper is organized as follows: Section 2 outlines the literature. Section 3 gives a detailed description of the experimental design and introduces the hypotheses. Section 4 reports the experimental results. Section 5 discusses the results and concludes.

2 Literature

2.1 Confidence

The term *confidence* is used to describe the relationship between objective knowledge as measured by a test and subjective knowledge as measured by self-assessment. Previous research has shown that subjective and objective measures of financial knowledge do not necessarily coincide (Courchane, 2005; Robb & Woodyard, 2011) and should therefore be treated as separate but related constructs (Feick et al., 1992). Non-coincidence can point in two directions:

- a) If the subjective knowledge score exceeds the objective knowledge score, subjects are overconfident, i.e., they think they know more than they actually do (Alba & Hutchinson, 2000).
- b) If the objective knowledge score exceeds the subjective knowledge score, subjects are underconfident, i.e., they think they know less than they actually do.

The objective knowledge level in the field of finance is denoted with the term *financial literacy*. In line with Huston (2010) and Lusardi & Mitchell (2007a, 2007b) the term refers to both the knowledge of basic financial concepts such as compound interest or inflation and basic numerical skills.

2.2 Confidence and information acquisition strategy

To prepare a financial decision subjects have two information strategies at choice: they can rely on prior knowledge and information obtained from memory (internal search for information) or they can seek new information from the environment (external search for information). Prior research showed that subjects decide to collect external information when the internal search proves inadequate (Assael, 1984; Bettman, 1979; Engel et al., 2000).

The fact that individuals seem to have problems assessing their financial knowledge accurately leads to the question how the individual level of confidence influences the information strategy.

Cooper et al. (1995) examined the information search practices of entrepreneurs and showed that the entrepreneurs' opinions of how much information they need is biased: Overconfident entrepreneurs search less intensely than those with lower confidence levels as they are blinded to their need to acquire more information.

Biehal (1983) showed that consumer with above average objective product knowledge still engage heavily in external search if they feel ignorant about the subject and whereas consumer with below average objective product knowledge who feel very confident about their knowledge level rely

¹ See Williams (2007) for an analysis about the relationship between financial education and consumer responsabilization

on their self to make the purchase decision. He concludes that the absolute amount of information in memory may be less important as a determinant of search than the consumer's perception of how knowledgeable he is.

Zacharakis and Sheperd (2001) examined the investment decisions of venture capitalists in a policy capturing experiment and conclude that venture capitalists are overconfident, leading to an overreliance on the existing knowledge base and limited information search.

These findings from the fields of consumer research and business venturing suggest that the objective level of financial literacy may not be the sole determinant of the information strategy adopted. Whether individuals rely on their internal knowledge base or search for external information rather depends on their perceived ability to make a decision. On the basis of the above mentioned arguments I hypothesize that underconfident subjects prefer an information strategy that includes external sources of information whereas overconfident subjects tend to use an information strategy that is based on internal sources of information only.

2.3 Conduct towards advice

The term advice is used here in the narrow sense of a recommendation for a certain action (Dalal & Bonaccio, 2010) that is not further justified (*Choose option X!*). In line with Schotter (2003) *naive advice* refers to a case where the advisor is no more knowledgeable than the advisee and *expert advice* refers to a case where the advisor has an advance in knowledge.

2.3.1 Ex ante: What makes people seek advice?

People seek advice in order to share accountability and to improve the decision quality (Harvey & Fischer, 1997; Yaniv 2004a, 2004b). Individuals are generally more likely to seek advice when the cost of seeking advice is low (Schrah et al., 2006; Gino, 2008) and when the decision problem is complex (Snizek & Buckley, 1995; Schrah et al., 2006).

Findings on the relationship between financial literacy and advice seeking are less consistent:

Some studies document a negative relationship between financial literacy and advice seeking, suggesting that individuals with lower levels of financial literacy are more inclined to make use of financial advice. According to these findings advice serves as a substitute for financial knowledge. Hackethal et al. (2010) analyse the behaviour of German retail investors and find that customers with lower subjective knowledge levels in finance are more likely to rely on advice. Hung and Yoong (2010) find that individuals with low financial literacy (both self-assessed and measured) choose to seek advice more often. Kramer (2012) finds that banking clients who view themselves as less financially literate are more likely to ask for expert financial assistance. Finke et al. (2011) show that subjects with high self-reported knowledge are less likely to pay for professional financial advice.

Other studies document a positive relationship between financial literacy and advice seeking, indicating that advice serves as a complement to, rather than a substitute for, financial capability. Collins (2012) analyses data from the 2009 FINRA Financial Capability Survey and finds that the use of advice increases for higher levels of income, educational attainment, and financial literacy. Bucher-Koenen and Koenen (2011) analyse data from the SAVE panel and find that individuals with higher financial literacy are more likely to solicit financial advice. Lusardi and Mitchell (2006) find that people with high financial literacy consult a financial planner more often. A possible explanation for a positive relation between financial literacy and the inclination to seek advice is that people with higher financial literacy are offered better advice (Bucher-Koenen & Koenen, 2011), that they have higher opportunity costs of time (Hackethal et al. 2011), and that less knowledgeable people lack the

ability to recognize their illiteracy, therefore overestimate their ability and hence do not seek advice (Kruger & Dunning, 1999).

2.3.2 *Ex post: What makes people follow advice?*

Advice utilization refers to the extent to which subjects follow advice, advice discounting, conversely, refers to the extent to which advice is not followed (Bonaccio & Dalal, 2006). Previous research has shown that people tend to overweigh their own opinion relative to the opinion of others (Yaniv, 2004b, Yaniv & Kleinberger, 2000; Gardner & Berry, 1995; Harvey & Fischer, 1995).

Several factors influence how pronounced the tendency to discount advice is:

One influence factor is the source of advice with expert advice being more influential than novice advice (Jungermann & Fischer, 2005). Advice discounting also depends on the quality of advice: poor advice is discounted more than good advice with subjects being sensitive to any changes in the quality of advice (Yaniv & Kleinberger, 2000). This effect showed when participants received feedback of the quality of advice as well in a no-feedback condition. Another influence factor is the level of task requirements as subjects discount advice less when tasks are complex (Schrah et al., 2006; Gino & Moore, 2007). In addition, advice that has been solicited is more likely to be followed than advice that has been given without request (Gibbons, Sniezek & Dalal, 2003) and purchased advice is weighted more heavily than advice that is offered for free (Gino, 2008).

Apart from these contextual factors, the individual knowledge base influences the tendency to discount advice as well: advice discounting is less pronounced for subjects who are less knowledgeable relative to their advisors (Harvey & Fischer, 1997; Sniezek, Schrah & Dalal, 2004). Bucher-Koenen and Koenen (2011) showed that individuals with high financial literacy are less likely to follow financial advice. A possible explanation for this finding can be found in the idea that advice discounting occurs because subjects have access to their internal justifications for arriving at a particular decision but no access to the advisors' reasoning (Yaniv 2004a, 2004b, Yaniv & Kleinberger, 2000). Less knowledgeable subjects accordingly retrieve less supporting information for their own decision and therefore discount advice less than more knowledgeable subjects do (Yaniv 2004b).

To summarize, previous literature indicates that financial literacy influences the conduct towards advice *ex ante* as well as *ex post*. On the basis of the above mentioned arguments I hypothesize that financial literacy discourages advice seeking and lowers compliance - at least when opportunity costs of time do not exist and advisors do not provide better advice to financial literate subjects. Again, as individuals have problems to assess their financial knowledge accurately, it seems reasonable to investigate as well if overconfidence has a similar effect.

3 Experimental design and hypotheses

The main idea of the experiment is to link financial literacy and confidence to information acquisition behaviour. The experiment consists of two parts. In the first part, the financial literacy of each participant was ascertained, once by self-assessment and once by a financial literacy test. In the second part, participants had to solve five decision problems from the field of personal finance. At each decision problem they had to choose a financial product out of a set of four or five. The participant's payment depended on the degree to which the chosen product met the decision criteria predefined in the task. To better prepare their decision, participants could acquire additional pieces of information such as explanations of specific terms or advice.

3.1 Financial literacy test

At the beginning of the experiment, participants were asked to rate their financial literacy on a scale from zero to five. Five indicated that the participant considered his financial literacy to be very high; zero indicated that the participant considered his financial literacy to be very low. Only integer numbers could be entered.

Thereafter, participants took part in a financial literacy test (see Appendix B).² The test consisted of five multiple choice questions and measured the comprehension of basic economic concepts as well as the competences in basic financial numeracy. After the test, participants learned how many questions they answered correctly. For each correct answer they received € 1.

Comparing objective knowledge as measured by the test and subjective knowledge as measured by self-assessment allowed for identifying the confidence level.

3.2 Decision problems

3.2.1 Basic design

The second part of the experiment consisted of five subsequent decision problems (see Appendix D). At each decision problem, participants had 10 minutes time to choose a financial product. A counter at the bottom of the screen displayed the time remaining. At some decision problems, participants had different financial products at choice and had to decide for example between depositing their money in a savings account, an instant access savings account or a fixed deposit account. At other decision problems, they had to compare financial products of the same kind and choose for example between different credit cards.

Table 1: Overview of decision problems

Problem No.	Task
1	Choose one of the following options to deposit your money.
2	Choose one of the following bank giro accounts.
3	Choose one of the following credit cards.
4	Choose one of the following options to obtain credit.
5	Choose one of the following savings schemes.

At each decision problem, it was necessary to identify the product that met the predefined decision criteria best in order to maximize the payoff.

Example: *Choose one of the following bank giro accounts. These are your priorities:*

- 1. You are not willing to accept an interest rate higher than 10% when using the credit facility.*
- 2. You only accept a giro account at a bank that offers a secure procedure for online banking.*

² The questions build on the Financial Literacy Test derived by Lusardi & Mitchell (2006) for the HRS

3. *After one year the amount on your giro account should have grown as much as possible.*

A table provided information about up to eight attributes of the products. Similar to real-world decisions, participants were required to select helpful from distracting information: while some of information provided by the table were necessary to assess in how far a product meets the decision criteria (e.g., interest rate), others were completely irrelevant for the decision (e.g., the level of deposit protection fund). At each decision problem, participants could call up a calculator on their screen, e.g., to compare costs and returns across several products.

