

Psychology of Financial Decision-Making: A Literature Review*

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Psychological elements are increasingly being incorporated into standard theories in order to better understand actual human behaviors. In particular, in human financial decision-makings, there are some biases, heuristics, and behavioral preferences, which tend to be commonly observed and can be better understood by exploring some psychological factors. In this article, I attempt to summarize some of the findings offered by the behavioral household finance literature.

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1. INTRODUCTION

People believe that they think, but often the decisions they make turn out to be suboptimal ones. Humans are often not capable of processing all the required computations. Especially decisions involving money tend to arise with layers of complexities to be considered, such as risks, uncertainties, and various points of time. And in such decision-making, there may not be perfectly clear rules and ways of making the right decisions. Humans' judgments can be biased (and even erroneous) and may rely on their more convenient heuristics. And the more complex the decision-making is, the prevalence of biases and use of heuristics is likely to be higher. Assuming human fragility and limitation in such complex decision-making seems plausible, since humans cannot process like unlimited computers.

Behavioral economics and behavioral finance cover a wide range of topics. Thus, before proceeding further, I would like to clearly set the boundary of what is to be reviewed. This article is mostly relevant to and within the realm of the field called behavioral household finance. In behavioral household finance, various topics are included, i.e., saving and

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consumption, borrowing, asset allocation, insurance, payments (i.e., as covered in Beshears et al. (2018)). This article attempts to marginally add to the behavioral household finance literature by focusing on some biases/heuristics and behavioral preferences which seem to be particularly relevant to households' financial preparation for future. That is, this article is mostly related to household decisions of saving and consumption rather than other types of financial decision-making. In particular, I focus on cognitive aspects (and some relevant social aspects). Thus, the large volume of studies on emotions/affects and those on other types of household financial decision-making are not included (only briefly mentioned if relevant) in this paper.

For recent survey studies on the behavioral finance literature, refer to Park and Sohn (2013) on investor behavior and market anomalies including studies on Korean financial markets in the areas of both household and corporate finance, chapter 3 (on behavioral household finance, by Beshears et al. (2018)) and chapter 4 (on behavioral corporate finance, by Malmendier (2018)) in the Handbook of Behavioral Economics (Beshears et al., 2018), Duxbury (2015) on experimental studies in behavioral finance, as well as Shleifer (2000), Shefrin (2002), Barberis and Thaler (2003), Byrne and Brooks (2008), Hirshleifer (2015), Baker, Filbeck, and Ricciardi (2017), Baker, Filbeck, and Nofsinger (2019), just to name a few.

Building on these studies, this article summarizes the literature including recent developments on cognitive biases/heuristics and behavioral preferences particularly relevant to households' financial preparation, with some suggestions for future research directions. First, why is the topic of households' financial preparation important? Individuals' and households' financial preparation for future is important for their own welfare security as well as for social cost reduction. Less than 25% of the world population saves for their aged years (Demirgüç-Kunt, Klapper, and Panos, 2016); Pension provisions are experiencing deficits thus are not sustainable (i.e., Farrar et al., 2019; Agarwal et al., 2020; Gupta and Hershey, 2016). This is increasingly problematic with population ageing (He, Goodkind, and Kowal, 2016; Marchal et al., 2012).

Despite its importance, decision-making of financial preparation is complex in that it is intertemporal. That is, it involves tradeoffs between immediate rewards now and delayed larger future rewards. Also, it involves complexities of processing vast information and also tends to occur within social influences. Layers of complex mechanisms come into play, including high degree of uncertainties. Thus, there is likely to be no single concept or framework which provides full explanations. Various attributes are likely to be weighed differently across different points of time.

Explorations of household saving and consumption behavior go back to 50s, i.e., the seminal study by Modigliani and Brumberg (1954) on households' capability of implementing some smoothing behavior on their consumption over their lives. Developing further, there has been a number of empirical studies specifically addressing the retirement-consumption puzzle, the phenomena of consumption falling sharply after retirement (i.e., Banks et al., 1998; Bernheim et al., 2001; Angeletos et al., 2001; Haider and Stephens, 2007; Schwerdt, 2005; Olafsson and

Pagel, 2018).

