Don't lapse into temptation: A behavioral explanation for policy surrender

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Many policyholders surrender their life insurance policies early, leading to substantial monetary losses for private households. Surrender can be explained rationally if it constitutes the last resort providing liquidity in the event of an urgent need of cash. In contrast, we find clear evidence in German panel data that for more than half of all surrendered contracts investors had cheaper options available to provide the required liquidity. This finding demonstrates that there must be other factors influencing these important life time decisions. We provide a behavioral explanation, focusing on the role of financial literacy, individual decision heuristics, and financial advice. In particular, we show that financial literacy and financial advice can mitigate the behavioral temptation to lapse.

Keywords: Life Insurance; Behavioral Insurance; Emergency Fund Hypothesis; Financial Literacy; Financial Advice; Heuristic Decision Making

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1. Introduction

What helps people to take optimal decisions in important economic situations? Numerous publications have portrayed that the decision outcome often deviates from what we would label a *rational* decision following rules of logic and probability theory (Tversky and Kahneman, 1974; Thaler, 1980; Frederick et al., 2002; Johnson and Goldstein, 2003). In the paper at hand we investigate the decision to surrender a classical participating life insurance contract.[1] Surrender refers to the termination of a (life) insurance contract by the policyholder before maturity. The basic question of what the driving forces of surrender are has been discussed by both academics and the insurance industry for many decades.[2] We explore policyholders' behavior after they suffered a significant income shock which usually implies a need for liquidity. Moreover, this shock can be treated as a trigger to reconsider financial decisions. There are clear predictions in the literature how a *rational* decision maker would behave after such an event, most prominently represented by the emergency fund hypothesis (Outreville, 1990). Yet such a triggering event opens the ground for non-rational explanations as well. To describe non-rational behavior, we subdivide the decision process into three steps inspired by the salient-assessment-weighting model (Rosenzweig and Critcher, 2014). This enables us to investigate the determining factors of the surrender decision. We concentrate on three particular factors: Does sound financial literacy enable a person to make informed decisions? Does the propensity to use simplified decision strategies (heuristics) have a significant impact on the decision outcome? And finally, can financial advice improve the decision quality?

Third parties like financial magazines or financial advisors often publish statements like: "Surrender? Think again!". Almost all life insurance policies are front-loaded, i.e., the policyholder has to pay a high price relative to the actuarially fair price in the beginning of the life insurance coverage while later paying relatively less. As a result, policyholders who lapse usually lose substantial parts of the front loading in addition to paying a penalty

[1] Participating life insurance products present the most popular contracts within the class of life insurance policies in Germany – although the percentage of all new business decreased from more than 50% in 2002 to roughly 30% in 2013, see statistics for insurance and pension funds of the BAFIN. Providing protection in case of death, the policies additionally come along with a certain savings component and a so-called surrender guarantee. In contrast to unit-linked life insurance contracts the savings component is not related to an external fund but the performance of the life insurer itself.

[2] In this paper, we use lapse and surrender interchangeable and refer to a full termination of the contract before maturity where the insured receives a so called surrender value.

(surrender-fee) when lapsing.[3] From a rational point of view policyholders should only surrender their life insurance in case of a significant income shock if they lack other, cheaper to liquidate financial resources and surrendering is the last resort to finance their well-being (emergency fund hypothesis). In the following, we demonstrate evidence where policyholders lapse in spite of having sufficient liquid funds available. This suggests that surrender is not necessarily a measure of last resort. Instead, behavioral forces significantly influence the probability to surrender. We identify financial literacy and financial advice as factors that can prevent people from surrendering their life insurance contracts.

Our analysis is based on the waves 2005-2010 of the German SAVE panel survey comprising questions on households' saving and asset choices as well as socio-demographic characteristics. Additionally, the German SAVE panel survey also covers questions on the psychological nature of saving behavior. In the recent literature on policy surrender little attention has been paid to behavioral forces. In our opinion, a deeper understanding of these forces is beneficial not only to better understand the decision to lapse but for a better grasp of decision making in important life time situations in general. In particular, our findings shed light on the benefits of improving financial literacy and the role of financial advice accounting for individual decision heuristics.

Our main findings are the following: We confirm that there are investors that do not surrender life insurance as a last resort. That is, investors having other liquid financial assets still use their life insurance to substitute an income loss, so the emergency fund hypothesis cannot explain all lapse behavior. We find evidence that financial literacy reduces the probability to lapse and thus add to the political discussion on financial literacy education (Lusardi, 2010). A higher tendency to rely on heuristic decision making increases the lapse probability, demonstrating that individuals exhibit decision biases even in such important decisions. Financial Advice does not seem to play a role when considering the whole sample. However, when only considering the group of people that suffered an income shock (trigger), the findings differ: after an income shock, obtaining financial advice reduces the propensity to lapse significantly, while the other factors lose significance. We show that there are substantial interaction effects between financial literacy, heuristic decision making,

[3] With a liquid secondary market the policyholder could prevent this monetary loss by selling to a third party. However, the secondary market for life insurance hardly exists: 13.1 billion Euro terminated contracts to 0.16 billion Euro sold contracts on the secondary market (Gatzert, 2010).

and financial advice, and that these interactions also depend on a trigger. Taking financial advice is particularly relevant for policyholders with a low financial literacy score. This adds to the discussion on whether financial advice serves as a substitute or complement (Collins, 2012) for financial literacy. Also, the impact of financial literacy and financial advice on the decision to lapse depends on the tendency to employ heuristics.

The rest of the paper is organized as follows: Section 2 summarizes the related insurance and behavioral literature. Section 3 embeds surrender activity in a behavioral context and derives empirically testable hypotheses. This is followed by the presentation of our data and the relevant descriptives, see 4. Section 5 presents the results of our empirical analysis and covers several robustness checks. Section 6 concludes.

2. Related Literature

Literature on policy surrender Generally one can distinguish between the theoretical literature modeling lapse behavior and the empirical literature focusing on the driving forces of surrender. Our paper belongs to the second stream of literature.[4] Most of the empirical literature on life insurance surrender focuses either on macroeconomic and socio-economic data or on data on product and policyholder characteristics provided by insurance companies or regulatory authorities. The two most prominent hypotheses which also receive most empirical attention are the emergency fund hypothesis and the interest rate hypothesis (Linton, 1932; Schott, 1971; Pesando, 1974; Outreville, 1990; Kuo et al., 2003). The emergency fund hypothesis states that the insured lapses as the last resort if he lacks sufficient funds to finance his expenses due to micro factors like individual income shocks or macro factors like financial market turmoils. The logic behind the interest rate hypothesis is that since market interest rates can be seen as an opportunity cost of owning a life insurance policy, lapse rates should rise when the market interest rate rises. In addition, if interest rates go up, premiums for new contracts usually fall. Policyholders might prefer to substitute old polices in favor of new policies with better conditions. The empirical evidence regarding these two hypotheses is mixed, see Eling and Kochanski (2013). In our study we focus on the emergency fund hypothesis as a rational explanation for policy surrender, since the interest rate hypothesis cannot explain surrender activity triggered by individual events.

[4] For the pricing of the surrender option in life insurance contracts, we refer to Hilpert et al. (2014) and the literature overview therein.

Moreover, the time period we cover with our data saw a steady decline in interest rates, so it is very unlikely that any policyholder could have profited from switching to a new contract.

Besides these two most prominent explanations, other theoretical explanations link policy surrender with changes in personal health conditions, gender or age (Fang and Kung, 2012). There is a limited number of empirical studies (Renshaw and Haberman, 1986; Eling and Kiesenbauer, 2013) which take into account the policyholder's family situation, financial goals, health, and the distribution channel. While we have no information on the distribution channel nor on the exact product characteristics, we add to this literature as we include information on (changes in) family, education, financials, and health of participants in our analyses. To our knowledge there are only two other papers using microeconomic panel data to analyze lapse behavior (Liebenberg et al., 2010; Fier and Liebenberg, 2012). The first relies on the 1983/1989 panel study (2 years) of the Survey of Consumer Finances (SCF), while the second draws on data from the University of Michigan Health and Retirement Study (HRS) which only includes individuals aged 50 and above. Since we cover a 5-year time period and have a representative sample for the German population, our data set comprises much more information about the dynamics of household patterns over time. With this richer data source, we can support the emergency fund hypothesis for some households, but are also able to add to the literature by providing also behavioral explanations. In particular, while Liebenberg et al. (2010) aim at identifying household characteristics which drive the decision to take or reduce life insurance coverage, we are the first to exploit empirically the influence of behavioral forces on policy surrender.

Behavioral Literature Although surrender is usually costly for the policyholder, it is not necessarily beneficial for the insurance company. Excessive surrender can even endanger the financial stability and well-being of the insurer (Black and Skipper, 2000) due to sudden liquidity needs. Therefore, insurance companies have an interest in understanding (individual) determinants of lapsing which result from systematic and predictable biases. This enables them to react in time and to mitigate the consequences by a suitable adaption of the design of such policies.

A rational decision maker should base his decisions on a life cycle model where all financial and consumption consequences over his entire life are taken into consideration.

One of the key insights of behavioral finance, however, is that people do not consider all contingencies, but *frame* their decisions more *narrowly* (Thaler, 1985; Barberis et al., 2006). As a result, some policyholders may (over-)react to a trigger event like an income shock by prematurely terminating their life insurance contract. For insurance companies, this has consequences regarding the pricing of life insurance and their liquidity. A recent paper by Gottlieb and Smetters (2013) claims that life insurers actively exploit narrow framing in their contract design by pricing the contracts front-loaded while being aware of surrender activity. On average the insurance company does not gain, but those who lapse cross-subsidize the policyholders who stay with their policy until maturity. Hendel and Lizzeri (2003) argue that front loading is a commitment device used by insurers to reduce the likelihood that policyholders lapse excessively. Since insurance companies are obliged to pay a surrender guarantee if a policyholder lapses, excessive lapsing might lead to liquidity shortage on the side of the insurer. Thus, the insurance company is exposed to lapse risk, i.e., "the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level or volatility of the rates of policy lapses, terminations, renewals, and surrenders" (CHEIPOS-DOC-42/09). Good knowledge of lapse risk exposure becomes increasingly important under Solvency II. Nevertheless, the paper by Gottlieb and Smetters (2013) puts forward that due to narrow framing policyholders ignore background risks which would depend on income, age, education, and health. As mentioned earlier, we include these variables as controls accounting for this line of reasoning as well.