The decision criteria were displayed in hierarchical order. To generate a payoff the chosen option had to meet the first criterion. If the participant chose a product that met the first criterion only, he earned €1 euro. If he chose a product that met the first and the second criterion, he earned €2. If he chose a product that met all decision criteria, he earned €3. Each decision problem entailed one product that met all decision criteria and led to the maximum payment of €3, one product that did not meet the first criterion and led to the minimum payment of €0, and two to three products with moderate fit with the criteria that led to a payment between €1 and €2. To make sure all participants understood this mechanism the instructions entailed a detailed example and the recommendation to analyse the fitness of a product starting with the first criterion.

Participants did not get direct feedback after completing a decision problem. Only after completing the whole series of decision problems, they learned how much they earned in the second part of the experiment. This payoff added up to what they earned in the financial literacy test.

3.2.2 *Information environment*

Participants were randomly assigned to two treatments. In both treatments the same basic design described above was used. But the treatments differed with regard to the information available to subjects.

3.2.2.1 *Treatment 1: Explanations only*

Participants in the first treatment received the task, the decision criteria and the information table with the annotation that all following participants would receive this decision problem as well and they could earn money by giving them advice on which product to choose. The amount of their payoff depended on the quality of their advice. If they recommended a product that met all decision criteria, they earned the maximum of €3. If they recommended a product that only met the first two criteria, they earned 2€. If they recommended a product that only met the first criterion they earned €1. The parallel remuneration system in both treatments ensured that the decision problem was the same for all participants: They had to use the information table to identify the product that had the best fit with the decision criteria in order to maximize their payoff.

The participants in the first treatment had to tick which product they would advise to the following participants. The wording of their advice was standardised to *“Choose financial product X!”*

In order to better analyse the decision problem, participants could acquire explanations of specific terms (e.g., cash on deposit, APR). Next to each term was a button labelled *“Buy for €0.20”*. If they clicked the button, a box popped up where the term was explained. In total, 19 explanations were available (see Appendix E).

The participants had an initial budget of €4 they could use for information acquisition. They were free to choose how much of this budget to spend on information acquisition before giving an advice.

After each decision problem, they saw the amount of their remaining budget. In case the budget was not exhausted, the remaining part added up to the participant's final payoff.

3.2.2.2 Treatment 2: Explanations plus advice

Participants in the second treatment received the same task, decision criteria and information table as participants in the first treatment. Only the wording of the answer options differed: in the first treatment the wording was *"Choose product number X!"* (advice), in the second treatment it was *"I choose product X!"* (choice).

The participants in the second treatment had the same initial budget for information acquisition and could buy the same explanations as participants in the first treatment. Besides, they could acquire two types of advice at each task, naïve advice and expert advice. The naïve advice was next to a bottom labelled *"Buy for €0.40"*. It had been created as follows: all participants of the first group who had rated their financial literacy with five (very high) were selected. One of them was randomly chosen and his advice was displayed to all participants of the second group who acquired the advice for €0.40.

The expert advice was available for €0.80 and had been created as follows: all participants of the first generations who correctly answered all questions in the financial literacy test were selected. One of them was randomly chosen and his advice was displayed to all participants of the second group who acquired the advice for €0.80. The way advice was created was clearly exposed in the instructions.

With respect to the advice creation mechanism, two considerations were taken into account:

- 1) The participants in the second treatment know that the enumeration system creates an incentive for the advisor to advise a product that meets all decision criteria. This eliminates the problem of trust that otherwise might influence the participants attitude towards advice.
- 2) The participants in the second treatment get no feedback on the quality of their decision after each decision problem but only at the end of the experiment. This eliminates the problem of expectation formation: with a direct feedback after each decision problem solved, participants might arrive at an estimate on the quality of both types of advice, expect this to be constant over all tasks and take it into account when choosing which piece of information to use. That way, the choice between explanation and advice would be blurred by a hidden factor.

3.3 Procedure

The experiments were programmed and conducted with the software z-Tree (Fischbacher, 2007). The experimental sessions took place in the laboratory of the Ruhr-University Bochum (RUBEX). Each session lasted 90 minutes. Before the experiment started, participants received a copy of instructions explaining the experimental design. The researcher also read the instructions aloud and gave participants the opportunity to ask questions. Throughout the experiment it was assured that participants could neither communicate with each other nor observe another participant's actions. After the experiment participants filled in a questionnaire recording their gender, age, and field of study. Earnings were paid in private at the end of the session. 66 students from various faculties participated in the experiment. 29 students participated in treatment 1 and 37 students participated in treatment 2. Their mean age was 24.5 (SD = 2.51).

3.4 Hypotheses

Hypothesis A: In treatment 2, high financial literacy and overconfidence are associated with a lower demand for advice.

Hypothesis B: In treatment 2, high financial literacy and overconfidence are associated with lower levels of compliance.

Hypothesis C: In treatment 1, low levels of confidence are associated with the adoption of an information strategy that includes external information.

4 Results

In this chapter the experimental data are analysed against the background of both research questions. At first, conduct towards advice is analysed with data of treatment 2. The focus of interest is on demand for advice, hesitation to use advice, and compliance with advice. Thereafter, the relationship between confidence and information strategy is analysed with data from treatment 1. Two probit models estimate which factors influence the willingness to include external information into the decision making process.

In treatment 1, the mean score in the financial literacy test was 3.68 (SD = 0.17), which is slightly above the mean score in the self-assessment of 3.41 (SD = 0.15). 48.3% of participants are underconfident, 24.1% are overconfident and 27.6% have an accurate self-perception.³ The mean number of explanations acquired was 3.89 (SD = 0.63).

In treatment 2, the mean score in the financial literacy test was 3.67 (SD = 0.19), which is slightly above the mean score in the self-assessment of 3.21 (SD = 0.14). 48.6% of participants are underconfident, 24.3% are overconfident and 27.0% have an accurate self-perception. The mean number of explanation acquired was 3.83 (SD = 0.40) and the mean number of advice acquired was 0.72 (SD = 0.18).

4.1 Conduct towards advice

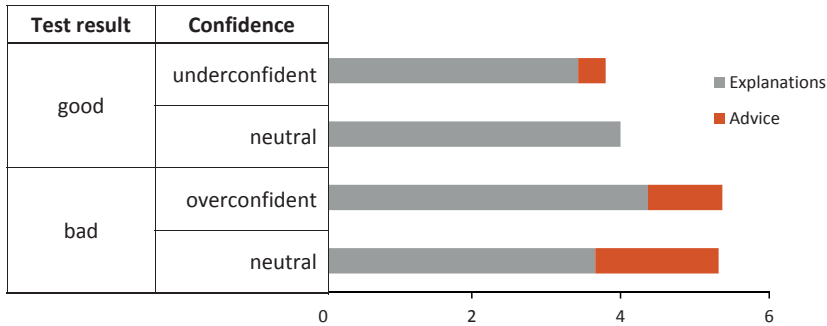
The participant's conduct towards advice is examined by observing behaviour at two points in time: Before receiving the advice (ex ante) and after having received the advice (ex post).

4.1.1 Ex ante

The ex ante conduct towards advice is measured in a twofold way: Once with the number of pieces of advice acquired and once with time variables, indicating how long a participant hesitated before acquiring a piece of advice. The time variables allow to observe how many seconds a participant had left to complete a task at the point of acquiring a piece of advice. They are included to capture reluctance to use advice as well at a level where it does not prevent the purchase but only delays it. The figure below indicates that the demand for advice varies across different levels of financial literacy and confidence.

³ Surveys sometimes report a stronger inclination towards overconfidence (see e.g., OECD, 2005). One explanation for the relative small share of overconfident participants in this experiment might be the fact that all participants are students and as such especially accustomed to critically assess their knowledge.

Fig. 1: Financial literacy, confidence, and demand for advice



Among participants with high financial literacy, advice is only attractive for the underconfident whereas the willingness to invest in advice is zero for participants with accurate self-perception. Among participants with low financial literacy, overconfident participants have a lower demand for advice ($M = 1.00$, $SD = 0.56$) than participants with accurate self-perception ($M = 1.66$, $SD = 0.55$).

A negative correlation between the level of financial literacy and the use of advice ($r_{sp} = -0.351$, $p = .033$) indicates that high levels of financial literacy lower the reliance on advice. Overconfidence seems to reduce the use of advice whereas underconfidence increases the use of advice, but the correlation between confidence and use of advice is not significant.

Taking into account time variables as well reveals that high financial literacy postpones the use of advice: The correlation between test result and point in time advice is solicited⁴ is negative ($r_{sp} = -0.825$, $p = .002$). The higher the financial literacy, the later in time advice is bought and the longer participants try to solve the task by solely relying on their internal sources of information or on explanations.

As shown in table 2, participants of high financial literacy acquire advice nearly in the last third of the processing time whereas participants of low financial literacy do so in the first third of the processing time. These differences cannot be explained by participants of high financial literacy taking generally more time to complete a task. Differences in actual processing time are very low between participants of high and participants of low financial literacy.

⁴ The variable measures the number of seconds left to complete the task after acquiring advice. Results refer to task number 4 where a sufficient number of advice items were purchased to allow for testing the association with financial literacy.

Table 2: Demand for advice, processing time, and hesitation to acquire advice summarized

Demand for advice			
Number of advice acquired	27		
Naïve advice	2	Both participants acquire naïve advice at task 5. One of them is of high financial literacy and underconfident. The other has a low financial literacy and an accurate self-perception.	
Expert advice	25	The mean financial literacy of participants acquiring expert advice is 3.23 (SD=0.30) which is below the overall average of 3.67 (SD=0.19).	
Processing time			
Maximum processing time for each task	600 sec.		
Mean number of seconds left when completing a task	82.51 (SD=2.10)	For participants of high financial literacy	81.69 (SD=3.03)
		For participants of low financial literacy	83.59 (SD=2.80)
Hesitation to acquire advice			
Mean number of seconds left after acquiring advice	328.83 (SD=30.36)	For participants of high financial literacy	205.71 (SD=21.88)
		For participants of low financial literacy	407.18 (SD=36.48)

Hesitation and processing time are measured across task 1-4 as task 5 has 3 subtasks and is therefore difficult to compare to the other tasks. In task 1-4, no naïve advice is acquired and 18 pieces of expert advice.

We can conclude from this section that participants with high financial literacy display a greater reluctance to use advice: if advice is used at all, this is only after a long period of hesitation. Overconfidence has a similar effect but the association could not shown to be significant.

