Self-Control, Financial Well-Being, and Motivated Reasoning

Essays in Behavioral Finance

Camilla Strömbäck

Linköping Studies in Arts and Sciences
Dissertation No. 793

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Abstract

The objective of this thesis is to improve our understanding of how individual differences in intuitive and analytic decision making are associated with people's behavior as well as their well-being. The first three essays investigate, in turn, how self-control—a typical System 2 driven ability—correlates with financial behavior, financial well-being, and affective forecasting ability. The fourth essay leverages an experimental design, in which a randomized treatment attempts to inhibit the use of System 2 processing by individuals by setting them under time pressure, while measuring how they interpret numerical information.

The first essay, *Does Self-Control Predict Financial Behavior and Financial Well-Being?*, describes how variation in self-reported individual differences in self-control, optimism and deliberativeness predicts financial behavior and financial well-being. Data was collected by means of an online survey distributed to a representative, adult Swedish sample. Results indicate that individuals with better self-control were more likely to engage in sound financial behaviors, were less anxious about financial matters, and felt more secure in their current and future financial situation than individuals displaying lower levels of self-control.

The second essay, *Subjective Self-Control but Not Objective Measures of Executive Functions Predicts Financial Behavior and Well-Being*, is a follow-up study of the first essay. Apart from using the same self-reported measures of self-control, optimism, and deliberativeness as essay one does, this analysis additionally includes an extensive test battery of objective performance measures of executive functions and intelligence. Findings suggest that, while self-reported self-control predicts both financial behavior and subjective financial well-being, neither of the executive functions, nor intelligence do so. This indicates that an ability to form good habits and avoid temptation is more important for sound financial behavior and financial well-being than actual inhibitory control.

The third essay, *Better Self-Control Does Not Imply Fewer Affective Forecasting Errors*, explores whether individual-level differences in self-control can explain observed variation in affective forecasting ability. Moreover, it assesses whether participants with strong self-control are more likely to make “optimal choices” in an intertemporal choice task: i.e. choices that maximize their own expected happiness. To test this, the study leveraged a laboratory experiment with a student sample in Linköping and Stockholm. Study results uncover no evidence of self-control predicting affective forecasting ability. Equally, self-control seemingly had no effect on the probability of individuals' choosing happiness maximizing options.

The fourth essay, *Motivated Reasoning, Fast and Slow*, investigates whether prior beliefs may hinder individuals from interpreting information about immigration and gender quotas correctly: a process commonly referred to as motivated reasoning. In general terms, motivated reasoning can be conceptualized as an intuitive or analytic process. Testing the prevalence of this form of sense-making, we ran an online experiment where half the respondents were tasked to interpret numeric information under time constraints, and the rest without said constraints. Findings provide clear evidence of the existence of motivated reasoning with regards to issues of both immigration and gender quotas. Numeric ability seemingly reduced the probability of individuals to engage in motivated reasoning, while time pressure had no effect on said likelihood. Hence, results suggest that motivated reasoning is an intuitive, rather than an analytic process.

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List of Essays

Essay I: Camilla Strömbäck, Thérèse Lind, Kenny Skagerlund, Daniel Västfjäll, Gustav Tinghög. *Does Self-Control Predict Financial Behavior and Financial Well-being?*. Published in Journal of Behavioral and Experimental Finance (2017)

Essay II: Camilla Strömbäck, Kenny Skagerlund, Daniel Västfjäll, Gustav Tinghög. *Subjective Self-Control but Not Objective Measures of Executive Functions Predicts Financial Behavior and Well-Being*. Published in Journal of Behavioral and Experimental Finance (2020)

Essay III: Camilla Strömbäck. *Better Self-Control Does Not Imply Fewer Affective Forecasting Errors*

Essay IV: Camilla Strömbäck, Daniel Västfjäll, Gustav Tinghög. *Motivated Reasoning, Fast and Slow*