There is a large volume of literature documenting the tendency of weighing immediate rewards more than later larger rewards (see Frederick, Lowenstein, O'Donoghue (2002) for a review). Failing to sufficiently save is often examined in the light of present-bias. Present-biased preferences can lead individuals to make decisions that favor recent rewards at the expense of future welfare, which can result in regret later in time (Strotz, 1955; Laibson, 1997). Also, people often make financial choices which can turn out to be detrimental (i.e., Campbell, 2006; Choi, Laibson, and Madrian, 2011). Also, there are studies on physical proximity, i.e., people tend to be able to delay rewards more when the rewards are not in front of them (Metcalf and Mischel, 1999).

Behavioral finance and behavioral economics cover a wide range of topics. For example, the topics covered in Handbook of Behavioral Finance (Bruce, 2010) include behavioral biases (i.e., framing effect, information overload, disposition effect, overreaction and bubbles, herding, psychic distance), behavior in investment process (i.e., effects of transaction costs, investor sentiments, optimism in earnings forecasts, active management due to overconfidence, growth forecasts based on availability bias, investment advices). Also, the topics covered in Handbook of Behavioral Economics (Bernheim et al., 2018) include reference-dependent preferences, psychology in asset pricing, behavioral household finance, behavioral corporate finance, behavioral public economics, behavioral industrial organizations, intertemporal choices, errors in probabilistic reasoning and judgment biases, errors in strategic reasoning, inattention, behavioral development economics, and health-care.

Since this article particularly attempts to focus on cognitive biases/heuristics (and relevant behavioral preferences) in financial preparation by individuals and households, I select ones which seem to be relatively less highlighted in the existing literature of household financial preparation despite their importance. In this article, I address illusions around the standard of value of money, prejudice and overconfidence, overweighing prevalent choices, desire of principal protection (in the light of (myopic) loss aversion), and probability judgments. Then, I briefly summarize some recent developments including empirical studies, experimental studies, and applied studies.

In this article, I explain some psychological factors which can help in better understanding individuals' behaviors in saving for future. People suffer from anchoring effects and overconfidence. People tend to overweigh relative standards and suffer from crowd psychology. People tend to consider money in nominal terms instead of real terms. People tend to overweigh potential loss of their principals. People tend to subjectively judge probabilities. In sum, people often fail to fully consider objective outcomes and probabilities, but are highly influenced by psychological factors.

The behavioral literature on financial decision-making considers the roles of human psychology. The explorations involve attempts to better understand human heuristics and biases laid as the backbones, then their roles and implications in variety of topics, i.e., from

asset pricing to corporate financial decisions.¹⁾ The exploration efforts as to decision makings at individual-level have been largely cognitive. Also, the exploration of heuristics and biases in crowds (that is, encompassing social influences) at group-level or market-level has been flourishing. The combinations of micro and macro level evidences together are enriching the behavioral finance and economics literature.

Broadly speaking, there are literatures on biased beliefs (i.e., overconfidence, anchoring, money illusion) and relatedly heuristic rules of thumbs, and behavioral preferences (i.e., risk attitudes not conforming with expected utility theory). In some cases, simple heuristics may prove to be useful in life but can lead to tangible losses especially in financial decision-making requiring some calculations and reflective thoughts. As to behavioral preferences, a well-known behavioral preference framework is prospect theory (Kahneman and Tversky, 1979) which describes how people subjectively consider values and probabilities. That is, final amounts and objective probabilities in the expected utility theory are replaced with the notions of value function involving gains and losses from subjective reference points and decision weights (subjective probabilities). Relatedly, Fellner (1961) introduce the notion of decision weight in his work on ambiguity aversion. Some of the notable features of this behavioral preference framework include loss aversion, subjective probability, and subjective reference points.²⁾

There are still much to be explored as to human monetary decision-making, i.e., on why so many people make impulsive, emotional, and even foolish choices, how to combine such elements into existing standard frameworks, and how to de-bias if possible at all. The research of macro-level and micro-level in behavioral finance will increasingly converge to offer combined and strong evidence. Even hundreds of years later, companies, industries, and economies will advance in technological terms, but the very human nature would not change much.