4.1.2 Ex post

The ex post attitude towards advice is examined by the advisee’s response to the advice: Does he follow advice (compliance) or not (non-compliance). Compliance showed to be very strong: In 26 of 27 decisions made with the help of advice, participants acted according to the recommendation. Naïve advice was bought twice and followed both times. Expert advice was bought 25 times and followed all but one time.

Compliance is not influenced by

- a) The quality of the advice. Advice that leads to the maximum payout of €3 Euro and advice that leads to a moderate payout are equally followed. The quality of advice differed across tasks. In task 1, for example, expert advice leads to the best option. Following the recommendation earns the participants a payoff of €3. In task 4, participants have to choose between 4 ways of financing debt. The expert advice is to use one’s credit card. This recommendation is not the optimal solution as another financial product fulfills the decision criteria better. It is also not the worst option as it at least fulfills the first decision criterion. It therefore leads to a moderate payoff.
- b) The expertise of the advisor. Expert advice and naïve advice are equally followed. Surprisingly, naïve advice is followed both times.
- c) The advisee’s level of confidence or financial literacy.

There is only one single case where a participant acquires a piece of advice and chooses a deviant option. The chosen option leads to a lower payment than the advised one. The participant has low financial literacy and an accurate self-perception. With 31 years the age is well above the medium age of 24 years.

4.1.3 Comparison of conduct towards advice ex ante and ex post

Comparing the ex ante and the ex post conduct towards advice leads to the following results: Ex ante participants display a rather critical conduct towards advice, especially when they are of high financial literacy or overconfident. This shows in a lower number of advice solicited and a greater hesitation before using advice. Ex post these differences diminish: Almost all participants who acquired advice followed it, independent of the quality of advice. This reveals a rather uncritical conduct towards advice across different levels of financial literacy and confidence.

4.2 Confidence and information strategy

According to hypotheses C, overconfident participants are more likely to rely on internal sources only when making a decision whereas underconfident participants are more likely to integrate external sources into the decision-making process.

To test this hypotheses participants were grouped according to their confidence level and compared with respect to the strategy they chose to master the task. Confidence was modeled as distance between the subjective level of financial literacy as measured by self-assessment and the objective level of financial literacy as measured by the test.

Table 3: Conception of confidence

Definition	Label
Self-assessment > Test result	Overconfidence
Self-assessment < Test result	Underconfidence
Self-assessment = Test result	Neutral

At each of the five tasks, participants could choose between two information strategies:

- Using external information to solve the task (Strategy 1)
- Relying solely on internal information to solve the task (Strategy 0)

Data were pooled across subjects and decisions. In total 145 decisions on information strategy were analysed. The table below indicates a close association between the participant's confidence level and the information strategy adopted: While the majority of underconfident participants (65.7%) chooses strategy 1, overconfident participants display a strong preference for strategy 0. The Cramer's V statistic indicates that the strength of association between both variables is medium to strong and the Goodman and Kruskal's tau score indicates that the confidence variable leads to a moderate, but statistically significant increase in accuracy of predicting information strategy.

Table 4: Confidence and information strategy I

Information strategy	Strategy 0	Strategy 1	$X^2(2, 145) = 21.54, p < .001$
Confidence level			Cramer's V: .385, $p < .001$
Underconfident	24 (34.3%)	46 (65.7%)	Goodman and Kruskal's Tau (strategy as dependent variable): .149, $p < .001$
Neutral	25 (62.5%)	15 (37.5%)	
Overconfident	28 (80.0%)	7 (20.0%)	

By transforming confidence from a categorical to a metric variable, this result can be further refined: The stronger the level of underconfidence, the stronger the preference for strategy 1. The stronger the level of overconfidence, the stronger the preference for strategy 0. Again, neutral participants represent the turning point of preferences: They prefer strategy 0 but this preference is less pronounced compared to overconfident participants.

Table 5: Confidence and information strategy II

Confidence	Strategy 0	Strategy 1	
-3	1 (10.0%)	9 (90.0%)	$X^2(5, 145) = 26.58, p < .001$
-2	8 (40.0%)	12 (60.0%)	
-1	15 (37.5%)	25 (62.5%)	Cramer's V: .428, $p < .001$
0	25 (62.5%)	15 (37.5%)	
1	18 (72.0%)	7 (28.0%)	Goodman and Kruskal's Tau (strategy as dependent variable): .183, $p < .001$
2	10 (100.0%)	0 (0.0%)	

Confidence = Self-Assessment – Test Result. -3 = strong underconfidence, -2 = medium underconfidence, -1 = light underconfidence, 0 = accurate self-perception, 1 = light overconfidence, 2 = medium overconfidence. There were no cases of strong overconfidence.

These differences in strategy preferences translate into differences in the information base:

The personal level of confidence is negatively correlated to the number of explanations acquired before making a financial decision ($r_{BP} = -0.574, p = 0.001$), indicating that the information base is thinner for overconfident participants. A Kruskal- Wallis test showed a significant difference in the information base between different levels of confidence ($X^2(2) = 8.354, p = .015$). Post hoc comparison using a Mann Whitney U test showed that the mean number of information of underconfident participants ($M = 5.71, SD = 0.89$) is significantly higher than the mean number of information of overconfident participants ($M = 1.71, SD = 0.94$): $U(14.7) = -2.55, p = .010$. However, the mean number of information acquired of neutral participants ($M = 2.62, SD = 0.92$) does not differ significantly from the one of overconfident or underconfident participants.

The above mentioned results sustain when taking the level of financial literacy into account as well:

A closer look at the results of the financial literacy test reveals, that the first three questions were answered correctly by a great majority of participants whereas the fourth and fifth question represented a hurdle to many of them (see Appendix C). This sharp drop in the share of correct answers was used to group participants: Participants who answered 4-5 questions correctly are referred to as participants with a *high* level of financial literacy, whereas participants who answered 0-3 questions correctly are referred to as participants with a *low* level of financial literacy.

Table 6: Financial literacy, confidence, and information strategy

Financial literacy	Confidence	Strategy 0	Strategy 1	
Low	Underconfident	1 (20.0%)	4 (80.0%)	$X^2(4, 145) = 22.28, p < 0.001$
	Neutral	18 (60.0%)	12 (40.0%)	
	Overconfident	28 (80.0%)	7 (20.0%)	Cramer's V: .392, $p < .001$
High	Underconfident	23 (35.4%)	42 (64.6%)	
	Neutral	7 (70.0%)	3 (30.0%)	Goodman and Kruskal's Tau (strategy as dependent variable): .154, $p < .001$

Among participants with low financial literacy, overconfidence increases the preference for strategy 0 and underconfidence increases the preference for strategy 1. Among participants with a good test result, underconfidence increases the preference for strategy 1. Again, these differences in information strategy translate into differences in the information base: The number of information items acquired is highest for participants of high financial literacy who are underconfident ($M = 5.76$; $SD = 0.96$) and lowest for participants of low financial literacy who are overconfident ($M = 1.71$; $SD = 0.94$). The difference between both these groups showed to be significant in a t-test ($t(18) = -2.72$, $p = .014$).

A Mann Whitney U test shows as well a significant difference between participants with high and participants with low financial literacy concerning the amount of information acquired before making a financial decision ($U(14,15) = -2.33$, $p = .019$). However, these differences are mainly created by participants with non-accurate self-perception, as participants with accurate self-perception behave very similar with respect to the number of information items acquired: The mean number of information items acquired is 2.50 ($SD = 2.50$) for participants with high financial literacy and 2.66 ($SD = 1.08$) for participants with low financial literacy.

Table 7: Financial literacy, confidence, and information base

Financial literacy	Confidence	Number of information items acquired	
		M	SD
Low	Overconfident	1.71	0.94
	Neutral	2.66	1.08
	Total	2.35	0.67
High	Underconfident	5.76	0.96
	Neutral	2.50	2.50
	Total	5.33	0.91

Table 8: Confidence and information strategy III

Dep. Variable: Strategy	Probit (1)			Dep. Variable: Strategy	Probit (2)		
	Coefficient	(Std. Err.)	P> z		Coefficient	(Std. Err.)	P> z
Age	-.134	(.074)	.073	Age	-.104	(.078)	.181
Female	.412	(.299)	.168	Female	.394	(.297)	.184
Economics	-.923	(.296)	.002	Economics	-.743	(.325)	.022
Overconfidence	-1.053	(.300)	<.001	Medium underconfidence	-.604	(.660)	.361
Neutral	-.848	(.318)	.008	Light underconfidence	-.643	(.603)	.287
				Neutral	-1.415	(.651)	.030
				Light overconfidence	-1.460	(.644)	.024
_cons	4.104	(1.937)	.034	_cons	3.849	(1.996)	.054
Observations		145		Observations		135	
Prob > chi2		<.001		Prob > chi2		<.001	
	Margin*	(Std.Err.)	P> z		Margin*	(Std. Err.)	P> z
Economics				Economics			
0	.687	(.078)	<.001	0	.683	(.082)	<.001
1	.332	(.056)	<.001	1	.394	(.065)	<.001
Confidence				Confidence			
Underconfidence	.645	(.060)	<.001	Strong underconfidence	.836	(.143)	<.001
Overconfidence	.248	(.080)	.002	Medium underconfidence	.646	(.106)	<.001
Neutral	.317	(.091)	.001	Light underconfidence	.632	(.079)	<.001
				Neutral	.331	(.090)	<.001
				Light overconfidence	.351	(.097)	.001

*At means

Table 8 summarizes the results of two probit models. In probit (1), the variable confidence discriminates between underconfident, overconfident and neutral participants. Confidence has a significant impact on the probability of choosing strategy 1 ($X^2= 15.56$, $df=2$, $p<.01$) with underconfident participants being most likely to choose strategy 1 (64.5%) and overconfident participants least likely to do so (24.8%). Being overconfident thus reduces the probability of choosing strategy 1 by 39.74% compared to being underconfident. Being neutral reduces the probability of choosing strategy 1 by 32.83% compared to being underconfident.

Studying economics has a significant impact on the probability of choosing strategy 1 too ($z= -3.12$, $p= .002$ for a two-tailed test) with participants studying economics having a 35.54% lower probability of choosing strategy 1 than students from other disciplines.

The variables economics and confidence might be related as studying economics could be assumed to boost the confidence level disproportional to the actual knowledge level. But as the VIF are quite low (all < 1.5) both variables are kept in the model. There are no gender differences but the variable age is at the verge of being significant and therefore further examined.