In the context of retirement savings a well documented puzzle is the low demand for annuities. Since a life insurance contract is the exact counterpart to an annuity, parts of the behavioral explanations put forward for the annuity puzzle also seem to be appealing for the decision to lapse. In particular, the complexity (Brown et al., 2014) and missing financial literacy (Lusardi and Mitchell, 2011) as well as mental accounting in combination with loss aversion (Hu and Scott, 2007) are well-documented facts that are relevant for either product. In the present paper, we combine these two explanations and apply it to the surrender decision.

The front-loading of life insurance contracts makes the investor feel like holding a "loser" asset. Although nominal losses in the early years of life insurance contracts should not come as a surprise but should rather be expected by policyholders, we claim that a shift in focus causes this "mis"perception as a . When compared to other assets like stocks, bonds,

or even a savings account, decisions may be based on past returns instead of (potential) future profits. With this changed focus, the policyholder is potentially tempted to view the life insurance policy as the weakest asset and therefore the first to sell. At a first glance this seems to be in stark contrast to the disposition effect. [5] However, the disposition effect is normally found within one asset class (Barberis and Xiong, 2009) and not investigated between asset classes. In addition, there is evidence that for mutual fund in- and outflows the disposition effect is reversed and the investors rather keep previous outperformers and sell past underperformers (Ivkovich and Weisbenner, 2006).

Supporting our argument from above, even when trying to determine future returns do people tend to build these expectations relying on an asset's past performance. Critcher and Rosenzweig (2014) argue that according to the findings of Kahneman and Frederick (2002) people substitute difficult questions with simpler ones. Thus, the policyholder who has to forecast the future performance of his assets at hand (hard task), instead will look at the performance of the past (easy task). This phenomenon is called "attribute substitution". When people decide based on this heuristic, life insurance contracts will be classified as underperfomers and more readily surrendered due to their front-loading which reduces returns substantially in the early years of the contract.

Our paper is also based on the empirical literature on financial literacy and financial advice. It has been acknowledged that there is a strong link between high financial literacy and less inefficient financial decisions (Guiso and Jappelli, 2008; Lusardi and Tufano, 2009; Lusardi and Mitchell, 2011). Other papers connect financial literacy with financial advice, which we also do in this paper. However, there is mixed evidence on whether financial advice serves as a substitute or complement for financial literacy. In an experimental setup Hung and Yoong (2010) find evidence supporting that financial advice works as a substitute for financial literacy. On the contrary, Calcagno and Monticone (2011) find survey evidence that financial advice serves as a complement rather than a substitute. This is also in line with Collins (2012). The paper at hand contributes to this literature with two findings: on the one hand, people with high financial literacy seek financial advice more often, supporting a complimentary relation. On the other hand, the beneficial impact of financial advice is highest for policyholders who display comparably low levels of financial literacy,

[5] The disposition effect refers to the phenomenon that investors tend to hold losers and sell winners in the stock market, see Shefrin and Statman (1985).

suggesting that the effects of the two are rather substitutive in nature.
We also link the outcome of the decision to lapse to intuitive or cognitive decision strategies.[6] Intuitive decision strategies relate to prominent heuristics and biases such as narrow framing. (Shiloh et al., 2002; Kahneman and Frederick, 2002, 2005; Alós-Ferrer and Hügelschäfer, 2012). However, there is little scientific research examining the impact of intuitive decision taking on financial decision making and investment behavior. A recent exception is the paper by Glaser and Walther (2013) who link dual-process theory with financial literacy. They hypothesize that financially literate investors who strongly rely on intuition still make biased decisions.

3. Policy surrender: A behavioral story

Owning a life insurance contract is a necessary prerequisite for lapsing. There is a natural self-selection between owners of a life insurance and other investors. While we do not focus on potential differences between these two groups, we rather investigate what separates the sub-group of investors surrendering their contract from those keeping the contract until maturity. From a behavioral perspective inertia prevents investors from leaving such contracts (Thaler and Benartzi, 2004) as long as they do not receive a significant impulse to reconsider their decision. Such an impulse can be a significant and unanticipated income shock. An increase in surrender activity triggered by such a shock can also be justified by rational explanations like the emergency fund hypothesis. Hence, the income shock has two roles within the surrender process: it can serve as a direct cause for surrendering or it can only initiate the decision process. The final decision to surrender will then be based on additional factors. We do not claim that all surrender decisions have to be initiated by such a trigger, but we believe that analyzing the group of policyholders that experienced a trigger event provides deeper insights into the surrender decision.

An income shock can be the direct cause of surrender activity if it results in liquidity needs that are covered by the surrender guarantee. However, liquidity needs as hypothesized by the emergency fund hypothesis are a necessary, but not a sufficient condition to surrender a life insurance contract. A rational investor would only choose to lapse his life insurance if there are no alternative assets with lower opportunity costs as sources of liquidity at his

[6] This distinction is often called dual-process theory, see Stanovich et al. (2000); Evans (2003); Kahneman (2003b).

disposal. Opportunity costs are commonly higher for life insurance policies than for most other financial assets because most policies are front-loaded, implying a significant financial loss when surrendering early. In consequence, surrender should be seen as the ultimate source of liquidity by most rational decision makers.

If an income shock is not a direct cause but only triggers people to think about their assets, surrender behavior is likely not driven by liquidity costs but based on narrow framing and simple heuristics. In particular, financial literacy, financial advice, and the tendency to rely on heuristics can serve as factors that influence the outcome of the decision process. We divide the decision process in three steps to structure the forces at work: (1) *availability* of assets, (2) *reevaluation* and *comparison* of the assets, (3) *decision* which asset to sell. This decomposition of the decision process is inspired by the work of Rosenzweig and Critcher (2014), who describe how people translate information into forecasts via the salience-assessment-weighting (SAW) model.

The first step is to categorize all *available* assets. Here, the investor will mentally frame his different financial investments in separate mental accounts in order to generate a set of potential liquidation candidates. Financially literate policyholders or those who receive sound financial advice are likely to be more able to categorize all assets correctly. Yet employing a simple mental accounting heuristic might lead the decision maker to ignore some assets like "holiday money" when identifying potential candidates for liquidation (Thaler, 1985).

When *comparing* and *reevaluating* the different assets a policyholder has identified in the first step, it is likely that he will do this based on common measures that apply to all of the assets under consideration like risk and return characteristics. From a risk-return perspective, though, life insurance policies usually look unattractive. Insurance products in general disclose relatively small returns at best, especially compared to high yield products like stocks. Moreover, in the beginning of a life insurance policy the front-loading absorbs mostly all gains which results in a negative return, potentially evoking the feeling of a loss. The policyholder might focus on this past performance of his available assets, because he may simplify the question of forecasting the future performance by answering the question which asset has best performed in the past ("attribute substitution"). The past performance of a life insurance policy is readily available from the annual report sent by the insurance company. Financial literacy is key to understanding and interpreting these reports correctly.

Especially for people displaying low levels of financial literacy, a financial advisor can explain the reports and stress the importance of the insurance component. Individuals relying more strongly on heuristics, i.e., intuitive decision strategies, tend to classify a life insurance policy as an underperformer based on the past performance and therefore surrender the policy.

The final *decision outcome* is based on the policyholder's level of information, his interpretation of this information, how strongly he relies on heuristics, and the quality of these heuristics. For example, individuals tend to overvalue the present while undervaluing the future (Laibson, 1997). Insurance exists to secure uncertain events in the future, so insurance that attenuates a future bad outcome may feel dispensable. The interaction of our three factors financial literacy, financial advice, and relying on heuristics becomes most relevant in this final step of the decision process. For example, a lack of financial literacy could be substituted by information provided by the financial advisor. Or a potentially well-informed, literate investor might surrender because his cognitive part could be overruled by his tendency to rely on heuristics. Thus, we believe that it is important to not simply look at these factors separately, but investigate their joint influence on surrender behavior.

Hypotheses The emergency fund hypothesis has 2 components: a liquidity shortage and surrender of life insurance as a last resort. Thus, our first two hypotheses are straightforward:

Hypothesis 1. *A negative income shock increases the probability to surrender a contract.*

Hypothesis 2. *Availability of other liquid assets decreases the probability to surrender.*

To form a sufficient condition for surrender both conditions have to be fulfilled at the same time. That is for the group that suffered the income shock, the availability of other liquid assets should be highly relevant. In contrast, for the group that is not in a liquidity squeeze the emergency fund hypothesis makes no clear statement.

Financial literacy can improve the decision quality at all three stages of the decision process. In the first stage of the process financially literate investors are more likely to consider all available assets, since they are more likely to make financial plans and be informed about their assets (Lusardi and Mitchell, 2011). The correct evaluation of different assets is key in the second step. Here, understanding basic financial concepts like discounting will very likely invoke the more correct evaluation. Financial literacy can help

to consider all relevant information and therefore value the insurance component in the final decision. Overall, financial literacy should improve the decision quality, which on average means that people will be less likely to surrender.

Hypothesis 3. *A higher financial literacy score reduces the probability to lapse a life insurance policy.*

Sound financial advice should improve the decision quality in a similar manner to financial literacy, although the relevant information is provided not by the insured himself but by an external source. Since a financial advisor should be informed about the assets of his client, be able to evaluate and compare the assets using an appropriate method, and provide all relevant information in an understandable manner to the policyholder, seeking financial advice should improve the decision quality in all stages of the process.

Hypothesis 4. *Seeking financial advice reduces the probability to lapse a life insurance policy.*

Potentially harmful heuristics may occur at all three stages of the decision process. Whole asset categories may be disregarded due to mental accounting in the availability phase. The evaluation phase may be biased by relying on the past performance of assets to predict their future return. Finally, the decision outcome depends on a correct estimation of the insurance value and future value of the insurance policy, an estimation that may also be distorted by intuitive decision making.

Hypothesis 5. *Being prone to rely on heuristics increases the probability to lapse a life insurance policy.*

As all three behavioral factors are likely to influence each other in their effect on surrender behavior, we also look at their interaction effects. For financial literacy and financial advice, their role in the decision making is fairly similar. Therefore, we hypothesize a substitutive relationship between the two.