The article is organized as follow. Section 2 explains overconfidence and prejudice. Section 3 explains anchoring effect. Section 4 explains illusions around the standard of the value of money. Section 5 explains overweighing the prevalent choice. Section 6 explains principal protection desire, loss aversion, and myopic loss aversion. Section 7 explains probability judgments. Section 8 concludes.

1) i.e., roles of psychology in investing and speculative movements of asset prices; roles of psychology in corporate strategies, policies, and accordingly value maximization.

2) Also, there are other behavioral preference frameworks considering self-control and regret aversion.

2. OVERCONFIDENCE AND PREJUDICE

There is a growing literature examining the relationships between the psychometric measures (i.e., overconfidence) and economic and financial variables. For example, on average, investors tend to suffer from better-than-average effects, and this can explain why they frequently trade (Glaser and Weber, 2007). Also, people tend to be overconfident that their beliefs are correct (Fischhoff et al., 1977). And with illusion of control, people tend to believe that they are capable of making the optimal decisions and making forecasts of the future when they cannot (i.e., hindsight bias (Strahlberg and Maass, 1998).

Moreover, people can be overconfident about their precision of their judgments about their retirement timing, the amounts of saving before retirement, health-care needs ex-post of retirement, and the possibility of the capability of being able to depend on the descendants, as well as their life prospects in aged years. This type of overconfidence can aggravate when uncertainties are higher. As to future financial planning and preparation, uncertainties tend to be high thus it is not easy to form accurate judgments. For example, people tend to believe that they are better than the average, suffer from inability of rational information processing and miscalibration (Benoit et al., 2014; Merkle and Weber, 2011; Ben-David, 2013).

Recent studies show that overconfidence can play important roles in saving choices (Avdeenko et al., 2019). And overconfidence in financial knowledge can potentially harm retirement preparedness (Angrisani and Casanova, 2019), and retirement planning (Yeh and Ling, 2022).

People's judgments are also often influenced by prejudices (i.e., Kahneman and Tversky (1974) on frames, Akerlof and Kranton (2000) and Bénabou and Tirole (2011) on identity, Benjamin, Choi, and Strickland (2010) on self-categorization). Individual judgments and preferences can be influenced by their frames of identity. Also relatedly, when seeming descriptions, stories, or external features which are consistent with some of the features of particular events, people are likely to be more overconfident in the even happening in the future. Such overconfidence could make people to try to beat the market, and trade more often, make forecasts of stock markets and prices, become overly confident about their job security, and potentially underweight needs for early financial preparation.

3. ANCHORING EFFECT

The anchoring (also known as anchoring effect, anchoring bias, or anchoring heuristic) is a cognitive bias of being influenced by an anchor, or a particular reference (Tversky and Kahneman, 1974).

The anchors can be quantitative or qualitative. People tend to be largely influenced by

recently observed salient numbers (Tversky and Kahneman, 1974). People tend to be largely influenced by their qualitative explanations and stories (Pennington and Hastie, 1992). Decisions in stock investments tend to be largely influenced by anchoring, since the recent past prices can easily serve as the anchors. Especially when making rough estimations, forecasts, and judgments, in complex decision-making such as those involving many countless cases of events, readily available and salient information can be commonly used as anchors.

Susceptibility to anchoring effect can potentially vary across individual by their style of ‘thinking fast and slow.’³⁾ For example, Bergman, Ellingsen, Johannesson, Svensson (1974) find that cognitive reflection measure (cognitive reflection test (CRT) in Frederick (2005)) tends to decrease although does not remove anchoring effect. That is, when decisions are made more impulsively at a fast speed without sufficient calculations, the decisions are more likely to suffer from anchoring bias and heuristic.

Anchoring effects can even aggravate in decision-making influenced by crowd psychology. Shiller (2000) pointed that anchoring effect and contagion of thought are the two main psychological factors underlying the amplifications of speculative price movements.

Anchors can influence saving and pension contribution choices, i.e., high anchors provided in communications can raise pension fund contributions of employees (Choi et al., 2017; Goda et al., 2014). Also, susceptibility to anchoring effect can be ameliorated by cognitive reflection, intelligence, and some other individual personality traits (Teovanović, 2019).