Table 9: Age and confidence

Age*	Confidence	Margin	Std.Err.	Z	P> z
21	Underconfidence	.763444	.076387	9.99	.000
	Overconfidence	.404595	.120756	3.35	.001
	Neutral	.477575	.121519	3.93	.000
22	Underconfidence	.723841	.066601	10.87	.000
	Overconfidence	.358479	.102329	3.50	.000
	Neutral	.429519	.104551	4.11	.000
23	Underconfidence	.681350	.058589	11.63	.000
	Overconfidence	.314399	.087863	3.58	.000
	Neutral	.382564	.091185	4.20	.000
24	Underconfidence	.636445	.056827	11.20	.000
	Overconfidence	.272862	.078470	3.48	.001
	Neutral	.337342	.083026	4.06	.000
25	Underconfidence	.589696	.064387	9.16	.000
	Overconfidence	.234276	.074092	3.16	.002
	Neutral	.294407	.080385	3.66	.000
26	Underconfidence	.541747	.079623	6.80	.000
	Overconfidence	.198937	.073318	2.71	.007
	Neutral	.254222	.081874	3.11	.002
28	Underconfidence	.445016	.118836	3.74	.000
	Overconfidence	.138627	.074884	1.85	.064
	Neutral	.183410	.088511	2.07	.038
29	Underconfidence	.397631	.137760	2.89	.004
	Overconfidence	.113703	.074527	1.53	.127
	Neutral	.153158	.090413	1.69	.090

* No participant was 27 years old.

The results summarized in table 8 show that the impact of confidence on information strategy declines steadily with age. Underconfident participants are more likely to choose strategy 1 at the age of 21 (76.34%) than at the age of 25 (58.96%) or 28 (44.50%). The same can be observed for overconfident and neutral participants though on overall lower levels.

Probit (2) offers a refined measurement with initially 6 categories of confidence, ranging from strong underconfidence to medium overconfidence. The category medium overconfidence had to be excluded from the analysis because of perfectly predicting the choice of information strategy: every decision in this confidence category was made without using external information. The 10 observations belonging to this confidence category were therefore dropped. Similar to probit (1), confidence has a significant impact on choice of information strategy ($X^2 = 12.47$, $df=4$, $p = .01$). The probability of choosing strategy 1 steadily declines across confidence categories with highest probability for strong underconfidence (83.65%) and lowest for light overconfidence (31.54%). Being neutral lowers the probability of choosing strategy 1 by 50.49% and being slightly overconfident lowers the probability of choosing strategy 1 by 52.10% compared to being strongly underconfident. Studying economics has a significant impact on the probability of choosing strategy 1 too ($z = -2.29$, $p = .022$ for a two-tailed test) with participants studying economics having a 28.83% lower probability of choosing strategy 1 than students from other disciplines.

The age effect observed in probit (1) can be observed in probit (2) as well (see Appendix F).

5 Discussion and conclusion

Results from treatment 2 reveal that subjects with high financial literacy have a lower demand for advice than subjects with low financial literacy. But surprisingly, they are not less likely to follow advice, even when the quality of advice is moderate.

One can argue that according to the literature expert advice should be more influential than novice advice (Jungerman & Fischer, 2005). This could not be shown in the experiment. A possible explanation is that in the experiment naïve advice stem from subjects with high confidence levels. This may have eroded differences in compliance as people use the advisors confidence to infer his abilities and task-related knowledge (Price & Stone, 2004).

But why was moderate quality of advice no barrier to compliance, at least for the more financial literate?

One explanation for the insensitivity towards advice quality might be a hierarchy among the influence factors on advice discounting: On the one hand, advice was given on demand only and acquiring advice was costly. Both contextual traits have shown to promote compliance (Gibbons et al., 2003; Gino, 2005). On the other hand, high financial literacy is assumed to reduce compliance (e.g., Snizek et al. 2004, Bucher-Koenen & Koenen, 2011). In the experiment, compliance was prevalent, indicating that the influence of the contextual traits was dominant. Financial literacy might promote a critical conduct towards advice ex ante but it does not immunize against sunk cost fallacies.

Engelmann et al. (2009) offer another explanation for high levels of compliance: They analyse neural activation patterns of participants making a series of financial choices. When expert financial advice is displayed, these neural activation patterns flatten. Engelmann et al. conclude that in the presence of advice subjects offload the burden of figuring out the best decision option to the expert. The results of the current experiment point in a similar direction: Only three participants bought both explanations and advice to solve a specific task. Each of them did so in one of the five tasks only. Two of them bought explanations first and turned to expert advice afterwards, probably because they gave up solving the task by internal reasoning. Only one person bought expert advice first and explanations later onwards. This can be interpreted as a signal that advice was not used as a substitute for own reasoning. However, in the end, that person followed advice as well. Offloading could explain why high financial literacy does not immunize against the inclination to follow financial advice: It is no advantage to have a higher knowledge base if this knowledge is not activated to search for the best solution of the decision problem.

If consumers are unable to assess the quality of advice directly one might argue that they could at least try to protect against low quality advice by ensuring that the compensation scheme does not create a conflict of interest for the advisor. But Chater et al. (2010) found that this is no solution either: in their experiment participants failed to distrust advice in cases where it was evident that the compensation scheme created an incentive for the advisor to give a recommendation that is not in the best interest of the advisee.

Taken together, these findings indicate that it might be naïve to shift the assessment of advice to the client. High standards in the quality of financial consulting should therefore be enforced externally. Inderst and Ottaviani (2012) offer some ideas how this could be achieved: One idea is making incentives more long-term by regulating the split of compensation between up-front and trail

commissions. A second idea is the implementation of minimum statutory rights of cancellation and generous terms of refund. Besides, the market itself can create an incentive for the provision of good advice when clients can discern good from bad advice. Inderst and Ottiviani (2012) therefore propose to increase transparency. Future research could show if these ideas not only provide incentives for the consultant to offer good advice but also facilitate it for the client to maintain a critical conduct towards advice as the quality of advice is continuously evaluated.

Results from treatment 1 indicate that underconfidence leads to a preference for an information strategy that includes external information whereas overconfidence increases the likelihood that subjects solely rely on their internal sources of information. Empirical studies show that financial knowledge is sorely deficient in the US, Europe, New Zealand, and Australia with people having an unwarranted confidence in their abilities to make financial decisions (for an overview see Lusardi & Mitchell, 2007c, 2011.). According to this study people with low financial literacy who are overconfident are very likely to ignore external information which may result in a poor quality of financial decisions. Age seems to reduce the impact of underconfidence on the choice of information strategy. This might be due to the fact that experience teaches people their true need for information. This way of learning is of course not ideal as learning from mistakes bears potentially high costs. It might be more efficient to give consumers the opportunity to check whether they really understood crucial features of a financial product prior to the purchase. This could lead to a revaluation of the subjective knowledge and increase the perceived need for information. One step further is the adoption of a driver's licence model (Kozup & Hogarth, 2008) requiring the consumer to demonstrate some basic level of financial knowledge prior to the purchase. But this approach needs further research examining the effects of such initiatives on consumer outcome and a debate about normative questions surrounding those policies.

Literature

Alba, J.W. & Hutchinson, J.W. (2000). Knowledge calibration: What consumers know and what they think they know. *Journal of Consumer Research*, 27(2): 123-156.

ANZ (2011). *Adult Financial Literacy in Australia: Full report of the results from the 2011 ANZ Survey*. The Social Research Centre, Melbourne.

Assael, H. (1984). *Consumer behavior and marketing action*. Boston: Kent Publishing Company.

Bettman, P. (1979). *An information processing theory of consumer choice*. Reading MA: Addison-Wesley Publishing.

Biehal, G. (1983). Consumers' prior experiences and perceptions in auto repair choice. *Journal of Marketing*, 47: 82 – 91.

Bonaccio, S. & Dalal, R. S. (2006). Advice taking and decision-making: An integrative literature review, and implications for the organizational sciences. *Organizational Behavior and Human Decision Processes*, 101: 127-151.

Brennan, C. & Coppack, M. 2008. Consumer empowerment: global context, UK strategies and vulnerable consumers. *International Journal of Consumer Studies*, 32(4): 306–313.

Broniarczyk, S.M. & Griffin, J.G. 2014. Decision Difficulty in the Age of Consumer Empowerment. *Journal of Consumer Psychology*, 24(4): 608-625.

Bucher-Koenen, T. & Koenen, J. (2011). *Do smarter consumers get better advice?* Working Paper.

Chater, N., Huck, S., & Inderst, R. 2010. *Consumer decision making in retail investment services: a behavioral economics perspective*. Final report to the European Commission/SANCO.

Collins, J.M. (2012). Financial advice: A substitute for financial literacy? *Financial Services Review*, 21(4): 307–322.

Cooper, A.C., Folta, T.B., & Woo, C. (1995). Entrepreneurial information search. *Journal of Business Venturing*, 10: 107–120.

Courchane, M. (2005). Consumer literacy and creditworthiness. *Proceedings*, Federal Reserve Bank of Chicago.

Dalal, R.S., & Bonaccio, S. (2010). What types of advice do decision-makers prefer? *Organizational Behavior and Human Decision Processes*, 112: 11–23.

Engel, J., Blackwell, R. & Miniard, P. (2000). *Consumer Behaviour*. New York: The Dryden Press.

Engelmann, J.B., Capra, C.M., Noussair, C. & Berns, G.S. 2009. Expert financial advice neurobiologically “offloads” financial decision-making under risk. *PLoS ONE*, 4(3):e4957.

Feng, B. & MacGeorge, E. L. (2006). Predicting responsiveness to advice: Characteristics of the problem, the advice-giver, and the recipient. *Southern Communication Journal*, 71: 67–85.

Feick, L., Park, C.W. & Mothersbaugh, D.L. (1992). Knowledge and knowledge of knowledge: What we know, what we think we know, and why the difference makes a difference. *Advances in Consumer Research*, 19: 190-192.

Finke, M. S., Huston, S. J. & Winchester, D. D. (2011). Financial advice: Who pays. *Journal of Financial Counseling and Planning*, 22(1): 18-26.

Fischbacher, U. (2007). Z-Tree: Zurich Toolbox for Ready-made Economic Experiments. *Experimental Economics*, 10(2): 171-178.