Hypothesis 6. *For policyholders that display low levels of financial literacy, seeking financial advice reduces the probability to lapse a life insurance policy (and vice versa).*

For the interaction between financial literacy and the tendency to rely on heuristics, we base our hypothesis on the idea of an internal struggle between the two forces. For people

who tend to rely on heuristics, financial literacy may not even play a role in the decision process because financial literacy influences the decision on a cognitive level. The positive effect of financial literacy may be offset by (too) simple heuristics. If the policyholder is not likely to rely on heuristics, there will be less of a struggle but rather a supportive behavior for financial literacy. Put differently, sound financial knowledge can only be beneficial if this knowledge is incorporated into the decision by cognitive, non-intuitive consideration.

Hypothesis 7.

Hypothesis 7.a. *For policyholders that display high levels of financial literacy, being prone to rely on heuristics increases the probability to lapse a life insurance policy.*

Hypothesis 7.b. *For policyholders that are less prone to rely on heuristics, financial literacy decreases the probability to lapse a life insurance policy.*

Our final hypothesis considers the interaction between financial advice and the tendency to rely on heuristics. This (potential) interaction has not been documented in the literature so far. The similarities between financial literacy and financial advice may suggest a similarity in the interaction with the tendency to rely on heuristics, too. However, in contrast to financial literacy, financial advice is an external information source, so it is unlikely that there will be an internal struggle between simple heuristics on the one hand and financial advice on the other hand. Instead, sound financial advice may be strong enough to overrule heuristic decision making or provide the decision maker with more helpful heuristics, thereby offsetting the negative effect.

Hypothesis 8. *For policyholders that are prone to rely on heuristics, financial advice decreases the probability to lapse a life insurance policy.*

4. Data and Descriptives

We base our analysis on representative panel data obtained from the German SAVE study. The SAVE survey was first conducted in 2001 and continued biannually until 2005, from which point onwards it provides annual data. New households were added to the sample in 2003, 2005, and 2006. We include the waves from 2005 to 2010 in our analyses, where sample sizes range from 2047 participants in 2010 to 3474 households in 2006. For a more

detailed description of the SAVE dataset, see Börsch-Supan et al. (2008).[7] The SAVE study provides information on basic socio-economic data, focusing on financial and savings data such as saving behavior, income, wealth, consumption, credits, and old age provisions on a household level. Additionally, it includes questions on a personal level concerning personal traits of the household head, for example psychological characteristics, financial literacy, and the propensity to take and follow financial advice.

Since there is no direct question asking for households' surrender behavior, we need to construct a variable from the available data on participating life insurance policies. We have information on whether a household has any life insurance policies, how many policies it has, and on the total value of all life insurance policies of a household. Since some of the latter values are imputed and we do not want to base our analysis to a large extent on imputations, our basic measure of policy surrender is very simple: if a household owned at least one life insurance policy in the previous period and does not own a policy in the current period, this household is considered a lapsing household for the current period. There were some datapoints where the number and volume of life insurance contracts in the previous and the following period were almost identical, but the participant stated that he currently had no policy. In these cases, we assume that the contract was not surrendered but was either suspended for a year or the survey participant provided false information. We did not count these households as "lapsed". [8] A further discussion on the lapse variable is provided in the robustness checks, see Section 5.2.

One question that we cannot directly address with our data is whether a contract is indeed surrendered or whether it has expired. To mitigate the effect of this potential error on our results, we only include participants aged 55 and below. Most participating life insurance contracts in Germany are used as a saving vehicle for retirement, so we assume that the initial duration of most of these policies would be to an age of around 65, the legal retirement age in Germany for the regarded time period.[9] Thus, we consider contracts that were terminated at least 10 years before this age as surrendered. Additionally, we exclude

[7] To overcome the problems of item non-response to sensitive questions (such as financial issues), all our results are based on an iterative multiple imputation procedure which has been applied to the SAVE data (Schunk, 2008). Thus, all regressions and tests are based on the fully imputed SAVE data.

[8] The average number of policyholders who lapse is 14.8% in our sample, while the average number of lapsed policies is 7.2%. The difference is because some households hold more than one life insurance policy.

[9] Studies by the Gesamtverband der Deutschen Versicherungswirtschaft (GDV) show that most insured sign the contract between thirty and fourty and the main prupose is retirement savings.

all households where the household head or the spouse is retired. We later perform a robustness check w.r.t. this and many of our other assumptions.

As key independent variables of interest, we use an indicator of financial distress, availability of other liquid assets, whether a household receives external financial advice, the level of financial literacy of the household head, and a participant's tendency to rely on heuristics in decision making. As an *indicator of financial distress*, we generate a dummy variable based on household income. This variable takes on the value "1" if a household's current net monthly income is less than 90 percent of its net monthly income from the previous period. The results we present later are robust to different percentage thresholds, although the group size becomes too small for reasonable analyses when the chosen level is below 70 percent. We assume this substantial income shock in turn initiates the process of reevaluating and comparing available assets as outlined above. The way we interpret the role of *other assets*, they have to be more liquid than the participating life insurance. Although this is probably true for most asset classes we have information on like stocks and bonds, we can only be sure for actual liquid savings, i.e., money in a savings account. Thus, our indicator variable whether a household has liquid assets takes a value of "1" if this household has money available in a savings account. Additionally, we looked deeper into the availability of liquid assets. One might argue that, although a household has liquid assets available, there might not be enough of those assets available to cover liquidity needs. The median household of our subsample of households owning a life insurance contract has 5,633 EUR (mean: 14,434 EUR) available in liquid savings, amounting to about 44% (mean: 163%) of the value of the respective household's life insurance contract. Later, we will also conduct several robustness checks concerning the liquid savings variable.

In the questionnaire, subjects had to state whether (years 2005-2009) or how often (years 2005-2010) they talk to their banks or insurers. We only use the information whether there were any *advisory talks* with banks or insurers in the respective year for 2005-2009, as we assume that these talks would include the decision to lapse if a household contemplates surrendering a policy. For year 2010, we conjecture that a subject received financial advice if she talked to banks or insurers at least once this year.

The *level of financial literacy* is tested with the three basic questions as suggested by Lusardi and Mitchell (2011). We derive a variable indicating high financial literacy if a subject answered all three questions correctly. Since the level of financial literacy and receiving

financial advice has been found to be highly correlated in previous studies like Joo and Grable (2001), we investigate their correlation as well. Of those subjects that correctly answered all three financial literacy questions, 52% see their bank advisor at least once a year, while this rate is only 42.5% for those that did not get all three questions correct. The correlation (Pearson's rho) between the financial literacy score and whether people go to their banks regularly is significantly positive (0.113) on a 1%-level.

The wave of 2009 included three questions based on the cognitive reflection test (Frederick, 2005) to differentiate *intuitive* from *cognitive* thinkers.[10] We integrate these three questions into one measure that takes the value of "1" if a subject answered all three questions correctly, indicating that this person's decisions are based on cognitive thought rather than heuristics. Since the tendency to make intuitive, heuristic-based decisions is thought to be a time-consistent subject characteristic (Kahneman, 2003a), we assign the value measured in 2009 to all other years the respective subject has been part of the study.

We also include a set of control variables to rule out other explanations for policy surrender. As discussed above, there are several individual characteristics that need to be considered. We include demographics like marital status, education level, gender, age, health, whether participants save to leave a bequest (one period lagged), risk preferences, and how long the participant takes to make decisions (Croson and Gneezy, 2009; Van Rooij et al., 2011; Cohen and Einav, 2007; Outreville, 2015). The latter three were answered on 10-point Likert scales. We capture health by constructing an index based on the self-stated status in different health categories of the policyholder as well as his/her spouse. As the characteristics of people suffering an income shock play an important role in our analysis, we need to account for potential sources of this income shock. We excluded retirement for our subsample, but unemployment might be a strong driver. We control for whether a household has become unemployed in the current year. This rate is significantly higher for those suffering an income shock (7.9%) than for those that do not suffer an income shock (2.3%), so it is necessary to include it as a control in our analyses. However, the rate of people suffering an income shock is only slightly lower for those that have not become unemployed in the current year (19.4%) compared with the entire subsample (20.3%). Thus, we believe that although controlling for unemployment is essential for our analyses, our

[10] For the complete set of questions used in this study, see the Appendix.

overall results with regard to the impact of suffering an income shock will not be biased by this. We also construct a dummy variable for households that have taken out a new loan to account for significant changes in the financial situation. Next to the individual controls mentioned above, we control for macroeconomic factors, namely GDP growth in Germany and the effects of the subprime crisis.[11] We include the subprime crisis because as put forward by the International Association of Insurance Supervisors (IAIS), global systemic risks emanate from the financial sector and have severe consequences for liquidity. Table 1 displays summary statistics of all covariates we include in our analyses.

[11] We define this crisis for the interview years 2009 and 2010, claiming that the effect of the crisis on a household starts in 2008 with Lehman Brothers' bankruptcy.

Table 1. The table presents for each year the average values over policyholders and covariates which we include in our regressions.