4. ILLUSIONS AROUND THE STANDARD OF THE VALUE OF MONEY

Money illusion (also known as price illusion) refers to the tendency of considering money in nominal terms instead of real terms. That is, people tend to insufficiently consider the effects of inflation (or deflation).

For example, people falsely believe that the dollar income or wealth today is worth the same as the dollar income last year and next year. When employees’ incomes are not sufficiently raised to reflect the effects of inflation, their earnings in nominal terms even if slightly increased from the previous year may actually mean a decrease in earnings in real terms. Similarly, people often do not take into account potential increases in the real costs of living sufficiently in planning their finances for their future. When people suffer from money illusion, they may falsely and wishfully believe that their income streams and their wealth will be sufficient to cover the living costs in the future. Likewise, when returns from investments are considered, they are often considered in nominal terms even when the investment periods are long enough involving some changes in the standard of the value of money.

3) The title of the book by Kahneman (2011).

In decisions which involve monetary outcomes in future (especially in far future), the effects of money illusion can be tangible and significant. Missing out the effects of change in the standard of value of money in financially preparing for far future times, such as post-retirement years, can be a significant mistake.

Some contractual agreements are sometimes considered to take advantage of such prevalent money illusion. For example, financial products' positive nominal returns may turn out to be negative when inflation effects are considered. These are not uncommon at all in reality. Most deposit products and even some of bonds may provide negative real-term returns, under inflation. Employers may also offer a modest increase in nominal wages. But seemingly constant (or even modestly rising) nominal income streams may imply decreases in real incomes over time.

The concept of money illusion was discussed by Irving Fisher in the book called *Stabilizing the Dollar* (1919) and the book called *The Money Illusion* (1928). John Maynard Keynes in the book called *Economic Consequences of the Peace* (1919) mentions the importance of stableness in the value of the standard of money: “*Lenin is said to have declared that the best way to destroy the capitalist system was to debauch the currency. By a continuing process of inflation, governments can confiscate, secretly and unobserved, an important part of the wealth of their citizens. By this method they not only confiscate, but they confiscate arbitrarily; and, while the process impoverishes many, it actually enriches some.*” (pp. 148-149). That is, the effects of large changes in the value of standard of money are likely to be destructive especially in unfair terms among the members of the community.

Money illusion can be considered as a cognitive bias or heuristic, where the value of money is wrongly considered in its seeming (nominal terms) than its real purchasing power. It can be considered as an easy rule of thumb based on the seeming information, that is, nominal values. Such a bias is not surprising. Information, news, facts, that people tend to refer to in their financial preparation decisions are also in nominal terms, i.e., media, financial statements. Also, see Shafir, Diamond, and Tversky (1997) for empirical evidence on the prevalent existence of money illusion.

Money illusion influences individuals' financial choices, and those with higher financial literacy tend to suffer less from money illusion (Darriet et al., 2020), Money illusion is found to be important in individuals' intertemporal financial decision-making (Yamamori et al., 2018).

5. OVERWEIGHING THE REPELLENT CHOICE

Crowd psychology is a branch of social psychology, that is, it considers human psychology in social settings.

Crowd psychology is known to be useful in better understanding how individual investors are largely influenced by the popular opinions of the crowd. For example, in the book called

Extraordinary Popular Delusions and the Madness of Crowds, published in 1841, Charles Mackay describes crowd behaviors including many economic and financial cases such as bubbles, i.e., the tulip bubble in the early 17th century, bubbles of the South Sea Company and the Mississippi Company in the early 18th century.

People tend to overweigh more salient popular signs, which are prevalent in the market, i.e., through recent past prices, news, chats and talks. William James (1890) pointed that attention tend to be focused on the information socially salient. That is, when others pay attention to particular information, one is also likely to pay attention to it.

Gustave Le Bon (1895), in his popular work, *The Crowd: A Stud of the Popular Mind*, describes crowd psychology as follow. In the crowd, individuals' sense of self and responsibility tend to decrease, reinforced by the anonymity of individuals. The predominant thoughts and emotions tend to be contagious among those in the crowd. Such contagion of thoughts and emotions tend to involve unconscious mechanisms. Such a tendency of unquestioning following of others in the crowd can result in potentially destructive outcomes.