Gardner, P. H. & Berry, D. C. (1995). The effect of different forms of advice on the control of a simulated complex system. *Applied Cognitive Psychology*, 9: 55–79.

Gibbons, A. M., Snizek, J. A., & Dalal, R. S. (2003, November). Antecedents and consequences of unsolicited versus explicitly solicited advice. In D. Budescu (Chair), Symposium in Honor of Janet

Snizek. Symposium presented at the annual meeting of the Society for Judgment and Decision Making, Vancouver, BC.

Gino, F. (2008). Do we listen to advice just because we paid for it? The impact of advice cost on its use. *Organizational Behavior and Human Decision Processes*, 107(2): 234-245.

Gino, F., Brooks, A.W. & Schweitzer, M.E. (2012). Anxiety, advice, and the ability to discern: Feeling anxious motivates individuals to seek and use advice. *Journal of Personality and Social Psychology*, 102(3), 497-512.

Gino, F., & Moore, D. A. (2007). Effects of task difficulty on use of advice. *Journal of Behavioral Decision Making*, 20(1): 21-35.

Hackethal, A., Inderst, R. & Meyer, S. (2010). *Trading on advice*. CEPR Discussion Paper No. DP8091.

Hackethal, A., Haliassos, M. & Jappelli, T. (2011). Financial advisors: A case of babysitters? *Journal of Banking and Finance*, forthcoming. CFS Working Paper, No. 2009/04.

Harvey, N. & Fischer, I. (1997). Taking advice: Accepting help, improving judgment, and sharing responsibility. *Organizational Behavior and Human Decision Processes*, 70: 117–133.

Hoffmann, A.O.I. & Broekhuizen, T.L.J. (2009). Susceptibility to and impact of interpersonal influence in an investment context. *Journal of the Academy of Marketing Science*, 37(4): 488-503.

Howells, G. (2005). The potential and limits of consumer empowerment by information. *Journal of Law and Society*, 32(3): 349–370.

Hung, A. A. & Yoong, J. K. (2010). *Asking for help: Survey and experimental evidence on financial advice and behavior change*. RAND Working Paper.

Huston, S. J. (2010). Measuring financial literacy. *Journal of Consumer Affairs*, Special Issue: Financial Literacy, 44(2): 296–316.

Inderst, R. & Ottaviani, M. (2012). Regulating financial advice. *European Business Organization Law Review*, 13: 237-246.

Jungermann, H. & Fischer, K. (2005). Using expertise and experience for giving and taking advice. In T. Betsch & S. Haberstroh (Eds.), *The routines of decision making* (pp. 157–173). Mahwah, NJ: Lawrence Erlbaum.

Kaustia, M. & Perttula, M. (2012). Overconfidence and debiasing in the financial industry. *Review of Behavioural Finance*, 4(1): 46 – 62.

Kozup, J. & Hogarth, J. M. (2008). Financial literacy, public policy, and consumers' selfprotections – more questions, fewer answers. *Journal of Consumer Affairs*, 42: 127-136.

Kramer, M. M. (2012). *Financial literacy, cognitive ability and financial advice-seeking*. Working paper University of Groningen.

Kruger, J. & D. Dunning. (1999). Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology*, 77: 1121-1134.

Lusardi, A. & Mitchell, O.S. (2011). Financial literacy around the world: An overview. *Journal of Pension Economics and Finance*, 10(4): 497–508.

Lusardi, A. & Mitchell, O.S. (2007a). Baby boomer retirement security: The roles of planning, financial literacy, and housing wealth. *Journal of Monetary Economics*, 54: 205-224.

Lusardi, A. & Mitchell, O.S. (2007b). *Financial literacy and retirement planning: New evidence from the RAND American Life Panel*. MRRC Working Paper No. 2007-157.

Lusardi, A. & Mitchell, O.S. (2007c). *The importance of financial literacy: Evidence and implications for financial education programs*.

Lusardi, A. & Mitchell, O.S. (2006). *Financial literacy and planning: Implications for retirement wellbeing*. Working Paper, Pension Research Council, Wharton School, University of Pennsylvania.

Organization for Economic Co-Operation and Development (2005). *Improving financial literacy: Analysis of issues and policies*, Paris, France.

Price, P. C. & Stone, E. R. (2004). Intuitive evaluation of likelihood judgment producers: Evidence for a confidence heuristic. *Journal of Behavioral Decision Making*, 17: 39–57.

Robb, C. A. & Woodyard, A. S. (2011). Financial knowledge and 'best practice' behavior. *Journal of Financial Counseling and Planning*, 22(1): 36-46.

Schotter, A. (2003). Decision-Making with naïve advice. *American Economic Review*, 93(2), 196-201.

Schrah, G., Dalal, R. & Snizek, J. (2006). No decision-maker is an island: Integrating expert advice and information acquisition. *Journal of Behavioral Decision Making*, 19: 43-60.

Snizek, J. A., Schrah, G. E. & Dalal, R. S. (2004). Improving judgment with prepaid expert advice. *Journal of Behavioral Decision Making*, 17: 173–190.

Snizek, J. A. & Buckley, T. (1995). Cueing and cognitive conflict in judge–advisor decision making. *Organizational Behavior and Human Decision Processes*, 62: 159–174.

Williams, T. (2007). Empowerment of whom and for what? Financial literacy education and the new regulation of consumer financial services. *Law & Policy*, 29(2):226-256.

Yaniv, I. (2004a). The benefit of additional opinions. *Current Directions in Psychological Science*, 13: 75–78.

Yaniv, I. (2004b). Receiving other people's advice: Influence and benefit. *Organizational Behavior and Human Decision Processes*, 93: 1–13.

Yaniv, I. & Kleinberger, E. (2000). Advice taking in decision making: egocentric discounting and reputation formation. *Organizational Behavior and Human Decision Processes*, 83: 260–281.

Zacharakis, A. L. & Shepherd, D. A. (2001): The nature of information and overconfidence on venture capitalists' decision making. *Journal of Business Venturing*, 16(4): 211-332.

Appendix

A. Instructions

Instructions treatment 1

Welcome to the experiment!

The experiment is about financial decisions. The experiment consists of two parts (*introductory part* and *main part*) and takes about 90 minutes.

1. Introductory part

In the introductory part you will be asked to assess your ability to make financial decisions on a scale from 0 to 5. You cannot earn any money at this first step.

The first step is followed by a short financial literacy test. The test consists of five questions. Each question has several answer options. Only one answer option is correct. Please only tick one answer per question. You can earn money by completing the financial literacy test: For each correct answer you get €1. At maximum you can earn €5 by completing the test. The money is paid out after the experiment. It is not possible to lose any money by selecting an incorrect answer option.

2. Main part

In the main part of the experiment you receive five tasks about financial products. These tasks are given as well to participants of a subsequent experiment. Your job is to give these participants an advice on how to solve the tasks. By giving an advice you can earn money. At the first four tasks you can earn €3 respectively. The fifth task consists of three sub questions. You can earn €3 at each sub question. In total you can earn €21 in the main part of the experiment.

Please find the task and the decision criteria at the left hand side of the screen. Please select one of the advice items below. Beneath the advice items you find a table with additional information. A short example from a different thematic domain will illustrate the evaluation scheme.

Example:

The participants of the subsequent experiment receive the following task: „You want to take over a god parenthood for a zoo animal. Please select one of the 4 animals listed below. You have 5 minutes time to do so.

These are your decision criteria:

1. (top priority) You want an animal that is on the Red List of Threatened Species.
2. (medium priority) You want an animal that does not hibernate.
3. (low priority) You want an animal as large as possible“

Please give these participants an advice which animal to choose. You have 10 minutes time to do so.

Choose animal A!

Choose animal B!

Choose animal C!

Choose animal D!

OK

	Animal A	Animal B	Animal C	Animal D
Name	Leopard (Panthera pardus)	Vancouver Island Marmot	Wildcat (Felis silvestris)	Jaguar (Panthera onca)
Habitat	Africa, Asia	Vancouver Island	Europe, Central Asia	Central and South America
Hibernation	-	6-9 months	-	-
Shoulder height (cm)	70-80	<30	35-40	65

Solution and evaluation

Please select one advice item. With the OK button you confirm your entry irrevocably.

Your earnings depend on the quality of your advice. Try to find an animal that fulfills all decision criteria. Start with the first decision criterion.

Three of the four animals are on the Red List of Threatened Species. If you recommend to choose animal C (the only animal which is not on that list thereby not fulfilling the most important criterion), you earn €0. You should therefore make sure that the first criterion is definitely met. In this case eliminate option C and move on to the next decision criterion.

Only animal B hibernates. If you recommend animal B, you earn at least €1 as the most important criterion is fulfilled (B is on the Red List of Threatened Species). But the advice is not optimal because the second criterion is not fulfilled (you do not want an animal that hibernates). Therefore, eliminate option B and move on to the next criterion.

With respect to the third criterion animal A fares better than animal D. If you recommend animal A, you earn €3. If you recommend animal D, you earn €2. Only animal A fulfills all decision criteria. Animal D fulfills the first two criteria but is inferior to animal A with respect to the third criterion.

This example is to show you how your decisions and your earnings are related. As the decision criteria are displayed in hierarchical order it is advisable to work through the decision criteria top down. Please note: even if animal C were the largest animal (and thereby dominant with respect to the third criterion), you would earn €0 by recommending it because it does not fulfill the first criterion. Your earnings solely depend on the quality of your advice. It does not matter if you advice is followed.

As you can see from the example, the table contains relevant as well as irrelevant information. In this case the information about the animal's habitat is irrelevant for optimizing the decision. Other characteristics are not listed in the table at all (here: biohazard). In that case you can draw on the *support items* on the right hand side of the screen.

Support items

Please find different support items on the right hand side of the screen.

1. Calculator

Please find the calculator icon on top of the screen. Clicking on icon opens up the calculator in a separate window. You can use the blank pages behind the instruction sheet to take notes or write down calculation steps. Please submit the instruction sheet at the end of the experiment.

2. Explanations

Beneath the calculator icon you will find several explanation items. Next to each explanation item is a button labelled „Buy for €0.20“. Clicking the button opens up a window with a brief explanation of the respective term. All explanations are kept simple and comprehensible. The length of the explanation may vary.