		2006	2007	2008	2009	2010
Lapse Rate		0.17	0.12	0.14	0.13	0.19
suffered income shock		0.32	0.22	0.25	0.16	0.21
no liquid savings		0.43	0.31	0.30	0.27	0.29
received financial advice		0.48	0.41	0.42	0.41	0.39
high FL		0.51	0.69	0.66	0.68	0.69
Cognition dominant			0.2			
Monthly household net income		2,759	2,873	2,744	2,926	3,048
new credit		0.11	0.13	0.12	0.13	0.17
no health issues		0.46	0.49	0.38	0.46	0.42
no health issues spouse		0.32	0.33	0.29	0.31	0.33
newly wed		0.024	0.051	0.055	0.032	0.031
newly divorced		0.036	0.036	0.026	0.026	0.024
marital status						
	married	0.67	0.63	0.65	0.68	0.69
	separated	0.02	0.04	0.03	0.02	0.02
	single	0.18	0.20	0.19	0.18	0.16
	divorced	0.10	0.09	0.09	0.09	0.09
	widowed	0.003	0	0.004	0.004	0.009
education level						
	lower secondary	0.26	0.24	0.23	0.21	0.21
	middle secondary 1	0.27	0.30	0.31	0.31	0.28
	middle secondary 2	0.13	0.11	0.12	0.13	0.15
	higher secondary 1	0.07	0.11	0.10	0.12	0.11
	higher secondary 2	0.28	0.24	0.23	0.24	0.25
employment type						
	blue-collar	0.19	0.20	0.22	0.20	0.20
	white-collar	0.46	0.48	0.48	0.50	0.52
	civil servant	0.10	0.10	0.08	0.09	0.09
	self-employed	0.10	0.12	0.10	0.08	0.08
	homemaker	0.15	0.11	0.12	0.13	0.11
male		0.51	0.49	0.48	0.48	0.47
newly unemployed		0.09	0.06	0.04	0.03	0.03
spouse newly unemployed		0.05	0.03	0.03	0.02	0.02
newly retired		0.009	0.002	0.014	0.006	0.009
age		42	41	42	42	43
bequest motive		3.14	2.64	2.82	2.67	2.66
time for decisions		5.65	5.68	5.67	5.73	5.65
risk aversion		7.73	7.79	7.87	7.74	7.81
gdp growth (%)		3.81	3.33	0.80	-5.21	3.78
No. of Observations		313	531	614	500	419

5. Results

5.1. Main Regressions

Basic Models We begin our analysis by exploring the role of the emergency fund hypothesis, financial literacy (FL), financial advice (FA), and heuristics (Cognition) on the whole sample. As emphasized above the liquidity shock separates our participants in two groups. For that reason, we perform all further analyses for these two groups – with income shock (I) and without income shock (NI) – separated. We conduct random effects logistic panel regressions[12], with coefficients and standard errors adjusted for multiple imputations. For all independent variables of interest, we display average marginal effects in Table 2.[13] When our models include interaction effects, we include both basic variables and the interaction term in our analysis. Since the estimated relationships are non-linear in nature, marginal effects have to be calculated for the respective subgroups separately. Thus, we calculate and present all four conditional marginal effects per model for these subgroups in Table 2. This allows for easier interpretation and is possible since all interacting variables are binaries.[14]

[12] We need to use random instead of fixed effects because we are interested in the influence of individual characteristics that are partly constant over time.

[13] The marginal effects represent the percentage increase in likelihood to lapse given a one-unit increase in the respective independent variable.

[14] All conditional marginal effects for all subgroups of a model are presented in one column. In a 2x2 interaction with two dummy variables, this leads to a total of four conditional marginal effects. Although we report these four effects, the regression still only included the three beforementioned variables, i.e., the two dummy variables and the interaction term.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	All	NI	I	NI	I	NI	I	NI	I
Income Shock	0.495**								
	(0.221)								
No LS	0.764***	0.988***	0.365	0.982***	0.372	0.996***	0.379	0.991***	0.371
	(0.238)	(0.293)	(0.316)	(0.296)	(0.321)	(0.292)	(0.324)	(0.294)	(0.322)
FL is high	−0.617**	−0.702**	−0.123					−0.702**	−0.123
	(0.271)	(0.323)	(0.380)					(0.326)	(0.379)
- if FA				−0.919**	0.070				
				(0.415)	(0.614)				
- if No FA				−0.509	−0.233				
				(0.427)	(0.398)				
- if Cognition						−2.247***	0.575		
						(0.843)	(1.468)		
- if Intuition						−0.494	−0.166		
						(0.332)	(0.394)		
FA	−0.269	−0.0179	−0.808**			−0.031	−0.822**		
	(0.194)	(0.246)	(0.406)			(0.245)	(0.369)		
- if FL is high				−0.192	−0.695				
				(0.419)	(0.481)				
- if FL is low				0.218	−0.998*				
				(0.419)	(0.536)				
- if Cognition								0.348	−0.699
								(0.616)	(1.120)
- if Intuition								−0.076	−0.821**
								(0.268)	(0.376)
Cognition	−0.653**	−0.479	−0.661	0.489	−0.672				
	(0.342)	(0.397)	(0.624)	(0.399)	(0.623)				
- if FL is High						−1.001**	−0.525		
						(0.489)	(0.672)		
- if FL is Low						0.752	−1.266		
						(0.707)	(1.383)		
- if FA								−0.291	−0.614
								(0.478)	(0.969)
- if No FA								−0.715	−0.735
								(0.566)	(0.736)
Crisis	1.225***	1.227***	0.564	1.239***	0.569	1.249***	0.578	.1232***	0.565
	(0.264)	(0.349)	(0.437)	(0.351)	(0.429)	(0.355)	(0.409)	(0.351)	(0.404)
Log Income	−0.292*	−0.886**	0.116	−0.890***	0.011	−0.900*	0.015	−0.896***	0.124
	(0.175)	(0.343)	(0.175)	(0.346)	(0.177)	(0.346)	(0.176)	(0.346)	(0.174)
GDP	9.223***	10.46***	4.560	10.659***	4.518	10.429***	4.617	10.512***	4.533
	(2.787)	(3.53)	(4.194)	(3.555)	(4.948)	(3.555)	(4.841)	(3.542)	(4.786)
Credit	−0.569++	−0.746**	0.375	−0.756**	0.386	−0.737***	0.383	−0.751	0.376
	(0.281)	(0.359)	(0.456)	(0.362)	(0.458)	(0.361)	(0.458)	(0.361)	(0.455)
Health	−0.011	−0.206	0.321	−0.204	0.329	−0.198	0.319	−0.207	0.319
	(0.202)	(0.255)	(0.324)	(0.256)	(0.326)	(0.256)	(0.323)	(0.256)	(0.320)
Health spouse	−0.021	0.041	0.072	0.035	0.075	0.049	0.054	0.041	0.069
	(0.231)	(0.288)	(0.377)	(0.288)	(0.381)	(0.287)	(0.383)	(0.289)	(0.377)
newlywed	−0.145	−0.406	0.292	−0.401	0.285	−0.403	0.322	−0.416	0.294
	(0.544)	(0.643)	(0.762)	(0.645)	(0.778)	(0.647)	(0.785)	(0.647)	(0.757)
newlydiv	0.019	0.238	−0.242	0.204	−0.254	0.199	−0.239	0.256	−0.233
	(0.603)	(0.787)	(0.793)	(0.788)	(0.805)	(0.787)	(0.797)	(0.792)	(0.788)
married, but separated	0.908	0.597	0.765	0.608	0.799	0.593	0.751	0.582	0.757
	(0.817)	(0.944)	(0.931)	(0.949)	(0.946)	(0.943)	(0.902)	(0.952)	(0.887)
single	0.272	−0.134	0.435	−0.144	0.449	−0.1212	0.421	−0.139	0.434
	(0.329)	(0.438)	(0.448)	(0.444)	(0.446)	(0.441)	(0.436)	(0.442)	(0.426)
widowed	0.762*	0.792	0.505	0.795	0.515	0.820	0.498	0.794	0.505
	(0.388)	(0.529)	(0.477)	(0.532)	(0.481)	(0.536)	(0.462)	(0.534)	(0.456)
divorced	1.251	1.046	1.308	1.072	1.339	1.047	1.234	1.018	1.305
	(1.366)	(2.089)	(1.602)	(1.098)	(1.624)	(2.123)	(1.629)	(2.096)	(1.611)
middle secondary 1	−0.555*	−0.901**	0.028	−0.923**	0.034	−0.942	0.052	−0.912**	0.032
	(0.296)	(0.386)	(0.450)	(0.387)	(0.454)	(0.389)	(0.445)	(0.389)	(0.436)
middle secondary 2	−0.178	−0.659	0.402	−0.674	0.412	−0.704	0.422	−0.670	0.411
	(0.353)	(0.433)	(0.482)	(0.437)	(0.486)	(0.437)	(0.479)	(0.436)	(0.475)
higher secondary 1	−0.502	−0.610	−0.159	−0.624	−0.175	−0.654	−0.126	0.611	−0.155
	(0.396)	(0.469)	(0.554)	(0.472)	(0.564)	(0.473)	(0.559)	(0.473)	(0.549)
higher secondary 2	−0.368	−0.648	−0.059	−0.659	−0.064	−0.698	−0.052	−0.659	−0.056
	(0.337)	(0.418)	(0.459)	(0.343)	(0.466)	(0.423)	(0.464)	(0.422)	(0.457)
white-collar	−0.004	0.301	−0.496	0.302	−0.175	−0.508	−0.511	0.303	−0.499
	(0.284)	(0.342)	(0.402)	(0.343)	(0.563)	(0.402)	(0.394)	(0.343)	(0.389)
civil servant	−1.367**	−1.211*	−1.211	−1.219*	−1.199	−1.209*	−1.232*	−1.208*	−1.211
	(0.573)	(0.702)	(0.761)	(0.726)	(0.748)	(0.708)	(0.719)	(0.704)	(0.711)
self-employed	−0.087	0.131	−0.587	0.121	−0.592	0.171	−0.609	0.141	−0.593
	(0.426)	(0.491)	(0.599)	(0.494)	(0.603)	(0.492)	(0.554)	(0.494)	(0.549)
homemaker	0.054	0.339	−0.412	0.339	−0.401	0.339	−0.423	0.349	−0.416
	(0.367)	(0.495)	(0.473)	(0.496)	(0.471)	(0.498)	(0.474)	(0.498)	(0.474)
male	0.068	0.391	−0.325	0.403	−0.340	0.400	−0.331	0.397	−0.322
	(0.239)	(0.312)	(0.321)	(0.314)	(0.327)	(0.313)	(0.319)	(0.315)	(0.310)
newlyunemp	0.545	0.537	0.682	0.544	0.680	0.576	0.688	0.530	0.678
	(0.434)	(0.628)	(0.486)	(0.626)	(0.489)	(0.629)	(0.481)	(0.632)	(0.475)
newlyunemp spouse	0.859*	0.547	0.863	0.587	0.876	0.552	0.852	0.547	0.868
	(0.496)	(0.628)	(0.577)	(0.695)	(0.583)	(0.694)	(0.570)	(0.694)	(0.571)
age	−0.006	0.004	−0.025	0.003	−0.025	0.004	−0.026	0.004	−0.025
	(0.015)	(0.018)	(0.019)	(0.019)	(0.019)	(0.186)	(0.049)	(0.019)	(0.019)
bequest	0.039	0.018	0.055	0.017	0.056	0.020	0.056	0.0182	0.055
	(0.034)	(0.044)	(0.051)	(0.044)	(0.051)	(0.044)	(0.049)	(0.044)	(0.049)
time for decision	−0.039	−0.045	−0.025	−0.044	−0.027	−0.039	−0.0279	−0.045	−0.025
	(0.046)	(0.058)	(0.065)	(0.058)	(0.066)	(0.058)	(0.066)	(0.058)	(0.065)
risk aversion	0.053	0.048	0.024	0.046	0.025	0.044	0.025	0.049	0.0243
	(0.039)	(0.054)	(0.058)	(0.055)	(0.058)	(0.054)	(0.059)	(0.054)	(0.0580)
Observations	2,381	1,843	538	1,843	538	1,843	538	1,843	538

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2. The Table reports the results of random effects logit regressions adjusted for multiple imputations as specified in Section 4. The conditional marginal effects displayed are the sample averages over subject-level marginal effects. One star denotes the 10% significance level, two stars denote the 5% significance level, and three star the 1% level. All standard errors over all imputation schemes (shown in parentheses) are adjusted for heteroscedasticity and contemporaneous autocorrelation.