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Introduction

Every day, we make many decisions. Most of these decisions influence our well-being, either immediately or in the future, and many decisions also affect our financial situation. In order to make the best possible decisions, we forecast our emotional response to different outcomes, interpret information, and analyze facts. In a perfect world, we would act to achieve long-term goals and never worry. However, in the real world there are several obstacles that render decision-making difficult. For example, people are generally not good at predicting their emotional response to future events (Gilbert et al., 2002), they lack the necessary skills to interpret information (Skagerlund et al., 2018), they interpret information in a biased way (Drummond & Fischhoff, 2017), they make intuitive decisions even when they do not have the necessary experience to do so (Dane & Pratt, 2007), they procrastinate (O'Donoghue & Rabin, 1999), and they lack the self-control needed to act on long-term goals (Mischel et al., 1989).

In the field of behavioral finance, the focus has often been on how psychological factors affect investment decisions and stock-market participation. However, behavioral finance should include a wider range of topics. Since people tend to have trouble separating investment decisions from decisions about consumption (Statman, 2014), it is important to include, for example, the often-neglected topic of everyday financial decision-making. In this thesis, the focus will therefore be on how individual differences may or may not be able to explain everyday financial behaviors, such as whether people pay their bills on time or if they save money, rather than how they invest their hypothetical savings. The overall purpose of this thesis is to study how self-control and intuition are linked to financial behavior, financial well-being, affective forecasting, and motivated reasoning. I address the question of whether individual differences in self-control and analytical thinking can explain people's ability to make and follow through decisions that will be favorable in the long term.

Conceptual underpinnings

The work included in this thesis makes use of dual process theory (Epstein, 1994; Kahneman, 2011; Stanovich & West, 1998) to explore different kinds of financial behaviors and motivated reasoning. According to dual process theory,

System 1 is typically characterized as fast, automatic, intuitive, and emotionally driven, while System 2 is typically characterized as slow, reflective, and effortful. Decisions are generally made using System 1, but they can at any point be overridden by System 2 thinking. Consider the following situation as an example. You are on a tight budget, saving money for your wedding, but you need a new pair of socks. Once in the store, you see a beautiful shirt. Buying the shirt would give you immediate satisfaction, but in the long run you would prefer to save money for the wedding rather than having the shirt. The intuitive response would be to buy the shirt anyway to gain instant gratification. However, to act in accordance with long-term goals, System 2 must be activated to override the impulsive response. If your System 2 is not engaged to override the impulse to buy the shirt, you will fail to act in accordance with your long-term goals, which can be considered a failure of self-control. This conflict between immediate gratification and long-term goals has been formalized by Thaler and Shefrin (1981) in their planner–doer model. According to this model, every person has an internal, ongoing conflict between myopic and selfish doers, who only care about short-term utility and immediate gratification, and a far-sighted planner who is concerned with lifetime utility. Originally, the model was developed to explain inconsistencies in savings behavior and why people put costly restraints on their own future consumption.

Apart from self-control, several other factors impacting upon System 1 and System 2 processing have been identified within the field of consumer psychology (for a review, see, Samson & Voyer, 2012). In this thesis, I examine some of them, namely working memory, time pressure, and intelligence. Essays I–III focus on how self-control is linked to financial behavior, financial well-being, and affective forecasting, while Essay IV focuses on how time pressure, which inhibits System 2 processing, affects the likelihood of engaging in motivated reasoning.

For decades, self-control has been studied within psychology and behavioral economics and its effects on aspects such as health (Moffitt et al., 2011), wealth (Biljanovska & Palligkinis, 2018), and educational attainment (Mischel et al., 1989) are widely recognized. In the financial domain, self-control has been linked, among other things, to shopping patterns (Gathergood, 2012), savings behavior (Rha et al., 2006), and home ownership (Moffitt et al., 2011). Although most people have an idea of what self-control is, different studies have used different definitions. Self-control has been defined, for example, as the ability to exert control over responses and states (Oaten & Cheng, 2007) and resist temptation in favor of long-term goals (Mischel et al., 2011). In this thesis, self-control is defined as the ability to resist temptation, overcome first impulses, and break bad habits. Apart from greater