Example: You tend to recommend animal A because it meets the second and third criterion. But you are not sure if that animal is endangered. In that case you could open the explanation item *Panthera Pardis* containing a brief profile of the animal (generic group, appearance, biohazard). The number of explanation items varies across tasks. In total, 19 explanation items are available.

Initial budget

Your initial budget amounts to €4. You can make use of this budget to purchase explanations. You are free to decide whether to spend the money on explanations or not. You can as well spend it in part only. The budget is not bulked up after each task. As all explanations cost €0.20 you can afford to buy each explanation. After each task the amount of your remaining budget is displayed. If you have looked up two terms at the first task, the information „Your remaining budget is €3.60“ is displayed on your screen before you move on to the second task. If you did not spend your initial budget in total, the remaining budget is paid out to you after the experiment.

Payoff

After the introductory part you get to see how much money you earned so far. This amount is between €0 (you answered no question correctly) and €5 (you answered all questions correctly). After the main part you see how much you earned by completing the five tasks. This amount is at maximum €21 (you always recommended the optimal solution) and at minimum €0 (you always recommended the worst solution). Your remaining budget adds up to your earnings from the introductory part and the main part. The remaining budget is at maximum €4 (you purchased no explanations at all) and at minimum €0.20 (you purchased all explanations available). In total you can earn €30 at maximum. Your earnings are paid to you in cash at the end of the experiment. Please note that you do not have an entitlement to a specific amount of money. How much you earn depends solely on your behavior and on your decisions.

Instructions treatment 2

Welcome to the experiment!

The experiment is about financial decisions. The experiment consists of two parts (*introductory part* and *main part*) and takes about 90 minutes.

1. Introductionary part

In the introductionary part you will be asked to assess your ability to make financial decisions on a scale from 0 to 5. You cannot earn any money at this first step.

The first step is followed by a short financial literacy test. The test consists of five questions. Each question has several answer options. Only one answer option is correct. Please only tick one answer per question. You can earn money by completing the financial literacy test: For each correct answer you get €1. At maximum you can earn €5 by completing the test. The money is paid out after the experiment. It is not possible to lose any money by selecting an incorrect answer option.

2. Main part

In the main part of the experiment you receive five tasks about financial products. For every task you have 10 minutes time to find the solution. At the first four tasks you can earn €3 respectively. The fifth task consists of three sub questions. You can earn €3 at each sub question. In total you can earn €21 in the main part of the experiment.

Please find the task, the decision criteria, and the answer options at the left hand side of the screen. Beneath the answer options you find a table with additional information. A short example from a different thematic domain will illustrate the evaluation scheme.

Example:

You want to take over a god parenthood for a zoo animal. Please select one of the 4 animals listed below. You have 5 minutes time to do so.

These are your decision criteria:

4. (top priority) You want an animal that is on the Red List of Threatened Species.
5. (medium priority) You want an animal that does not hibernate.
6. (low priority) You want an animal as large as possible“

I choose

Animal A

Animal B

Animal C

Animal D

OK

	Animal A	Animal B	Animal C	Animal D
Name	Leopard (Panthera pardus)	Vancouver Island Marmot	Wildcat (Felis silvestris)	Jaguar (Panthera onca)
Habitat	Africa, Asia	Vancouver Island	Europe, Central Asia	Central and South America
Hibernation	-	6-9 months	-	-
Shoulder height (cm)	70-80	<30	35-40	65

Solution and evaluation

Please select one answer. With the OK button you confirm your entry irrevocably.

Your earnings depend on the quality of your answer. Try to find an animal that fulfils all decision criteria. Start with the first decision criterion.

Three of the four animals are on the Red List of Threatened Species. If you choose animal C (the only animal which is not on that list thereby not fulfilling the most important criterion), you earn €0. You should therefore make sure that the first criterion is definitely met. In this case eliminate option C and move on to the next decision criterion.

Only animal B hibernates. If you choose animal B, you earn at least €1 as the most important criterion is fulfilled (B is on the Red List of Threatened Species). But the answer is not optimal because the second criterion is not fulfilled (you do not want an animal that hibernates). Therefore, eliminate option B and move on to the next criterion.

With respect to the third criterion animal A fares better than animal D. If you choose animal A, you earn €3. If you choose animal D, you earn €2. Only animal A fulfills all decision criteria. Animal D fulfills the first two criteria but is inferior to animal A with respect to the third criterion.

This example is to show you how your decisions and your earnings are related. As the decision criteria are displayed in hierarchical order it is advisable to work through the decision criteria top down. Please note: even if animal C were the largest animal (and thereby dominant with respect to the third criterion), you would earn €0 by choosing it because it does not fulfill the first criterion. Your earnings solely depend on the quality of your advice. It does not matter if your advice is followed.

As you can see from the example, the table contains relevant as well as irrelevant information. In this case the information about the animal's habitat is irrelevant for optimizing the decision. Other characteristics are not listed in the table at all (here: biohazard). In that case you can draw on the *support items* on the right hand side of the screen.

Support items:

Please find different support items on the right hand side of the screen.

1. Calculator

Please find the calculator icon on top of the screen. Clicking on icon opens up the calculator in a separate window. You can use the blank pages behind the instruction sheet to take notes or write down calculation steps. Please submit the instruction sheet at the end of the experiment.

2. Explanations

Beneath the calculator icon you will find several explanation items. Next to each explanation item is a button labelled „Buy for €0.20“. Clicking the button opens up a window with a brief explanation of the respective term. All explanations are kept simple and comprehensible. The length of the explanation may vary.

Example: You tend to recommend animal A because it meets the second and third criterion. But you are not sure if that animal is endangered. In that case you could open the explanation item *Panthera Pardis* containing a brief profile of the animal (generic group, appearance, biohazard). The number of explanation items varies across tasks. In total, 19 explanation items are available.

3. Advice

At each task you can resort to two pieces of advice. At the fifth task you can resort to two pieces of advice per subtask.

Next to one advice item you find a button labelled „Buy for €0.40“. If you click the button, a window with a recommendation opens up. For example: *Choose product B!* Next to the other

advice item you find a button labelled „Buy for €0.80“. Again, clicking the button opens up a window with a recommendation.

What is the difference between both pieces of advice and where do they come from?

In a previous experiment, participants had to pass a financial literacy test and tasks on financial products as well. The introductory part of this experiment was identical with the introductory part of this experiment. In the main part, participants received the same five tasks you are going to receive. Their job was to give a recommendation on which answer to choose. In contrast to you participants of the previous experiment had no advice items among the support items. But they could buy the same explanations as you. Participants also had 10 minutes time for each task and each explanation had a price of €0.20.

If you buy the advice for €0.80, all participants of the previous experiment who answered all five questions of the financial literacy test correctly are selected. One of them is randomly chosen and his advice is provided to you. All participants who take part in the experiment today receive the same recommendation when purchasing the advice.

If you buy the advice for €0.40, all participants of the previous experiment who reported to be very good in financial decision-making and rated their abilities in this field with 5 (maximum score) are selected. Please note that in selecting the participants the number of correctly answered questions in the financial literacy test is not considered. The selection can include participants with very good test results as well as participants with bad or medium test results. Again, one of the selected participants is randomly chosen and his advice is provided to you. All participants who take part in the experiment today receive the same recommendation when purchasing the advice.

Please note: Participants of the previous experiment have no reason to recommend an answer to you that leads to a low payoff. How much these participants earned depended on the quality of their advice. This implies: If a participant of the first experiment has recommended answer A, and choosing answer A leads to the maximum payment of €3, the participant received €3 for this advice. If choosing the answer the participant has recommended leads to a payment of €0 the participant does not earn anything as well. His payoff is not affected by the question if someone actually decides to purchase his advice or not. All participants of the previous experiment had an incentive to recommend the optimal answer.

Initial budget

Your initial budget amounts to €4. You can make use of this budget to purchase explanations or advice. You are free to decide whether to spend the money on explanations and/or advice or not. You can as well spend it in part only. The budget is not bulked up after each task. As all explanations cost €0.20 you can afford to buy each explanation. After each task the amount of your remaining budget is displayed. If you have looked up two terms at the first task, the information „Your remaining budget is €3.60“ is displayed on your screen before you move on to the second task. If you purchase an advice for €0.80 at the second task, the information „Your remaining budget is €2.80“ is displayed on your screen before you move on to the third task. If you did not spend your initial budget in total, the remaining budget is paid out to you after the experiment.

Payoff

After the introductory part you get to see how much money you earned so far. This amount is between €0 (you answered no question correctly) and €5 (you answered all questions correctly). After the main part you see how much you earned by completing the five tasks. This amount is at maximum €21 (you always chose the optimal solution) and at minimum €0 (you always chose the worst solution). Your remaining budget adds up to your earnings from the introductory part and the main part. The remaining budget is at maximum €4 (you purchased no support items at all) and at minimum €0.00 (you spend the total budget on explanations/ advice). In total you can earn €30 at maximum. Your earnings are paid to you in cash at the end of the experiment. Please note that you do not have an entitlement to a specific amount of money. How much you earn depends solely on your behavior and on your decisions.

B. Financial literacy test

Please answer the following questions by ticking one of the answer options. For each correct answer you receive €0.50. For each incorrect answer you receive €0.

1. Suppose you have €100 in a savings account and the interest rate is 2% per year. After 5 years, how much do have in the account if you left the money to grow?
More than €102
Exactly €102
Less than €102
Don't know
2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy
more than today
exactly the same as today
or less than today with the money in this account?
Don't know
3. Please judge the following statement: "Buying a single company stock usually provides a safer return than a stock mutual fund."
True
False
Don't know
4. Suppose you deposit €1,000 in a savings account earning 1% per year. The interest is added to your account every quarter (that is every three month) and is subject to interest as well. How much money to you have after 2 years?
More than €1,020.17
Less than €1,020.17
Exactly €1,020.17
Don't know

Hint:

$1,000 \cdot (1+1/100)^8 = 1,082.85$	$1,000 \cdot (1+1/400)^8 = 1,020.17$	$1,000 \cdot (1+1/400)^2 = 1,005.00$
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5. Suppose you deposit €1,000 in a savings account earning 2% per year. The interest is added to your account every month and is subject to interest as well. How much money to you have after 2 years?