Model (1) of Table 2 presents the basic results of our analysis, without a sample split. Model (1) confirms Hypothesis 1 that a negative income shock has a significantly positive effect on the propensity to surrender (5% level). This finding is consistent with the necessary condition supporting the emergency fund hypothesis. We also find evidence for Hypothesis 2, since having no other liquid savings (No LS) significantly increases the propensity to surrender (1% level). What we have not identified yet is the role liquid savings play after having suffered an income shock. We have conjectured that this is the sufficient condition for the emergency fund hypothesis to hold. Therefore, we investigate the effects for the two subsamples in Models (2) and (3). Interestingly, there is no significant impact of having other liquid savings if the household suffers from a significant income shock. Instead, other liquid savings do decrease the propensity to lapse significantly only if there is no shock. Although the effect remains positive, it is smaller than the one for the whole sample. We would have expected the opposite finding for a rational decision maker. Thus, this result does not fully match the sufficient condition for the emergency fund hypothesis and therefore at least partly violates "rational" lapsing behavior, demanding a more behavioral explanation. For this reason, our further analysis explores behavioral temptations of lapsing as outlined in the previous section.

In Model (1), being financially more literate decreases the lapse probability significantly (5% level), so Hypothesis 3 can be confirmed. For the subsamples (Model (2) and (3)) the effect of financial literacy is, however, only significant for the group that has not suffered an income shock. Thus, financial literacy does not seem to be one of the crucial decision factors after an income shock. This result can be interpreted in the following way: financial literacy generally leads to better decisions (less surrender behavior in calm times), but in times where the decision is triggered by an outside event like an income shock, financial literacy is not enough to prevent policyholders from lapsing and there are other factors that take over and influence the decision. For financial advice, the picture looks exactly opposite. There is no significant effect on the whole sample in Model (1) or for the group in Model (2), but obtaining financial advice decreases the lapse probability significantly (5% level) after an income shock, Model (3). Thus, Hypothesis 4 can only be supported for times of financial distress. So receiving financial advice is particularly helpful when there is a need for a decision triggered by an event like an income shock, while it does not influence the decision to surrender without such a trigger. This adds to the discussion put forward

by Von Gaudecker (2013) how to expand the availability of external advice to foster good financial decision making. More specifically, in contrast to Von Gaudecker (2013), we do not consider the outcome from advice before a decision maker has signed a contract but in how far financial advice can help to stay committed to the own decisions. Regarding Hypothesis 5, we find support for a "propensity-increasing" effect of a tendency to rely on heuristics on the whole sample in Model (1). This finding cannot be supported in either Model (2) or Model (3), where the marginal effect becomes insignificant. The size of the effect remains on a similar level for both models. So although it appears that heuristics seem to play a role in general, we cannot identify whether this effect stems from calm or distressed times.

In addition to our key variables of interest, there are two effects worth mentioning that we observe in the control variables. The financial crisis, which can be interpreted similarly to an income shock but on a macroeconomic level, significantly increases lapse behavior (1% level) in Model (1). This effect remains similar in size and significance for the subsample without an income shock, but disappears after an income shock. This can be interpreted in two ways. First, the micro-level shock is most important to the decision maker, which is why a macro-level shock does not play a role in this situation. Second, a macro-level shock can influence individual behavior even if there are no direct consequences to the personal income, which is somewhat surprising because one would argue that macro changes have to go through the channel of micro changes in order to influence behavior on a micro level. A similar effect can be found for the influence of income on surrender behavior, which decreases the propensity to lapse in Models (1) and (2), but does not have an effect in Model (3) where the sign of the effect even changes. We would have expected the marginal effect to be negative for all three models, since higher income can act as collateral for shocks to liquidity. However, in times of economic distress there seem to be other factors that take over and influence the surrender decision. In the following sections, we are going to look into the interaction effects of these factors in more detail.

Financial Literacy and Financial Advice In our basic model we have already found support that financial literacy can decrease policy surrender in general and specifically in calm times, while financial advice works strongly in times of financial distress. Models (4) and (5) investigate the interaction between the two. Financial advice works best for financially illiterate policyholders in our treatment group (5%-level). In contrast, the decreasing effect

of financial literacy is only present for people who do obtain financial advice if there was no income shock. Thus, we find support for Hypothesis 6 in one direction (financial advice can substitute financial literacy), but opposite effects for the other direction (financial literacy works strongest for people who obtained financial advice). While this result may seem surprising at first, it is in line with the general notion in the literature, namely that financial literacy and financial advice can be both, substitutes and complements. Overall, our results suggest that financial advice can substitute financial literacy only for those displaying rather low literacy levels. However, this does not contradict the empirical finding that seeking financial advice is positively correlated with financial literacy (Joo and Grable, 2001). Indeed, we also find a small, but significantly positive correlation between the two (spearman's rho: 0.093***). Regardless of whether this is due to financially literate people seeking advice more often (Bhattacharya et al., 2012), or because more information results in higher levels of literacy (Lee and Hogarth, 2000), our results show that financial advice and financial literacy strongly reduce the propensity to surrender life insurance policies.

Financial Literacy and Heuristics Models (6) and (7) of Table 2 present the results of our regression where we take into account interaction effects between financial literacy and the tendency to rely on heuristics. In Model (6), we find that relying on heuristics is harmful for financially literate policyholders, supporting Hypothesis 7a. We conjecture that this is because heuristics may win the internal struggle and overrule a financially more sensible decision. In addition, the effect of financial literacy is pronounced for people that do not rely on heuristics, so we also find support for Hypothesis 7b. A more literate person would benefit relatively more from cognitive thinking. However, neither of the two Hypotheses can be confirmed in Model (7), supporting the general finding that there are other factors at play in times of financial distress.

Financial Advice and Heuristics Our final analysis is conducted in Models (8) and (9), where we investigate the effect that relying on heuristics has on the influence of financial advice. Hypothesis 8 claims that financial advice is particularly helpful for people who tend to rely on heuristics, since these heuristics can be countered by external financial advisors. This effect can only be found in times of financial distress (Model (9)). This is in line with the earlier finding that financial advice matters after a triggering event. The implication is that individuals who reconsider their asset allocation, insurance contracts, and investment

decisions in general should ask for professional help before making an intuitive decision that may be biased by simple heuristics.

5.2. Robustness

No Imputations for Lapse Variable The dependent variable in our regressions, whether a household has surrendered an insurance contract, is at least partly based on imputed information. This might result in incorrect estimates for marginal effects and/or standard errors, if subjects are incorrectly assigned to either the group of policyholders or non-holders. In total, 3.1% of the subjects did not provide information on their possession of life insurance policies, resulting in imputed values. Out of all subjects classified as owning a contract, 8.5% did not actually provide this information but were classified according to at least one imputation method. This difference in percentages could be due to either a selection effect by policyholders that do not (want to) state their possession, or a systematic overestimation within the imputation algorithm. Either way, since the information of policy ownership is crucial for our analysis, in Table 3 of the Appendix, we present results from a robustness test where we only include non-imputed information on policy holdings. With respect to marginal effects' signs and significance levels for all variables which are central to our hypotheses, results remain qualitatively unchanged. The only difference is that financial advice is weakly significant (10 %-level) even for the whole sample.

Including all ages Our main regressions only include subjects aged 55 and younger to avoid labeling regularly expired contracts as surrendered. It could be that we thereby systematically exclude characteristics of older policyholders that drive lapse behavior in our analysis. One might argue that for older contracts the impact of up-front fees on the decision to lapse is reduced, questioning the perceived inferiority of these contracts compared to other financial products. This effect is mitigated, however, by surrender fees which usually increase in the age of the contract. In Table 4 of the Appendix, we present the results of Models (1) - (9) without excluding any subjects from the analysis because of their age. We still exclude all households in retirement, so there is a natural age barrier at around age 65. Although the size of the coefficients slightly differs from the restricted sample, signs and significance levels remain virtually unchanged. Therefore, we conclude

that the characteristics driving lapsing behavior relevant for our analyses are robust also for higher ages and older contracts.

Including all asset classes A further robustness test we have conducted deals with the availability of liquid savings. In our basic model we are very strict and only consider money in a savings account in order to guarantee liquidity of these assets. In Table 5 of the Appendix, we broaden the class of liquid assets and also include stocks, bonds, and other financial assets a household owns. We combine availability of any one of these assets in a new variable called "other assets", substituting the old liquid savings variable in Models (1) - (9). While the coefficients of the other covariates do not seem to be affected much by this change, the individual marginal effect of having any other assets is comparably larger than that where only liquid savings are considered (1.08 compared to 0.87). Of special interest to us is the effect conditional on suffering an income shock. This effect is now significant for both conditions (income shock or no income shock), but it is only significant on a 10% level after an income shock. Overall, we conclude that the broader definition of liquid savings and the resulting clearer distinction of households without any other assets allows to more definitely identify households without a fallback option. Thus, it should be for those households in particular that we observe a strong effect. In contrast, we only find minor support for the predictions by the emergency fund hypothesis, but qualitatively similar, albeit partly stronger marginal effects compared to our basic model.