In financial investment settings, which not only involve risks, uncertainties, but involve other complexities and information asymmetries, decisions are likely to be difficult. Thus, people are likely to fail to perceive correctly and fully the necessary and broad financial information and facts, but only can roughly guess. It is easy to falsely believe that other people including financial experts have gone through more concrete and solid analyses. In this light, following others' popular opinions may in part arise from lack of capability of own judgments. It may be that people are more likely to overweigh others' popular opinions in situations or games which they believe are not fully capable of understanding. Heath and Tversky (1991) found that with high sense of competence, people tend to take more risks even when the probabilities are held constant.

Unquestioning following others can also be considered as a heuristic such as a rule of thumb. That is, rather than actually going through all the calculations, people may falsely use the salient and easy-to-understand and readily available benchmarks of peers.

Also, following others' popular opinions may in part arise from desire of wanting to avoid responsibility for potential negative event such as losses. This aversion of responsibility for loss can underlie why even finance industry professionals may also overweigh popular opinions. And professionals having to deal with some expectations from their clients may be susceptible to the constant evaluations of the correctness of their judgments. This can reinforce their reluctance to make a different voice to the other professionals. That is, losing with population opinions may seem better than losing with unpopular opinion. Popular opinions may be largely used when searching for justifications for decisions.

White et al. (2019) find that individuals' decisions of green consumption are influenced by peer behavior. Ponti and Rodriguez-Lara (2015) find that a focus on absolute rather than relative values tends to increase in cognitive reflection, in their dictator game experiment. Kiss et al. (2016) find that, in the setting of the bank-run game, those with higher cognitive reflection

tend to show withdrawal decision less.

6. PRINCIPAL PROTECTION DESIRE, LOSS AVERSION, AND MYOPIC LOSS AVERSION

People tend to exhibit more sensitivity to losses than gains, even when the two are of the same amounts. Tversky and Kahneman (1992) show that the loss aversion coefficient is around 2.25 on average. That is, people tend to be twice more sensitive to losses than gains.

Sensitivity to loss of the principal could underlie the prevalent use of deposit products than stock investments. While deposit products may offer returns too low to cover inflation in many cases, the seeming protection of the principal in nominal terms can fool many. Overweighing the certain protection of the principal can potentially lead to prevalent use of principal-protected financial arrangements rather than those involving risks and uncertainties of loss.

Benartzi, Michaely, and Thaler (1997) shows that the equity premium (the phenomena that stocks offer much more returns than bonds, to the degree that the difference cannot be fully explained by risk aversion) can be explained by loss aversion. Also, Barberis, Huang, and Santos (1999) include loss aversion in asset pricing model, and show that a combination of loss aversion and increased risk-taking upon increased stock prices can explain equity premium.

Sensitivity to myopic losses (Benartzi and Thaler, 1995) refers to the tendency of being sensitive to losses especially when they are about to come in a near future than in a distant time. People tend to evaluate and pay attention to the market values of their portfolios frequently, and can take into account the short-term losses in market valuations even when they are likely to be recouped and make positive returns in the longer terms.

This implies that, people commonly tend to consider greatly any potential loss of their principals. Even a small possibility of losing their principals can significantly influence their decisions of saving and investing people tend to overweigh such a small chance of loss (Kahneman and Tversky, 1979). And because of the existence of a potential chance of losing their principals, they may be overly adverse to investing in the types of assets of which market values can be volatile. Even when they will invest over a long period of time, enduring the time in which their investments' market values are in the negative ranges, namely losses, are likely to have psychological impacts. Accordingly, an exposure to even a small chance of loss of principal and even a loss of small amount in market values (even when it does not necessarily mean a permanent loss of the principal) can play potentially important roles in human decision-makings of saving and investing for future.

Recent studies show that myopic loss aversion is evident even during adolescence (Glätzle-Rützler et al., 2015) and also tends to vary across individuals (Durand et al., 2019).