self-control being positively correlated with numerous appealing behaviors, it has also been shown to correlate with fewer psychological and emotional problems, including anxiety (Tangney et al., 2004). In Essays I and II, we examine the relationship between self-control and a key predictor of general well-being, namely financial well-being (Netemeyer et al., 2017). As there is a non-linear relationship between income and happiness (Hsieh, 2001), and as social comparison is an important aspect of financial well-being (Leach et al., 1999), we chose to use a subjective measure of the construct. We also made this choice so that we would be able to separate the participants' emotional responses to their financial situations from their actual behavior, which an objective measure of financial well-being had not enabled.

Essays III and IV also include variables connected to well-being. In Essay III, I studied the relationship between self-control and how well the participants could forecast their emotional response to future events, commonly referred to as affective forecasting. In Essay IV, we investigated the underlying processes of motivated reasoning, which is defined as the action whereby people, instead of objectively considering information, interpret it in a biased way in order to protect personal beliefs about value-laden topics (Bénabou, 2015; Kunda, 1990). The rationale behind this behavior is that the utility we receive from maintaining these beliefs makes us willing to sometimes give up accuracy in order to protect our most valued opinions (Hagmann & Loewenstein, 2017). Motivated reasoning has previously been found in several political issues, including gun control (Kahan et al., 2017), climate change (Drummond & Fischhoff, 2017), and immigration (Lind et al., 2018). By studying it in the context of how gender quotas on company boards affect the companies' financial outcomes, we examined motivated reasoning in the financial domain, which has not been done to any great extent before. Additionally, we were interested in investigating whether motivated reasoning should be considered more of an intuitive or analytical process, following the motivated reasoning-as-analysis and motivated reasoning-as-feelings hypotheses suggested in Lind et al. (2018).

Methodology

The essays in this thesis cover how financial behavior, financial well-being, and the evaluation of information can be affected by whether we trust our System 1 or System 2 when making decisions. Essays I–III focus on System 2 processing, because the main variable of interest was self-control. In Essay IV, we experimentally inhibit the participants from using System 2 processing by putting them under time pressure while also measuring another System-2-driven ability, namely numeracy. The data supporting the results of the studies

presented in this thesis were collected through surveys, online and laboratory experiments, and laboratory testing.

The results presented in Essay I are based on a large-scale survey that was conducted in May 2016. Weblinks were distributed through a survey company, Origo Group (previously CMA), to a representative subsample of the adult Swedish population. To increase the probability of reaching a representative sample of the population, quotas with respect to the participants' age, sex, and residential region were set. The participants had signed up in different online panels to which Origo Group has access. All participants answered the same questions and in the same order. Internet-based surveys are advantageous when large and diverse samples are needed. Compared to a laboratory experiment, the costs can usually be kept lower, and the participants can conveniently answer the survey at home, at a time that suits them. However, the researcher loses some control over the data collection and, although the participants are paid, the payment does not generally depend on how they answer the questions, i.e. the questions are not incentivized. As we were interested in participants' subjective ratings of self-control, optimism, financial behavior, and financial well-being, we could not have incentivized the questions anyway. Hence, conducting a survey became the best option for this data collection.

Within the fields of behavioral economics and behavioral finance, self-control has mostly been assessed using self-reports (e.g., Achtziger et al., 2015; Gathergood, 2012; Lind et al., 2020), and in some cases as the ability to wait for desired rewards in intertemporal choices (Pyone & Isen, 2011). The greatest limitations of self-reported data are that the responses may suffer from social desirability bias and that the participants may have imperfect knowledge about their own characteristics (Schmeichel & Zell, 2007). Despite these limitations, this thesis continues the tradition of using self-reported assessments of self-control. However, we also wanted to include a behavioral measure, namely inhibition. Behavioral measures are commonly used within psychology, but good tests of inhibition and other executive functions are rare within the fields of behavioral economics and behavioral finance. Since inhibition is highly correlated with the other executive functions (Miyake et al., 2000), all three constructs, and preferably other related abilities, should be included together or any hypothetical variance could be caused by another executive function not included in the model. In Essay II, we investigated how inhibitory control correlates with financial behavior and financial well-being. The necessity for supervised and extremely time-consuming tests to gain valid estimates of the participants' executive functions and intelligence led us to choose a student sample for this data collection. Students at both the technical and the philosophical faculty at Linköping University were invited by email to sign up

for the laboratory tests. As well as a wide range of cognitive tests, the participants also answered the same survey as in Essay I.