Different Income Shock levels The basic regression defines a severe income shock as a drop of at least 10% in income compared to last period's income. Different policyholders might, however, feel a significant income shock at another level or even if income stays at the status quo. Therefore, we conduct two more sets of regressions. In the first set, we define a significant income shock as a loss in income of more than 20% (see Table 6 of the Appendix). The covariate income shock remains significant but only at the 10% level. The group suffering an income shock becomes quite small in this setting. We observe no significant results for that group, although all marginal effects retain the signs they had in our previous analyses. [15] For the results of the distressed group, the findings remain unchanged. In the second set we define a drop if we cannot observe an increase, i.e., there is no compensation

[15] We only report Models (1)-(8) because there are insufficient observations in the interaction variable for Model (9).

for inflation (see Table 7 of the Appendix). In this new setup, income shock loses its significant coefficient. This is consistent with money illusion, i.e., that subjects only consider nominal, not real income losses (Shafir et al., 1997). In this setting, all other previous findings with respect to the three factors financial literacy, financial advice and relying on heuristics are confirmed. So although the fact whether policyholders suffer an income shock seems to matter, different sizes of this shock do not seem to influence the factors at play. This supports our conjecture that an income shock is not a direct cause for surrender but rather triggers people to think about their assets.

Higher Differentiation in FL and heuristics measures In our main regressions, the measures of financial literacy and relying on heuristics are dummies categorizing people either in a high or a low domain. This makes interpretation of interaction effects easier, since we have fewer distinct groups to compare. However, as there are three questions each, further differentiation is possible. For each measure, we compute the score of correct answers, so this variable can take values of 0, 1/3, 2/3, or 1. Instead of the two categories each that we had before, interpreting the scores on a continuous scale (0-100%) allows us to look with more detail into the subgroups that did not answer all questions correctly, which we previously had combined in just one group. On the downside, using continuous instead of binary variables we cannot calculate or interpret contingent marginal effects as nicely as before. Table 8 of the Appendix contains all results using the percentage scores for financial literacy and the measure of impulsive behavior. Considering the individual marginal effects for the whole sample, we observe a higher significance level for both variables. Moreover, the coefficient representing the effect of a one-unit increase in the continuous variable, i.e., going from zero correct answers to all correct answers, is higher than the coefficient of the respective binary variable. This holds true not only for the whole sample but for the subsample without an income shock as well. The results given an income shock do not change qualitatively and remain insignificant for both variables, while financial advice remains highly significant. With respect to the interaction between financial literacy and financial advice, we find that the size of the marginal effect of financial advice in times of crises decreases as financial literacy levels increase, supporting our notion that advice substitutes literacy. The oppopsite effect that financial literacy works stronger for people who obtained financial advice also remains qualitatively the same, while significance

levels and marginal effects even increase. The interaction between the tendency to rely on heuristics and financial advice also remains qualitatively similar. The finding that relying on heuristics increases the propensity to lapse only holds for those participants who answered all three financial literacy questions correct. For all other literacy levels, the effect is insignificant and even positive for those that answered none or only one question correct. The effect of financial literacy is only mitigated by the group of participants who did not get any of the CRT-questions correct, but remains strongly significant in all other cases. In summary, higher differentiation of the two variables leads to even stronger support in terms of marginal effects and significance levels for our main hypotheses and the behavioral explanations provided in this paper.

Additional sample split at savings variable In our analyses so far, we have looked at the effects of our variables of interest for subsamples split by the information whether a participant has suffered an income shock. For a deeper understanding of the factors at play, we conducted robustness tests separating the sample further by whether there are liquid savings available or not. So instead of just controlling for this effect, we technically interact the availability of liquid assets with all other variables. This way, we can for example compare two households, both of whom received income shock AND have positive savings, but one is financially literate and the other is not. Since we additionally split the sample with respect to income shock, Table 9 depicts a total of 18 different models. In the first two models where we treat income shock as a control and not as a separating variable, we see that it significantly increases the propensity to lapse only if liquid savings are available and even has a negative coefficient in case there are no liquid savings. This goes hand in hand with our earlier observation that the availability of liquid savings matters in calm times, while other (behavioral) factors matter after a trigger event. Regarding our other relevant variables, this general sample split does not provide further insights. When we separate the sample into four different groups, however, we can see that financial literacy is particularly relevant if there are no liquid savings available in calm times. Here, it prevents people from surrendering their life insurance policy early, although they might be tempted to do so due to the lack of other funds. Regarding financial advice, we confirm our earlier finding that it significantly reduces the lapse probability in distressed times, while it plays no role during calm times. The marginal effect is strongest for the group that has suffered an income

shock but has enough liquid savings available (the group of people where lapsing is not rational according to the emergency fund hypothesis). Regarding the influence of a higher propensity to rely on heuristics in decision making, we do not gain further insights as all effects are to weak to be statistically significant, most likely due to the reduced group size. For all further models, our anlayses suffer from the issue that we only observe limited statistical significance due to small groups. Although we have some observable effects that generally support our earlier findings, they are generally only significant on a 10%-level so we do not want to over-interpret these results.

6. Conclusion

This paper analyzes the decision to surrender a participating life insurance contract from a policyholder's perspective. The option to surrender a life insurance contract gives the policyholder the right to terminate the insurance contract whenever he wants. A rational decision maker should only surrender when it is beneficial for him. One situation where surrender is optimal is covered by the emergency fund hypothesis, which states that in case policyholders have to compensate a liquidity squeeze surrender serves as a last resort. However, participating life insurance contracts usually exhibit an unfavorable pricing structure and most other investment assets have lower opportunity costs. Thus, a rational policyholder should only consider policy surrender as the ultimate source of liquidity. Since we only find mixed support for this explanation in our data, we put forward behavioral explanations for the decision to surrender which are based on financial literacy, financial advice, and heuristics. Our regression results support a more behavioristic lapse story. In particular, we show that financial literacy generally reduces the probability to surrender a contract, while the tendency to rely on heuristics increases that probability. To investigate the role of a shock to liquidity in more detail, we split the sample and look at policyholders who suffered an income shock separately. We interpret this shock as a triggering event initiating a decision process rather than a direct cause of surrender. After a shock, we find that obtaining financial advice remains as the strongest and only significant factor reducing the probability to lapse. In a final step, we explore the interaction between the three identified factors. We shed new light on the discussion on financial literacy and financial advice. Financial advice helps strongest when financial literacy is low, supporting a substitutive relation between the two. When it comes to the effect of financial literacy on surrender, the relation seems to be rather complimentary - higher levels of financial literacy reduce surrender probability the most when policyholders obtained financial advice. This result is not only relevant for policyholders themselves, but for policymakers, regulators, and even insurance companies and banks. Policymakers can focus on fostering financial literacy and, in cooperation with regulators and insurance companies, seek to provide opportunities to receive sound financial advice. This financial advice should be communicated more actively to those policyholders that are likely to reconsider their decisions, e.g. due to a severe financial shock. This reconsideration also

opens ground for potential behavioral biases and misguided impulsive decisions. We show that financial advice can compensate the negative effect these issues have on the decision outcome, while the benefits of financial literacy is weakened by these heuristics. Enhancing financial literacy, though beneficial, will not eliminate mistakes based on heuristic decision making.

Appendix

Questions

Relying on heuristics

(1) A bat and a ball cost 1.10 in total. The bat costs 1 more than the ball. How much does the ball cost? German question: Ein Schläger und ein Ball kosten zusammen 110 Cent. Der Schläger kostet 100 Cent mehr als der Ball. Wie viel kostet der Ball?

(2) If it takes five machines five minutes to make five widgets, how long would it take 100 machines to make 100 widgets? German question: 5 Maschinen brauchen 5 Minuten um 5 Produkte herzustellen. Wie lange brauchen 100 Maschinen um 100 Produkte herzustellen?

(3) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? German question: Auf einem Teich wachsen Seerosen. Jeden Tag verdoppeln die Seerosen die Fläche, die sie bedecken. Es dauert 48 Tage bis der Teich komplett mit Seerosen bedeckt ist. Wie lange dauert es, bis die Hälfte des Teiches mit Seerosen bedeckt ist?

Financial Literacy

(1) Suppose you had €100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? More than €102 exactly €102, less than €102, do not know. German question: Angenommen, Sie haben €100 Guthaben auf Ihrem Sparkonto. Dieses Guthaben wird mit 2% pro Jahr verzinst, und Sie lassen es 5 Jahre auf diesem Konto. Was meinen Sie: Wie viel Guthaben weist Ihr Sparkonto nach 5 Jahren auf? Mehr als €102, genau €102, weniger als €102, kann/möchte ich nicht einschätzen.

(2) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? More than today, exactly the same, less than today, do not know. German question: Angenommen, die Verzinsung Ihres Sparkontos beträgt 1% pro Jahr und die Inflationsrate beträgt 2% pro Jahr. Was glauben Sie: Werden Sie nach einem Jahr mit dem Guthaben des Sparkontos genauso viel, mehr oder weniger als heute kaufen können? Mehr als heute, genau so viel, weniger als heute, kann/möchte ich nicht einschätzen.

(3) Is the following false or correct: Investing in a stock usually offers a more certain gain than investment in an equity fund. German question: Ist die folgende Aussage richtig oder falsch: Die Anlage in einer einzelnen Aktie bietet in der Regel einen sicheren Gewinn als die Anlage in einem Aktienfonds.