More than 1,040.77

Less than 1,040.77

Exactly 1,040.77

Don't know

Hint:

$1,000 \cdot (1+2/1200)^2 = 1,003.35$	$1,000 \cdot (1+2/1200)^{24} = 1,040.77$	$1,000 \cdot 1.02^{24} = 1,608.43$
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C. Results of the financial literacy test

Financial Literacy Test	Treatment 1		Treatment 2	
	Number of correct answers	Number of incorrect answers	Number of correct answers	Number of incorrect answers
Question 1	29	0	36	1
Question 2	29	0	36	1
Question 3	23	6	21	16
Question 4	14	15	18	19
Question 5	17	12	25	12

D. Tasks in the main part

Please note: For some financial terms the English expression is more telling than the German equivalent. For example the term *borrowing rate* clearly indicates that it refers to the amount of money you need to pay in exchange for borrowing money, not to an interest you receive for depositing money. The German term *Sollzins* by contrast does not contain the verb for borrowing (German: leihen) which makes it harder to interpret the term. In the information table the German expression can be found beneath the English translation.

Task 1

The participants of the subsequent experiment receive the following task:

„You inherited €10,000 and want to invest the money for the next two years in a safe and riskless way. Please choose one of the four options in the table beneath.

These are your decision criteria:

- (high priority): You want to make sure you can always access a part of your money. You want to be able to withdraw up to €1,000 each month as a cushion against unexpected financial needs.*
- (low priority): You want a return as high as possible.“*

Please give these participants an advice which option to choose in order to arrive at a decision that is optimal according to the decision criteria mentioned above. You have 10 minutes time to do so.

Choose bankbook 1!
 Choose bankbook 2!
 Choose call money!
 Choose cash on deposit!

OK

	Bankbook 1 Sparbuch 1	Bankbook 2 Sparbuch 2	Call Money Tagesgeld	Cash on Deposit Festgeld
Bank Bank	A	B	C	D
Interest rate Zinssatz	1.5%	1.5%	2.5%	2.5%
Compounding Zinsintervall	At the end of year	Quarterly	Monthly	At the end of term
Deposit Protection Fund Einlagensicherung	100%	100%	100%	100%
Tenor Laufzeit	Not fixed	Not fixed	Not fixed	2 years
Account-keeping Kontoführung	Free	Free	One-off fee of €10	Free
Specials Besonderheit	€80 Starting balance	€80 Starting balance	-	-

Task 2

The participants of the subsequent experiment receive the following task:

„You want to pay €5,000 into a giro account. Please choose one of the five options beneath.

These are your decision criteria:

1. (top priority): You are not willing to pay more than 10% interest when using the credit line.
2. (medium priority): You want use the online banking service. Only giro accounts at a bank that provides a secure online banking procedure come into question.
3. (low priority): After one year the amount in your account should have increased as much as possible.“

Please give these participants and advice which option to choose in order to arrive at a decision that is optimal according to the decision criteria mentioned above. You have 10 minutes time to do so.

Choose giro account A!
 Choose giro account B!
 Choose giro account C!
 Choose giro account D!
 Choose giro account E!

OK

	Giro account A Girokonto A	Giro account B Girokonto B	Giro account C Girokonto C	Giro account D Girokonto D	Giro account E Girokonto E
Interest rate p.a. Zinssatz p.a.	2.5%	2%	1.5%	3%	1.8%
Starter bonus Starterbonus	0	0	€10	€10	€10
Account Management Charge Kontoführungsgebühren	€3 per month	-	-	-	€1 per month
Minimum Incoming Salary Deposits Mindestgehaltseingang	0	0	0	0	0
Deposit Protection Fund Einlagensicherung	€107,052,000	Unlimited	€1,614,000,000	Unlimited	Unlimited
Borrowing rate Overdraft Facility Sollzins vereinbarter Dispositionskredit	7.9%	9.4%	9.3%	8.5%	12%
Borrowing rate Tolerated Overdrafts Sollzins für geduldete Überziehungen	12%	13.9%	16.9%	13.5%	15.2%
Online banking Procedure Onlinebankingverfahren	Sm@rtTan plus	mTan	HBCI	PIN/TAN	mTan

Task 3

The participants of the subsequent experiment receive the following task:

„Please choose one of the credit cards beneath.

These are your decision criteria:

1. (top priority): Next year you want to spend a four-month semester abroad at a university in another European country. During this time you want to withdraw money from cash machines and this should be as cost-effective as possible. You exclude the offer most expensive in this respect. Assume that you always withdraw €200 to cover the expenditures for the current week.
2. (medium priority): During the examination period at the end of the semester you want to pause your side job and overdraw your credit card for 4 weeks instead. Doing so should be as cost-effective as possible.
3. (low priority): After one year your money should have multiplied. This implies that any dues you have accepted should be compensated by an adequate interest payment. Every month at minimum €1,000 will be kept within your account.“

Please give these participants and advice which option to choose in order to arrive at a decision that is optimal according to the decision criteria mentioned above. You have 10 minutes time to do so.

Choose credit card A!

Choose credit card B!

Choose credit card C!

Choose credit card D!

OK

	Credit card A Kreditkarte A	Credit card B Kreditkarte B	Credit card C Kreditkarte C	Credit card D Kreditkarte D
Fee (1st year)* Gebühr 1. Jahr	€0	€10	€0	€10
Fee (2nd year) Gebühr 2. Jahr	€0	€0	€0	€0
Interest on credit balances** Guthabenzinsen	2.6%	1%	0%	1.5%
Non-interest payment target Zinsfreies Zahlungsziel	2 weeks	4 weeks	5 weeks	3 weeks
Borrowing rate Sollzins	15%	25%	16%	6%
Cash Advance Fee (% of transaction amount) Bargeldgebühr in % vom Auszahlungsbetrag	2% Minimum charge: €11	4%	3%	5% Minimum charge: €5

*Due at the beginning of the year

**credited at the end of the year

Task 4

The participants of the subsequent experiment receive the following task:

„You need €5,000 for your first year in the Master programme. Please choose one of the following options to have this amount at your disposal.

These are your decision criteria:

- 1. (high priority): Flexibility is important to you. In times where you have spare money you want to be able to make exceptional redemption payments.*
- 2. (low priority): You want to keep the costs of the credit as low as possible.“*

Please give these participants an advice which option to choose in order to arrive at a decision that is optimal according to the decision criteria mentioned above. You have 10 minutes time to do so.

Make use of the call credit!

Make use of the micro-credit!

Charge your credit card!

Overdraw your giro account!

OK

Option 1	Call credit Abrufkredit	Option 2	Mirco-credit Kleinkredit
Credit line Kreditrahmen	300- 25,000	Net loan Nettodarlehensbetrag	€5,000
Minimum amount per call Mindestsumme pro Abruf	50	Tenor in month Laufzeit in Monaten	48
Minimum monthly redemption payment Monatliche Mindesttilgung	0	Borrowing rate p.a. Sollzins p.a.	4.5%
Administrative charge (% of consumed amount) Bearbeitungsgebühr (Prozent des verfügbaren Betrags)	0	APR Effektiver Jahreszins	4.59%
Borrowing rate (percent p.a.) Sollzins (prozent p.a.)	11.0	Processing Fee Bearbeitungsentgelt	0
APR Effektiver Jahreszins	13.5	Total amount Gesamtbetrag	€5,472.48
		Monthly Installment Monatliche Rate	€114.01

Option 3	Credit card Kreditkarte	Option 4	
Fee, 1st year Gebühr 1. Jahr	0	Minimum incoming salary deposits Mindestgehaltseingang	0
Fee, 2nd year Gebühr 2. Jahr	0	Account maintenance charge Kontoführungsgebühren	0
Interest on credit balances Guthabenzinsen	2.6%	Deposit protection fund Einlagensicherung	Unlimited
Non-interest payment target Zinsfreies Zahlungsziel	2 weeks	Overdraft facility Höhe des Dispokredits	€0- €6,000
Borrowing rate Sollzins	10% p.a.	Borrowing rate for tolerated overdraft Sollzins für geduldete Überziehungen	15% p.a. APR: 17%
APR Effektiver Jahreszins	16.8%	Deposit interest Guthabenzinsen	1%
Cash advance fee Bargeldgebühren	0	Interest overdraft facility Zinssatz Dispositionskredit	9% p.a. APR: 13%
Foreign usage fee Auslandsgebühren	1%		

Task 5

The participants of the subsequent experiment receive the following task:

„Please choose one of the saving schemes beneath.

These are your decision criteria:

1. (high priority): You are not willing to accept any uncertainty about the exact level of interest payment.
2. (low priority): You want the interest to be as high as possible.“

Please give these participants an advice which option to choose in order to arrive at a decision that is optimal according to the decision criteria metnioned above. You have 10 minutes time to do so.

5.1 Which bank do you recommend if the investment period is 4 years?

- Choose Bank A!
- Choose Bank B!
- Choose Bank C!
- Choose Bank D!

OK

5.2 Which bank do you recommend if the investment period is 6 years?

- Choose Bank A!
- Choose Bank B!
- Choose Bank C!
- Choose Bank D!

OK

5.3 Which bank do you recommend if the investment period is 8 years?

- Choose Bank A!
- Choose Bank B!
- Choose Bank C!
- Choose Bank D!

OK

	Description										
Bank A	The interest rate is variable and is oriented on the 3-month EURIBOR, reduced by a fixed deduction of 3.00% p.a. It amounts to at least 0.50% p.a.										
Bank B	The interest rate is fixed. This applies to both falling and raising market interest rates. The interest rate amounts to 0.25% p.a. for a tenor of 4 years 0.70% p.a. for a tenor of 6 years 1.60% p.a. for a tenor of 8 years The interest is credited to the account on 31st of December.										
Bank C	The interest rate is independent of the investment period. The saving scheme offers an interest rate of 1.45 %p.a. over the entire term. Interest is credited after one year and subsequently also accrues interest (compound interest).										
Bank D	The interest is credited to the account on 31st of December.										
	In year	1	2	3	4	5	6	7	8	9	10
	interest p.a. amounts to	0.60%	0.60%	0.85%	1.00%	1.30%	1.50%	1.70%	2.00%	2.20%	2.50%

E. Explanation items

Task 1

Tagesgeld Call money	Tagesgeld refers to an interest-bearing account with demand deposits that can be called by the account-holder any time. In contrast to a bankbook, there is no cancelation period or limit. The daily deposit availability makes Tagesgeld an ideal alternative for parking money in the short term. As interest rate conditions are fairly attractive, Tagesgeld is often used for long-term deposits as well. In contrast to giro accounts, Tagesgeld accounts are not admitted for payment transactions. Depository transfers can only be made onto the reference account stipulated by the user. Direct debit transactions cannot be withdrawn from the Tagesgeld account as well.
Festgeld Cash on deposit	Festgeld denotes a form of investment where a specified amount of money is deposited at a bank for predetermined period of time at a fixed interest rate. At the end of this period, the deposited amount and the accrued interest are paid out onto the client's bank account. During the investment period one cannot withdraw funds. The level of interest depends on market conditions at the time of concluding the contract as well as on amount and duration of the deposit. In case the Festgeld is not terminated at due date, it is extended automatically by the bank at the actual interest rate and the predetermined period of time. Before concluding the contract, you can opt as well for a transfer of the money on your bank account upon the expiry date.
Zinsintervall Compounding interval	Zinsintervall denotes the frequency of compounding. Usually, interest is credited on an annual basis at the end of year. Some banks offer accounts where interest is credited more frequently. Besides annual compounding, interest can be credited as well after 1, 3, or 6 months. This case is referred to as monthly, quarterly or semi-annual Zinsintervall. In case the interest earned adds up to the available balances, the interest begins earning interest on itself from the next period onwards. The higher the frequency of compounding, the larger the resulting annual interest return.