7. PROBABILITY JUDGMENTS

People tend to subjectively judge probabilities. For a review, see *Subjective Probability* (Wright and Ayton, 1994). In Wright and Ayton (1994)'s book, *Subjective Probability*, a wide range of topics are covered on subjective probability under four parts: 'backgrounds', 'studies in the psychological laboratory', 'accuracy of probability judgments', and 'real-world studies'. Subjective probability is an individual's probability derived from own personal judgment and opinion and is likely to be influenced by experiences: "Subjective probability for you depends on two things, the event whose uncertainty is contemplated, and the knowledge that you have at the time." (p. 6); "...subjective probability, expressing your beliefs about uncertain events" (p. 12); "Subjective probabilities represent degrees of belief in the truth of particular propositions" (p. 164). In particular, there are chapters specifically addressing gambling ('The Rationality of Gambling: Gamblers' Conceptions of Probability, Chance and Luck' by Gideon Keren (chapter 19)) and risk perception ('Risk Perception: Main Issues, Approaches and Findings' by Wibecke Brun (chapter 13)).

In 1962, Edwards published a paper titled "Subjective probabilities inferred from decisions". Also in 1967, Peterson and Beach published a paper titled "Man as an intuitive statistician" which reviewed studies on subjective probability.

Subjective probability plays central roles in intertemporal decisions, as well as decisions under risk and uncertainty. An increasingly used method is to directly query individuals about their expectations. Subjective probabilities are increasingly becoming important parts of surveys and experiments, as well as in publicly available household panel survey data of many countries. Individuals' beliefs (i.e., asking about percent chance) can be elicited by asking relevant questions. That is, individual participants' responses can be used as the measures of their expectations. For example, Delavande and Rohwedder (2008) and Hurd and McGarry (2002) discuss ways of and validity of eliciting subjective probabilities. In saving and consumption decisions, individuals often misjudge their probabilities of longevity risk (McGarry, 2022).

People tend to ignore base rate probabilities, and overweight familiar information (Tversky and Kahneman, 1974). That is, representative patterns tend to be overweighed. This tendency is known as representativeness heuristics. In the settings of saving and investing, people may overweigh familiar patterns, i.e., recent experiences of return changes. For example, having recently experienced rapid asset price increases, people are more likely fall into believing that such price increases would continue. And such representativeness heuristics are likely to contribute to reinforcing the feedbacks of price bubbles (Shiller, 2003).

There are games in which outcomes and their probabilities are structurally roughly inherent in the design of the games. And these can be important matters in determining future payoffs. But humans systematically tend to subjectively perceive not only the outcomes but also the probabilities involved. For example, people tend to overweigh a small probability of loss

while overweighing a certain gain and even people's subjective probabilities tend to be not only in a non-linear form but also in somewhat broken segments such as: it will certainly happen, maybe it may happen, it will not happen (Kahneman and Tversky, 1979).

Park (2016) shows that people can exhibit varying risk attitudes under different domains of gains and losses, and such risk attitudes can also vary by the capability of thinking through (thinking reflectively rather than impulsively). More specifically, the capability of thinking through (measured by Cognitive Reflection Test (CRT)) in Frederick (2005), which is the disposition of being able to resist impulsively arising fast and inaccurate responses in mind but instead think rationally) is positively associated with risk-taking in games with high chance of gain but low chance of loss, but is negatively associated with risk-taking in games with low chance of gain but high chance of loss. That is, lack of consideration of probabilities could be at least in part potentially attenuated by slow and reflective thinking. More broadly speaking, this can be understood as a heuristic of not fully considering the inherent game structures. People may wrongly exhibit choosing to play in games in which they are likely to lose, over the games in which they are likely to win.

Corgnet, Desantis, and Porter (2018) find that the capability of cognitive reflection is helpful in better updating prior beliefs in probability and better information processing of market order signals thus can contribute to trader performance.

8. CONCLUSION

Broadly speaking, strands of behavioral finance literature include studies on human financial behavior at individual-level (and household-level), cognitive foundations, emotions/affects, market pricing, and firm behavior. While these strands of literature are somewhat interconnected, this article is more relevant to the specific strand of the literature on cognitive foundations and human financial behaviors at individual-level (and household-level).

This article takes a more focused approach, by limiting its scope on households' financial preparation for future. This topic can also be considered in terms of household behaviors in saving and consumption. Accordingly, this article's scope focuses more on biases/heuristics and behavioral preferences at individual-level, rather than market-level (i.e., even social influences are addressed from the perspective of what individuals do with social settings in this article, rather than focusing on market-level variables). The purpose of this article is to consider some potential ways to enhance individuals' and households' preparation for future for betterment of their welfare.