Robustness No Imputation Lapse

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Joint	NI	I	NI	I	NI	I	NI	I
Income Shock	0.584**								
	(0.229)								
No LS	0.850***	1.119***	0.363	1.110***	0.383	1.123***	0.376	1.121***	0.369
	(0.226)	(0.298)	(0.309)	(0.302)	(0.329)	(0.298)	(0.319)	(0.299)	(0.316)
FL is high	-0.696**	-0.755**	-0.144					-0.757**	-0.143
	(0.295)	(0.353)	(0.357)					(0.357)	(0.358)
- if FA				-1.053**	0.110				
				(0.440)	(0.625)				
- if No FA				-0.492	-0.281				
				(0.438)	(0.388)				
- if Cognition						-2.203**	0.715		
						(0.895)	(1.454)		
- if Intuition						-0.541	-0.201		
						(0.363)	(0.353)		
FA	-0.340	-0.0356	-0.866**			-0.046	-0.886**		
	(0.211)	(0.257)	(0.392)			(0.257)	(0.396)		
- if FL is high				-0.265	-0.728				
				(0.327)	(0.468)				
- if FL is low				0.297	-1.119*				
				(0.405)	(0.665)				
- if Cognition								0.311	-0.720
								(0.657)	(1.081)
- if Intuition								-0.094	-0.885**
								(0.281)	(0.417)
Cognition	-0.776**	-0.559	-0.645	-0.570	-0.660				
	(0.369)	(0.420)	(0.549)	(0.424)	(0.572)				
- if FL is High						-1.054**	-0.466		
						(0.518)	(0.607)		
- if FL is Low						0.609	-1.381		
						(0.747)	(1.285)		
- if FA								-0.381	-0.570
								(0.501)	(0.902)
- if No FA								-0.786	-0.735
								(0.614)	(0.693)
Crisis	1.380***	1.344***	0.583	1.369***	0.595	1.366***	0.603	1.349***	0.585
	(0.284)	(0.387)	(0.450)	(0.392)	(0.498)	(0.391)	(0.451)	(0.389)	(0.450)
Log Income	-0.278	-1.039***	0.053	-1.050***	0.055	-1.052***	0.059	-1.048***	0.054
	(0.187)	(0.346)	(0.170)	(0.352)	(0.175)	(0.349)	(0.172)	(0.349)	(0.169)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,126	1,653	473	1,653	473	1,653	473	1,653	473

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3. The Table reports the results of our regression models as specified in Section 4 where we also considered imputed variables regarding the dependent variable. The results above are only relying on non-imputed values to identify lapse behavior. The conditional marginal effects displayed are the sample averages over individual marginal effects. One star denotes the 10% significance level, two stars denote the 5% significance level, and three stars the 1% level. All standard errors over all imputation schemes (shown in parentheses) are adjusted for heteroscedasticity and contemporaneous autocorrelation.

Robustness All Age Classes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Joint	NI	I	NI	I	NI	I	NI	I
Income Shock	0.351**								
	(0.174)								
No LS	0.823***	1.001***	0.411	0.995***	0.423	1.000***	0.418	1.003***	0.416
	(0.209)	(0.249)	(0.276)	(0.252)	(0.283)	(0.249)	(0.289)	(0.249)	(0.280)
FL high	-0.555**	-0.528**	-0.300					-0.528**	-0.300
	(0.235)	(0.264)	(0.290)					(0.265)	(0.290)
- if FA				-0.768**	-0.128				
				(0.358)	(0.433)				
- if No FA				-0.314	-0.414				
				(0.322)	(0.363)				
- if Cognition						-1.800**	0.003		
						(0.706)	(1.020)		
- if Intuition						-0.366	-0.324		
						(0.272)	(0.306)		
FA	-0.255	-0.100	-0.589**			-0.110	-0.593**		
	(0.163)	(0.199)	(0.237)			(0.199)	(0.293)		
- if FL is high				-0.296	-0.468				
				(0.259)	(0.327)				
- if FL is low				0.158	-0.754**				
				(0.321)	(0.383)				
- if Cognition								0.053	-0.338
								(0.505)	(0.854)
- if Intuition								-0.123	-0.616**
								(0.213)	(0.252)
Cognition	-0.542*	-0.420	-0.376	-0.426	-0.382				
	(0.287)	(0.337)	(0.391)	(0.340)	(0.396)				
- if FL is High						-0.841**	-0.307		
						(0.407)	(0.477)		
- if FL is Low						0.593	-0.635		
						(0.606)	(0.860)		
- if FA								-0.337	-0.234
								(0.411)	(0.641)
- if No FA								-0.513	-0.512
								(0.453)	(0.570)
Crisis	1.170***	1.195***	0.486	1.212***	0.492	1.206***	0.490	1.195***	0.486
	(0.219)	(0.290)	(0.346)	(0.292)	(0.342)	(0.292)	(0.395)	(0.290)	(0.342)
Log Income	-0.400***	-0.843***	-0.0871	-0.856***	-0.0873	-0.844***	-0.0865	-0.844***	-0.0853
	(0.152)	(0.259)	(0.146)	(0.264)	(0.148)	(0.260)	(0.149)	(0.260)	(0.145)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	3,076	2,347	729	2,347	729	2,347	729	2,347	729

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4. The Table reports the results of our regression models as specified in Section 4 where we consider only policyholder below 55. The following results are for all age classes. The conditional marginal effects displayed are the sample averages over individual marginal effects. One star denotes the 10% significance level, two stars denote the 5% significance level, and three stars the 1% level. All standard errors over all imputation schemes (shown in parentheses) are adjusted for heteroscedasticity and contemporaneous autocorrelation.

Robustness All Assets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Joint	NI	I	NI	I	NI	I	NI	I
Income Shock	0.440*								
	(0.226)								
No LS	1.039***	1.267***	0.545*	1.268***	0.562	1.272***	0.559	1.273***	0.548*
	(0.242)	(0.321)	(0.311)	(0.322)	(0.350)	(0.321)	(0.352)	(0.322)	(0.317)
FL high	-0.600**	-0.675**	-0.127					-0.675**	-0.126
	(0.270)	(0.335)	(0.345)					(0.338)	(0.346)
- if FA				-0.931**	0.089				
				(0.418)	(0.603)				
- if No FA				-0.448	-0.248				
				(0.443)	(0.370)				
- if Cognition						-2.186**	0.461		
						(0.855)	(1.404)		
- if Intuition						-0.463	-0.164		
						(0.345)	(0.364)		
FA	-0.259	0.0234	-0.744**			0.0139	-0.759*		
	(0.195)	(0.250)	(0.326)			(0.249)	(0.392)		
- if FL is high				-0.180	-0.620				
				(0.312)	(0.441)				
- if FL is low				0.303	-0.957*				
				(0.426)	(0.548)				
- if Cognition								0.448	-0.695
								(0.625)	(1.082)
- if Intuition								-0.044	-0.752**
								(0.271)	(0.334)
Cognition	-0.680**	-0.516	-0.576	-0.525	-0.582				
	(0.343)	(0.409)	(0.562)	(0.412)	(0.571)				
- if FL is High						-1.023**	-0.463		
						(0.500)	(0.637)		
- if FL is Low						0.700	-1.088		
						(0.724)	(1.303)		
- if FA								-0.298	-0.564
								(0.484)	(0.937)
- if No FA								-0.790	-0.622
								(0.590)	(0.657)
Crisis	1.234***	1.249***	0.498	1.266***	0.510	1.266***	0.514	1.255***	0.499
	(0.270)	(0.355)	(0.371)	(0.357)	(0.434)	(0.360)	(0.443)	(0.355)	(0.371)
Log Income	-0.317*	-0.954***	-0.007	-0.959***	-0.008	-0.963***	-0.004	-0.964***	-0.007
	(0.173)	(0.344)	(0.164)	(0.349)	(0.167)	(0.348)	(0.166)	(0.348)	(0.163)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,381	1,843	538	1,843	538	1,843	538	1,843	538

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. The Table reports the results of our regression models as specified in Section 4 where we consider only savings in the bank account as the liquid asset. In the following we also take other liquid assets into considerations. The conditional marginal effects displayed are the sample averages over individual marginal effects. One star denotes the 10% significance level, two stars denote the 5% significance level, and three stars the 1% level. All standard errors over all imputation schemes (shown in parentheses) are adjusted for heteroscedasticity and contemporaneous autocorrelation.

Robustness Income Shock at 80%

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Joint	NI	I	NI	I	NI	I	NI
Income Shock	0.441*							
	(0.267)							
No LS	0.720***	0.714***	1.179	0.711***	1.031	0.715***	1.102	0.715***
	(0.225)	(0.237)	(0.932)	(0.241)	(0.843)	(0.238)	(1.157)	(0.237)
FL high	-0.617**	-0.607**	-0.336					-0.604**
	(0.260)	(0.277)	(0.884)					(0.278)
- if FA				-0.683*	-0.597			
				(0.362)	(1.402)			
- if No FA				-0.541	-0.045			
				(0.361)	(0.820)			
- if Cognition						-1.812**	-1.774	
						(0.744)	(4.750)	
- if Intuition						-0.453	-0.163	
						(0.283)	(0.878)	
FA	-0.262	-0.116	-1.708			-0.119	-1.597	
	(0.189)	(0.206)	(1.658)			(0.206)	(2.015)	
- if FL is high				-0.176	-1.740			
				(0.274)	(2.075)			
- if FL is low				-0.035	-1.189			
				(0.351)	(1.534)			
- if Cognition								0.370
								(0.564)
- if Intuition								-0.187
								(0.222)
Cognition	-0.677**	-0.665*	-0.286	-0.668*	-0.235			
	(0.330)	(0.347)	(1.356)	(0.347)	(1.198)			
- if FL is High						-1.054**	-0.700	
						(0.422)	(2.082)	
- if FL is Low						0.305	0.911	
						(0.626)	(3.469)	
- if FA								-0.424
								(0.414)
- if No FA								-0.980*
								(0.516)
Crisis	1.185***	1.189***	0.777	1.194***	0.702	1.203***	0.733	1.183***
	(0.255)	(0.288)	(1.039)	(0.289)	(1.142)	(0.291)	(1.214)	(0.287)
Log Income	-0.360**	-0.865***	0.162	-0.867***	0.152	-0.870***	0.154	-0.871***
	(0.170)	(0.283)	(0.476)	(0.285)	(0.457)	(0.285)	(0.441)	(0.285)
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,383	2,096	287	2,096	287	2,096	287	2,096

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6. The Table reports the results of our regression models as specified in Section 4 where we consider an significant income shock at a 80% level. We only report Models (1)-(8) because there are insufficient observations in the interaction variable for Model (9). The conditional marginal effects displayed are the sample averages over individual marginal effects. One star denotes the 10% significance level, two stars denote the 5% significance level, and three stars the 1% level. All standard errors over all imputation schemes (shown in parentheses) are adjusted for heteroscedasticity and contemporaneous autocorrelation.