In our sample, the correlation between self-reported self-control and inhibitory ability was -0.04. Although the sample correlation may be lower than the 'true correlation' (Dang et al., 2020), this indicates that the measures were, in the best case, weakly correlated. The same pattern of weak correlation between self-reported and behavioral measures of self-control have been observed in other datasets as well (Delaney & Lades, 2017; Saunders et al., 2018). The underlying reason for the low correlation could be one of many. While self-reports measure trait self-control, which is relatively stable over time, behavioral measures test within-person differences in state self-control. Hence, the results of behavioral tests are more likely to be influenced by exogenous factors, such as laboratory settings, and how tired the participant was when doing the task, causing low test-retest reliability. Additionally, behavioral tests measure not only ability, but also the participants' effort and motivation to perform well (Dang et al., 2020). Another explanation for the difference in reliability between self-reported and behavioral measures lies in the different nature of the tests. While behavioral measures take place in a specific and highly structured situation, self-reported measures encourage participants to reflect on their behavior across a variety of real-life situations (Dang et al., 2020). One should therefore be careful when discussing studies using different measures because the tests may not be interchangeable indicators of the same construct. Hence, including different measures of self-control generated a more robust understanding for how self-control predicts financial behavior and financial well-being.

The results presented in Essay III are based on a laboratory experiment with students. The biggest advantage of laboratory experiments is that the experimenter can test predictions derived from theoretical models in a highly controlled environment (Falk & Heckman, 2009). However, using a student sample will always raise the question of biased results. Exadaktylos et al. (2013) showed that there exists a self-selection bias among students who volunteer for experiments and reported indications of students behaving slightly differently in studies of social preferences. However, the effects were so small that it is still appropriate to use students in laboratory experiments. In the data collection for Essay III, I also used two measures of self-control: a self-reported measure and the participants' discount rate. Once again, the correlation between self-reported self-control and the behavioral measure was low ($r = 0.0076$). It has been argued that self-control measured as present bias, elicited in a monetary delay task, does not predict self-control problems in non-financial domains (Delaney & Lades, 2017). As the main outcome variable was

affective forecasting ability, which is a non-financial variable, the self-reported measure was more suitable for the analysis.

In Essay IV, we used time pressure to exogenously manipulate the inhibition of System 2 processing among half of the sample in an online experiment. The aim of the treatment was to make the participants respond more intuitively. Time pressure has previously been shown to increase System 1 thinking, and hence to increase trust in intuition (Milkman et al., 2009).

However, using time pressure as a manipulation has one major drawback: what to do with participants who do not comply with the time limit? Excluding these participants may create biased results (Tinghög et al., 2013), but if the non-complying group is large enough, keeping them may lead to underestimation of a hypothetical treatment effect. In our sample, about 21 percent of the participants in the treatment group did not answer within the time limit, but we chose to keep all observations. According to manipulation checks at the end of the experiment, the participants who experienced the time-pressure treatment felt more stressed and answered more intuitively than participants in the control group, which indicates that the time-pressure treatment did influence the participants on an aggregated level. However, any hypothetical effect of the time-pressure treatment might be underestimated. For this data collection, we chose to use an online experiment, which is a relatively easy way to collect data on a fairly representative sample of the population. It is also less time consuming than laboratory experiments, while still allowing the experimenter to test theoretical models. One big drawback of online experiments is that they are less controlled than laboratory experiments and there is a risk of less attentive participants (Paolacci et al., 2010). We included an attention check in this data collection, which enabled us to exclude those who did not read the instructions. Although attention checks reduce the risk of inattentive participants affecting the results, there is a risk that participants with certain characteristics are more likely to fail the attention check, which instead could lead to attrition bias (Oppenheimer et al., 2009).