In recent years, the literature is increasingly providing evidence along the line of cognitive biases/heuristics and behavioral preferences. The literature is also extending to encompass how reasoning is overridden by social influences in social contexts, as well as how reasoning could be overridden by emotions and affects. People often use fast, automatic, non-reflective,

more intuitive shortcuts when quickly making decisions given their limited cognitive resources. People can be overconfident that their automatic shortcuts are correct. People can be overconfident that they have looked into sufficient and relevant information. People can be overconfident that their decisions are not influenced by the frames of the choice problem. Intense affects can make one to believe in the need of urgent decision-making, thus increasing reliance on speedy shortcuts.

Also, for other related works on financial planning and preparation, refer to the following studies: beliefs including religion (Renneboog and Spaenjers, 2012), experiences on economic belief formation (Malmendier and Nagel, 2016), selective memory and biased beliefs (Bordalo, Gennaioli, and Shleifer, 2020; Enke et al., 2020), past experiences and domain-specific belief formation (Malmendier, 2021), cognitive uncertainty in intertemporal choices (Enke et al., 2022), narratives around inflation (Andre et al., 2021), individual traits (Asebedo et al., 2019), and social influences and networks (Ostrovsky-Berman and Litwin, 2019), just to name a few. Also, relatedly, Liu (2016) studies home bias in Asia, Lee et al. (2015) explore personality and employment in South Korea, and Kim and Goo (2008) study consumer psychology in consumption in South Korea.

Individuals' judgments and decisions tend to be highly influenced and driven by psychological factors, rather than objective outcomes and probabilities. The literature on heuristics and biases report a variety of them, which are observed in systematic manner. The literature explores how such heuristics and biases arise in human mind, and how they influence financial decisions. With such heuristics and biases, human financial judgments often are far from being perfect. Human intuition can be useful in many life situations but may be fragile, especially in complex financial decision-makings involving various types of risks, uncertainties, and different points of time requiring reflective thoughts and numeric calculations.

In other words, improving the quality of financial decisions would be possible to some degree by: avoid being too certain about anything, avoid being influenced by the recent anchors, consider outcomes in real-terms, don't be fooled by '*population delusions and the madness of crowd*,⁴⁾ understand that any of risk-taking is likely to involve a chance of loss, but also try to choose the games in which the chance of loss is very small but the chance of winning is large. That is, exploring ways of improving thinking through and reasoning in financial decision-making (especially in the direction of well-managing "animal spirits"⁵⁾) would be useful.

In particular, in monetary decision-making which are often complex in nature, it is easy to fall into self-control failures. Correct and exact computations are not easy to make, necessary

4) As in the title of the book by Charles Mackay, *Extraordinary Popular Delusions and the Madness of Crowds*, published in 1841.

5) Animal spirits is the notion often used to refer to the psychological urge to decide and act in uncertainties. Its use goes back to Keynes (1936). Animal spirits (*spiritus animalis* in Latin) can be considered to be produced in brain from vital spirit and extend to body through the nerves, in neurophysiological studies (Smith et al., 2012).

information and rules may not be available, and individuals' capability to deploy cognitive control also differ across individuals. Cognitive control tends not to function well under some cases such as its over-use, heightened stress, lack of sleep and nutrition, over-intakes of alcohols (Baumeister et al., 1998, 2004). Also, working memory is likely to play important roles. Shamosh et al. (2008) find that working memory span and intelligence are related to lower discount rates in economic choice task. Benjamin, Brown, and Shapiro (2013) documents that those with higher cognitive ability tend to perform better in financial choices. Capability of exerting effortful thinking while inhibiting impulsively arising responses significantly influences choices in a range of economic tasks (Frederick, 2005).

While individual differences in cognitive functioning tend to remain more stable in later years in adulthood, it tends to develop in childhood and teenage years and even in early 20s (i.e., Sowell et al., 1999, 2003; Casey et al., 2005, 2008). Educational and parenting efforts on children and teenagers can be effective with meaningful performance and labor market outcome implications (Heckman, 2006). In this light, interventions in better educating and parenting children can also be useful in potentially improving long-lasting economic impacts in their lives.

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