Robustness Income Shock at 100%

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Joint	NI	I	NI	I	NI	I	NI	I
Income Shock	0.166								
	(0.192)								
No LS	0.733***	1.074***	0.414*	1.065***	0.422	1.092***	0.423*	1.071***	0.405
	(0.223)	(0.334)	(0.248)	(0.339)	(0.262)	(0.337)	(0.253)	(0.335)	(0.251)
FL high	-0.617**	-1.016**	-0.0735					-1.016**	-0.0731
	(0.264)	(0.433)	(0.284)					(0.439)	(0.283)
- if FA				-1.303**	0.079				
				(0.554)	(0.483)				
- if No FA				-0.781	-0.166				
				(0.554)	(0.286)				
- if Cognition						-3.135***	0.296		
						(1.088)	(0.930)		
- if Intuition						-0.729*	-0.102		
						(0.443)	(0.303)		
FA	-0.270	-0.0340	-0.615***			-0.0575	-0.621***		
	(0.190)	(0.322)	(0.225)			(0.321)	(0.227)		
- if FL is high				-0.259	-0.519*				
				(0.387)	(0.311)				
- if FL is low				0.263	-0.764**				
				(0.560)	(0.365)				
- if Cognition								0.723	-0.917
								(0.760)	(0.709)
- if Intuition								-0.154	-0.580**
								(0.346)	(0.235)
Cognition	-0.697**	-0.609	-0.526	-0.627	-0.531				
	(0.335)	(0.485)	(0.366)	(0.493)	(0.366)				
- if FL is High						-1.374**	-0.450		
						(0.642)	(0.416)		
- if FL is Low						1.032	-0.848		
						(0.855)	(0.876)		
- if FA								-0.232	-0.725
								(0.573)	(0.622)
- if No FA								-1.109	-0.389
								(0.709)	(0.432)
Crisis	1.189***	1.410***	0.571**	1.436***	0.571*	1.465***	0.578**	1.408***	0.566**
	(0.254)	(0.445)	(0.284)	(0.446)	(0.298)	(0.456)	(0.287)	(0.443)	(0.286)
Log Income	-0.406**	-1.032***	-0.198	-1.033**	-0.200	-1.068***	-0.199	-1.038**	-0.200
	(0.164)	(0.399)	(0.137)	(0.404)	(0.141)	(0.410)	(0.137)	(0.405)	(0.136)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,383	1,502	881	1,502	881	1,502	881	1,502	881

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7. The Table reports the results of our regression models as specified in Section 4 where we consider an significant income shock at a 100% level. The conditional marginal effects displayed are the sample averages over individual marginal effects. One star denotes the 10% significance level, two stars denote the 5% significance level, and three stars the 1% level. All standard errors over all imputation schemes (shown in parentheses) are adjusted for heteroscedasticity and contemporaneous autocorrelation.

Robustness: Higher Differentiation FL and heuristics measure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Joint	NI	I	NI	I	NI	I	NI	I
Income Shock	0.459*								
	(0.218)								
No LS	0.703***	0.963***	0.343	0.947***	0.352	0.964***	0.347	0.974***	0.344
	(0.222)	(0.293)	(0.301)	(0.300)	(0.303)	(0.294)	(0.305)	(0.296)	(0.306)
FL	-1.501***	-1.763**	-0.377	-1.475*	-0.570	-0.826	-0.435	-1.750**	-0.385
	(0.555)	(0.685)	(0.732)	(0.814)	(0.723)	(0.836)	(0.838)	(0.691)	(0.739)
- if FA				-2.210**	-0.005				
				(0.866)	(1.063)				
- if No FA				-1.475*	-0.570				
				(0.814)	(0.723)				
- at CRT = 0						-0.826	-0.435		
						(0.836)	(0.838)		
- at CRT = 1/3						-1.893***	-0.338		
						(0.694)	(0.838)		
- at CRT = 2/3						-2.992***	-0.238		
						(0.992)	(1.520)		
- at CRT = 1						-4.059***	-0.141		
						(1.476)	(2.331)		
FA	-0.240	0.0507	-0.727**	0.640	-1.170	0.0294	-0.726**	-0.146	-0.717*
	(0.192)	(0.246)	(0.323)	(0.841)	(0.791)	(0.247)	(0.327)	(0.362)	(0.411)
- at FL = 0				0.640	-1.170				
				(0.841)	(0.791)				
- at FL = 1/3				0.397	-0.984*				
				(0.544)	(0.527)				
- at FL = 2/3				0.147	-0.792**				
				(0.290)	(0.340)				
- at FL = 1				-0.096	-0.606				
				(0.294)	(0.386)				
- at CRT = 0								-0.146	-0.717*
								(0.362)	(0.411)
- at CRT = 1/3								0.035	-0.736**
								(0.250)	(0.325)
- at CRT = 2/3								0.222	-0.756
								(0.312)	(0.500)
- at CRT = 1								0.403	-0.775
								(0.483)	(0.771)
Cognition	-0.772**	-0.648	-0.634	-0.655	-0.627	2.132	-0.901	-0.925	-0.624
	(0.328)	(0.405)	(0.467)	(0.403)	(0.469)	(1.572)	(2.295)	(0.574)	(0.535)
- at FL = 0						2.132	-0.901		
						(1.572)	(2.295)		
- at FL = 1/3						1.065	-0.804		
						(1.014)	(1.446)		
- at FL = 2/3						-0.034	-0.704		
						(0.518)	(0.654)		
- at FL = 1						-1.101**	-0.607		
						(0.486)	(0.610)		
- if FA								-0.376	-0.682
								(0.487)	(0.829)
- if No FA								-0.925	-0.624
								(0.574)	(0.535)
Crisis	1.233***	1.256***	0.544	1.261***	0.529	1.292***	0.540	1.252***	0.554
	(0.263)	(0.353)	(0.382)	(0.353)	(0.385)	(0.355)	(0.384)	(0.352)	(0.384)
Log Income	-0.339**	-0.958***	-0.009	-0.954***	-0.008	-0.958***	-0.008	-0.973***	-0.010
	(0.167)	(0.335)	(0.158)	(0.334)	(0.158)	(0.339)	(0.158)	(0.341)	(0.158)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,381	1,843	538	1,843	538	1,843	538	1,843	538

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8. The Table reports the results of our regression models as specified in Section 4 where we now consider a more grain index for financial literacy and relying on heuristics. The conditional marginal effects displayed are the sample averages over individual marginal effects. One star denotes the 10% significance level, two stars denote the 5% significance level, and three stars the 1% level. All standard errors over all imputation schemes (shown in parentheses) are adjusted for heteroscedasticity and contemporaneous autocorrelation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
VARIABLES	LS	NLS	LS/ NI	NLS/NI	LS/I	NLS/I	LS/ NI	NLS/NI	LS/ I	NLS/ I	LS/ NI	NLS/ NI	LS/ I	NLS/ I	LS/NI	NLS/ NI	LS/ I	NLS/ I
Income Shock	0.948**	-0.121																
	(0.364)	(0.269)																
FL high	-0.498	-0.517*	-0.578	-0.799**	-0.454	0.151									-0.572	-0.811**	-0.434	0.208
	(0.470)	(0.288)	(0.702)	(0.392)	(0.994)	(0.613)									(0.692)	(0.399)	(0.993)	(0.629)
- if FA							-0.608	-0.778	-3.007	-1.007								
							(0.856)	(0.566)	(1.836)	(0.748)								
- if No FA							-0.495	-0.603	-1.706	0.349								
							(0.855)	(0.517)	(1.464)	(0.726)								
- if Cognition											-0.891	-2.521*	-1.708	0.261				
											(0.860)	(1.288)	(1.989)	(1.109)				
-if Intuition											-0.179	-0.551	-0.400	0.0320				
											(0.632)	(0.378)	(0.977)	(0.618)				
FA	-0.386	-0.234	-0.0565	0.0764	-1.812*	-1.031**					-0.0872	0.0896	-1.769*	-1.119**				
	(0.321)	(0.279)	(0.428)	(0.395)	(0.939)	(0.459)					(0.423)	(0.380)	(0.922)	(0.468)				
- if FL low							0.0403	0.284	-4.214*	-0.782								
							(0.705)	(0.601)	(2.210)	(0.592)								
- if FL high							-0.113	-0.175	-1.301*	-1.356*								
							(0.499)	(0.502)	(1.283)	(0.764)								
- if Cognition															-0.124	-0.507	-2.743	-0.312
															(0.794)	(0.950)	(2.283)	(0.941)
-if Intuition															-0.0900	0.0347	-1.910*	-0.860*
															(0.472)	(0.420)	(1.008)	(0.489)
Cognition	-0.545	-0.610	-0.110	-0.781	-1.185	-0.378												
	(0.557)	(0.539)	(0.642)	(0.768)	(1.462)	(0.789)												
-if FL high											-0.712	-1.969	-1.309	0.229				
											(0.759)	(1.214)	(1.718)	(0.937)				
-if FL low											1.634	0.816	-0.591	-1.362				
											(1.218)	(0.989)	(2.607)	(1.293)				
- if FA															-0.034	-0.541	-0.825	0.8602*
															(0.779)	(0.854)	(1.965)	(0.489)
- if No FA															-0.200	-1.074	-1.667	0.132
															(0.834)	(1.158)	(1.894)	(0.941)
crisis	1.540***	1.061***	1.867**	1.052**	0.441	1.101**	1.844**	1.044**	0.553	1.127**	1.798***	0.982**	0.429	1.156**	1.859**	1.058**	0.426	1.058*
	(0.455)	(0.371)	(0.667)	(0.492)	(0.916)	(0.537)	(0.697)	(0.498)	(1.081)	(0.543)	(0.536)	(0.483)	(0.882)	(0.549)	(0.645)	(0.500)	(0.919)	(0.543)
lnincome	-0.388	-0.618**	-1.492**	-0.790*	0.181	-0.447	-1.478**	-0.778*	0.220	-0.424	-1.454***	-0.815*	0.169	-0.445	-1.497**	-0.795*	0.189	-0.406
	(0.277)	(0.270)	(0.603)	(0.442)	(0.487)	(0.325)	(0.611)	(0.435)	(0.529)	(0.325)	(0.542)	(0.433)	(0.474)	(0.323)	(0.603)	(0.447)	(0.484)	(0.331)
CONTROLS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	1,641	732	1,300	532	341	196	1,300	532	341	196	1,300	532	341	196	1,300	532	341	196

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9. The Table reports the results of our regression where we split the sample additionally at the savings variable.The conditional marginal effects displayed are the sample averages over individual marginal effects. One star denotes the 10% significance level, two stars denote the 5% significance level, and three stars the 1% level. All standard errors over all imputation schemes (shown in parentheses) are adjusted for heteroscedasticity and contemporaneous autocorrelation.

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