Task 2

Kontoführungs- gebühren Account management charge	At some giro accounts, Kontoführungsgebühren are incurred. The level can vary depending on the financial institution and the services the bank provides. The bank uses the account management charges in order to settle administrative expenses emerging when establishing and maintaining a giro account.
Dispokredit Overdraft facility	Dispokredit is short for Dispositionscredit. A Dispokredit allows for withdrawing more than you have in your private giro account up to a specified maximum negative balance. The credit line is specified by the provider and depends on the monthly income transferred to the account. Banks usually grant a credit line to private persons amounting to two to three times the monthly income. When making use of the Dispokredit interest accrues daily. Interest is only incurred on the amount of your limit that is actually used.
Geduldete Überziehung Tolerated overdraft	Geduldete Überziehung refers to an overdraft of the giro account that exceeds the overdraft facility agreed with the bank.
Sicherheit im Onlinebanking Security in online banking	The simple PIN/TAN method is currently considered outdated and insecure. A single free TAN number and the PIN is enough for criminals to get access to your money. The method is particularly vulnerable to phishing, where criminals use a fake mail to pretend to be your bank.

	<p>The mTAN method is considered technically sound, for one thing, because the transaction number is generated during the request and therefore cannot be stolen beforehand, and for another thing, because TAN and all other relevant data are sent per SMS to the user's mobile and not to his PC that might be contaminated with malware.</p> <p>HBCI</p> <p>The HBCI method offers a high safety standard. Unlike the PIN/TAN method, a TAN is not required for conducting a transaction. The user signs his transaction data with a secret key on his smartcard by inserting the PIN via a smartcard reader. An assailant usually cannot read out the secret key from the smartcard in order to sign own transactions.</p> <p>Sm@rtTAN plus and Sm@rtTAN optic</p> <p>These two new methods are considered safe! Analogous to the mTAN method, the generated TAN plus the target account data are displayed again for one to check. If the displayed target account number is not equivalent to the desired target account number, the client can simply cancel the transaction. Unlike the mTAN method, the target account data have to be confirmed via the card reader before a TAN is generated. This offers additional security for the client.</p>
Task 3	
Bargeldgebühren Cash advance fee	If you use your credit card to withdraw money from a bank counter or from an automated teller machine (ATM), a Bargeldgebühr is incurred. Usually, these costs are a fraction of the amount in cash withdrawn. In case the resulting amount exceeds the minimum charge, the minimum charge applies and your account is debited with the minimum charge.
Zinsfreies Zahlungsziel Non-interest payment target	The zinsfreies Zahlungsziel of your credit card designs the period of time during which using the credit line is interest-free.
Sollzinsen Borrowing rate	Interest a bank requires you to pay for borrowing money or for overdrawing your account.
Task 4	
Kleinkredit Micro-credit	A Kleinkredit designs an instalment credit with low borrowing amounts. Because of the low credit sum (usually a four-digit euro amount) the creditor faces a manageable credit default risk. Repayment is made every month in equal amounts. Micro-credits often involve an interest burden higher than 20 per cent. Provider justify this with high additional expenditures they face when counselling potential borrowers.
Sollzinsen Borrowing rate	Interest a bank requires you to pay for borrowing money or for overdrawing your account.

Effektiver Jahreszins APR	<p>The effektiver Jahreszins matters with respect to credit transactions as well as with respect to financial investments. For both lending and savings interest rates one has to differentiate between nominal interest rate and effective interest rate.</p> <p>The nominal interest rate represents the mere interest costs of a credit or alternatively the mere interest revenue of a financial investment. The effective interest rate, by contrast, includes all related costs and fees of a financial investment or a credit. Therefore, investors as well as borrowers should use the effective interest rate to compare different offers. The effektiver Jahreszins always refers to a one-year period thereby facilitating the comparison of different offers.</p> <p>All banks over here are obliged to state the effektiver Jahreszins. For investment products such as Tagesgeld or Festgeld, the effective interest rate is either identical to the nominal interest rate or below the nominal interest rate. For credits, the nominal interest rate is usually below the effective interest rate because the effective interest rate includes costs as well as the settlement of the redemption.</p>
Dispokredit Overdraft facility	<p>Dispokredit is short for Dispositions-kredit. A Dispokredit allows for withdrawing more than you have in your private giro account up to a specified maximum negative balance. The credit line is specified by the provider and depends on the monthly income transferred to the account. Banks usually grant a credit line to private persons amounting to two to three times the monthly income. When making use of the Dispokredit interest accrues daily. Interest is only incurred on the amount of your limit that is actually used.</p>
Geduldete Überziehung Tolerated overdraft	<p>Geduldete Überziehung refers to an overdraft of the giro account that exceeds the overdraft facility agreed with the bank.</p>
Abrufkredit Call credit	<p>The Abrufkredit is very similar to the overdraft facility. The bank provides a drawing limit to the client he can use when needed. Doing so incurs interest. Similar to the overdraft facility, the interest for the amount taken orientates at the level of market rates. But the interest for the call credit is usually a bit higher than the interest for an overdraft facility. Interest and repayments are paid off in monthly instalments. Further costs are optional and many Banks forego account management fees.</p> <p>The level of interest is variable. It depends on income, the credit amount, and the speed this amount is paid off.</p> <p>The credit is variable: On the one hand, paying off the amount at a faster rate than initially planned can save costs. On the other hand, an expansion of the credit amount can lead to higher interest rates. A call credit is most useful when expenditures are to be made and the size of the expenditures cannot be specified completely. The flexible credit line at moderate interest rates offers a high leeway to the credit user.</p>
Task 5	
Zinseszins-effekt Compound interest effect	<p>Depositing money at a bank usually yields interest because the bank can work with this capital. Depending on the bank and the financial product, interest is credited annual, semi-annual, or quarterly to your investment amount. Zinseszins-effekt refers to the phenomenon that the interest payments are kept in your account and bear interest itself from the next period onwards. This effect increases exponentially because the amount in your account keeps growing as more and more interest payments add up to it. The more frequent the interest is credited, the stronger the compound interest effect and the higher the return.</p>
Variabler Zinssatz	<p>A variable interest rate is not fixed but is adjusted to the current market rates.</p>

Variable interest rate	Variable interest rate conditions are often less expensive. But a variable interest rate can become a huge disadvantage when market rates surge. Taken as a whole, variable interest rates lead to a lower planning security.
Zins p.a. Interest p.a.	The abbreviation p.a. stands for "per annum" or "pro anno" and means "per year". One can frequently find this abbreviation in the context of interest rates, underlining that the interest rate applies to a one-year period. Next to <i>Zins p.a.</i> one can find as well the term <i>Jahreszinssatz</i> or <i>jährlicher Zinssatz</i> (annual interest rate).

F. Age and confidence

Age*	Confidence	Margin	Std. Err.	Z	P z
21	Strong under confidence	.889225	.106351	8.36	.000
	Medium underconfidence	.743288	.115429	6.44	.000
	Light underconfidence	.731395	.096459	7.58	.000
	Neutral	.457698	.128286	3.57	.000
	Light overconfidence	.441131	.132314	3.33	.001
22	Strong under confidence	.869467	.117142	7.42	.000
	Medium underconfidence	.710730	.107457	6.61	.000
	Light underconfidence	.698145	.085627	8.15	.000
	Neutral	.419296	.108795	3.85	.000
	Light overconfidence	.403018	.114401	3.52	.000
23	Strong under confidence	.847420	.129896	6.52	.000
	Medium underconfidence	.676382	.101252	6.68	.000
	Light underconfidence	.663191	.077618	8.54	.000
	Neutral	.381666	.093666	4.07	.000
	Light overconfidence	.365823	.101018	3.62	.000
24	Strong under confidence	.823059	.145023	5.68	.000
	Medium underconfidence	.640491	.099039	6.47	.000
	Light underconfidence	.626798	.075846	8.26	.000
	Neutral	.345138	.084861	4.07	.000
	Light overconfidence	.329863	.093534	3.53	.000
25	Strong under confidence	.796401	.162784	4.89	.000
	Medium underconfidence	.603345	.102629	5.88	.000
	Light underconfidence	.589265	.082522	7.14	.000
	Neutral	.310013	.083127	3.73	.000
	Light overconfidence	.295422	.092083	3.21	.001
26	Strong under confidence	.767512	.183231	4.19	.000
	Medium underconfidence	.565264	.112402	5.03	.000
	Light underconfidence	.550923	.096771	5.69	.000
	Neutral	.276550	.087108	3.17	.001
	Light overconfidence	.262744	.09525	2.76	.006
28	Strong under confidence	.703549	.231262	3.04	.002
	Medium underconfidence	.487696	.145132	3.36	.001
	Light underconfidence	.473236	.137225	3.45	.001
	Neutral	.215447	.101996	2.11	.035
	Light overconfidence	.203429	.106920	1.90	.057
29	Strong under confidence	.668849	.257887	2.59	.009
	Medium underconfidence	.448937	.164387	2.73	.006
	Light underconfidence	.434622	.158903	2.74	.006
	Neutral	.188102	.108910	1.73	.084
	Light overconfidence	.177046	.112101	1.58	.114