Some reflections on the results

In line with previous studies, we found that people's self-control played an important role in decision-making. However, we also found that, depending on how self-control was assessed, the results differed. Self-reported self-control was positively correlated with sound financial behavior (Essays I and II), while the results from an inhibitory control task (STROOP) were not (Essay II). This could perhaps be explained by the nature of the questions on the Financial Management Behavioral Scale (Dew & Xiao, 2011), which we used to assess financial behavior. The items on this scale focus more on behaviors that require

an approach response rather than those that require an avoidance response. In the field of eating behaviors, it has been shown that inhibitory control predicts saturated fat intake, which requires an avoidance response, but not the intake of fruit and vegetables, which requires an approach response (Allom & Mullan, 2014). Future studies should therefore explore the link between different aspects of self-control and financial behavior using another financial behavior scale or by looking at actual, rather than self-reported, financial behaviors.

Self-reported self-control has also been linked to the ability to form habits that lead to efficient and steady performance in various areas of life (De Ridder et al., 2012) and to habits that reduce the time spent on exercising self-control in order to resist temptation (Ent et al., 2015). As self-reported self-control was positively correlated with financial well-being, helping people to form good habits in the financial domain could possibly improve both their financial behavior and their financial well-being. From a policy perspective, this would be good news; habit formation is improvable while inhibitory control may not be (Diamond, 2013; Thorell et al., 2009). Although high levels of self-control seem to predict good behavior in many areas of life, it is important to notice that self-control does not matter in situations where people do not understand the costs and benefits of their choices (Duckworth et al., 2018). This means that, without the necessary knowledge or, in financial matters, financial literacy, people will not be able to make informed decisions, and self-control will not be as important.

To conclude, whether we make use of System 1 or System 2 when making decisions influences not only our actions, but also our well-being. In this thesis, I found that self-control, a typical System-2-driven ability, was positively correlated with sound financial behavior and financial well-being, while another System-2-driven ability, numeracy, decreased the likelihood of engaging in motivated reasoning. Given these results, it is tempting to say that System 2 processing is superior to System 1 processing in all situations. That would, however, be an inaccurate conclusion. Although trusting your intuition when solving highly structured math problems often leads to mistakes (Dane & Pratt, 2007), System 1 should be used when making emotional choices (Milkman et al., 2009), and in situations where the decision-maker has expertise and the environment provides accurate cues about the situation (Kahneman & Klein, 2009). An important question is whether there exist financial situations in which accurate cues are provided. Thoma et al. (2015) found that professional investors trusted their intuition to a lesser extent than non-professionals. Additionally, the professional investors reported being more deliberative and performed better at the Cognitive Reflection Test, which is a behavioral test of deliberative thinking. Future studies should therefore investigate in which, if any, financial situations System 1 should be trusted.

Summary of the thesis

Essay I: Does Self-Control Predict Financial Behavior and Financial Well-Being?

In an online survey, we investigated how individual differences in self-control, optimism, and deliberative thinking predicted financial behavior and financial well-being. A representative Swedish sample ($n = 2,063$) were asked to fill out scales concerning the individual differences mentioned above and their financial well-being, and answer questions regarding how often they had engaged in different financial behaviors during the previous six months. We chose to focus on subjective financial well-being, i.e. the participants' feelings of anxiety and security connected to their current and future financial situation, rather than objective financial well-being, which has been the subject of most previous studies. Our main results indicate that, in our sample, the behavioral life-cycle hypothesis (Shefrin & Thaler, 1988) could be extended to include not only savings behavior, but also general financial behavior, because self-control was positively correlated with sound financial behavior. People with good self-control were also less likely to feel anxious about financial matters and felt more secure about their current and future financial situation. Additionally, we found that deliberative thinking was positively correlated with sound financial behavior and financial security, and that optimism was positively correlated with sound financial behavior and negatively correlated with financial anxiety.

Essay II: Subjective Self-Control but Not Objective Measures of Executive Functions Predicts Financial Behavior and Well-Being

Executive functions, i.e. inhibition, shifting, and working memory, are three separable, but robustly correlated constructs that have been widely studied within psychology. They are responsible for the ability to resist temptation, maintain attention towards an important task at hand, and switch efficiently between different demanding tasks. Previous studies have found a positive correlation between executive functions and physical and mental health, quality of life, and fewer social problems. However, in the fields of behavioral economics and behavioral finance, there is a lack of studies involving good measures of all three executive functions.

In this study, we used a student sample ($n = 166$) and collected data on the participants' executive functions and intelligence, which are closely related constructs. Additionally, the participants self-reported their self-control, optimism, deliberative thinking, financial behavior, and financial well-being. We found no correlation between either the executive functions or intelligence and financial behavior or financial well-being. However, subjective, (self-reported)

self-control and deliberative thinking were positively correlated with sound financial behavior, while subjective self-control and optimism were positively correlated with financial well-being.

The correlation between self-control and financial behaviors is not new. However, given the results of this study, that correlation could depend on how self-control is measured. In this study, we used two separate measures of self-control: subjective self-control and inhibition, which is a measure of the ability to override impulses. The correlation between the two measures was as low as -0.04. Additionally, we found that subjective self-control, but not inhibition, predicted general financial behavior and financial well-being. These results suggest that good habits in the financial domain might be more important than actual inhibitory ability.

Essay III: Better Self-Control Does Not Imply Fewer Affective Forecasting Errors

According to economic theory, the rational individual will evaluate all available actions in terms of possible outcomes and the corresponding expected utility. He or she will thereafter choose the action that generates the highest expected utility. One of the problems with this theory is that people generally have trouble with affective forecasting, i.e. the ability to predict their own emotional response to future events.

The objective of this study was to investigate whether individual differences in self-control could explain the observed differences in affective forecasting ability. To test this, an incentivized laboratory experiment was conducted with 178 undergraduate students. Apart from studying the link between affective forecasting and self-control, I also evaluated the extent to which the participants chose the response option in intertemporal choice tasks that maximized their expected happiness. The results did not show any evidence of self-control being associated with either affective forecasting ability or the likelihood of choosing the option that maximizes one's expected happiness in our sample. Furthermore, the results indicated that the size of the affective forecasting errors did not vary in any systematic way as the time horizon expanded.

Essay IV: Motivated Reasoning, Fast and Slow

In this study, we were interested in whether motivated reasoning is most accurately seen as an intuitive or analytical process. More specifically, we investigated the contrasting hypotheses of motivated reasoning-as-analysis and motivated reasoning-as-feelings. In an online experiment, participants ($n = 1,207$) were asked to evaluate numerical information regarding how immigration affects crime rates and how gender quotas on company boards

affect the companies' financial outcomes. Intuition was manipulated through time pressure, with about half the sample evaluating the scenarios under time pressure, while the other half could take as much time as they wanted. Analytical ability was assessed by means of a short numeracy test.

The results show clear evidence of motivated reasoning in both the immigration and the gender-quota setting. Participants who rated themselves as nationally oriented were less likely to correctly assess a scenario about immigration having a positive effect on crime rates than participants who rated themselves as globally oriented. On the other hand, participants who reported egalitarian values were less likely to correctly assess a scenario in which gender quotas led to worse financial outcomes for companies than participants who reported libertarian values. Time pressure had no effect on the likelihood of engaging in motivated reasoning, while motivated reasoning seemed to decrease with higher numeracy in the immigration scenario. Thus, our results suggest that motivated reasoning was best described as an intuitive rather than an analytical process, which would be in line with the motivated reasoning-as-feelings hypothesis.

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