

3 Current state of research on behavioral economic insights for financial market regulation

Financial regulation is the set of rules, laws, and directives that oversee the financial sector and its players. The objective is to secure investors, prevent monetary emergencies, and maintain the stability of financial markets. When monetary crises occur, fresh regulations are frequently established to rectify the deficiencies that caused the crisis in an ad hoc reaction. 36

This phenomenon known as *adhocracy* or *adhocracy model* of organizational structure is characterized by an absence of formal arrangement and a focus on specialized cross-disciplinary teams grouped by functions. This model is believed to be more adaptable, imaginative, and flexible, which can permit it to respond quicker and be more receptive to new ideas than bureaucratic organizations. Nevertheless, *adhocracy* also has its drawbacks, including the likelihood of extremism and threats to democracy and legality. Researchers have suggested combining *adhocracy* and *bureaucracy* to rectify these issues, referred to as the *bureau-adhocracy model* (Mintzberg, McHugh, 1985, p 160; Travica, 1999, p. 7). 37

This *adhocracy model* on financial regulation is also something that shall consequently be scrutinized from the perspective of behavioral finance and biases hereinafter. 38

Sahi, Arora, and Dhameja (2013) conducted an exploratory qualitative study to determine the individual investors' views and attitudes that affect their financial investment decision-making. By examining the underlying beliefs and emotions that influence each investor's investment behavior, the research aimed to investigate investor biases. The researchers conducted 30 semi-structured interviews to gain a thorough grasp of how individual investors make decisions. The verbal data obtained from the interviews were analyzed through open coding to identify the various biases that influence investment decision making. The study found that different preferences and views displayed by individual investors influence their investment choices. Such biases show the investor's mental architecture rather than reasoning errors. According to the study, it may be possible to comprehend how individual investors make investment decisions by having a greater understanding of their psychology. The study explores the perceptions and beliefs of financial consumers regarding their financial investment biases 39

ultimately contributing to novel data regarding the purchasing habits of financial products and providing insights into the behavior of individual investors (Sahi et al., 2013).

- 40 Already in 2003, two works named "*Regulation for Conservatives: Behavioral Economics and the Case for 'Asymmetric Paternalism'*" (Camerer et al) and "*Libertarian Paternalism*" (Thaler, Sunstein) laid out the intellectual foundation for applying behavioral economics to policymaking. The goal was to create policies that benefit individuals who do not act in their own self-interest, while not burdening those who do. The approach aimed to win over conservatives and progressives by pledging to increase welfare while protecting individual freedom. This framework popularized the idea of "*nudges*", which are interventions in the choice architecture that, without prohibiting any choices or substantially altering people's economic incentives, modifies people's behavior in a predictable manner (Bhargava & Loewenstein, 2015). Policymakers must acknowledge the impact of decision-making architecture and biases on market participants to develop targeted interventions that promote responsible investment decisions and mitigate potential risk.
- 41 Before delving into details of biases in financial investment behavior, a brief historical outline of the research on behavioral finance will be presented hereinafter.

3.1 History of behavioral finance & psychological biases related to finance

- 42 Behavioral finance, an interdisciplinary field that combines psychology and economics, strives to provide explanations for various events in financial markets. Over the past decades, the efficiency of stock markets has been a topic of considerable debate, attracting the attention of researchers studying stock returns and their movements. The concept of efficient stock markets can be traced back to the late 1960s when Fama (1970) introduced the efficient market hypothesis (EMH). Based on expected utility theory, EMH postulated that stock markets were efficient systems with rational investors, becoming widely accepted and still followed for asset pricing decisions. However, EMH struggled to account for unexpected stock market phenomena, such as late 1990s internet bubble or the 2008 recession. Moreover, with an increased number of individual investors, stock returns often diverged from their fundamental values (Sharma & Kumar, 2020; Park & Sohn, 2013). One of the key challenges remaining in behavioral finance

is to develop policy instruments that can effectively mitigate the effects of cognitive biases and emotional reactions on financial decision-making (Filbeck et al., 2017).

In response to these shortcomings, behavioral finance was argued as a more reasonable explanation for stock returns and unexpected market phenomena. Advocates of behavioral finance reject expected utility theory, arguing that stock markets are inefficient systems with irrational and biased investors offering a more realistic portrayal of stock markets and an explanation for sudden market shifts (Starmer, 2000) and prospect theory has largely replaced utility theory (Starmer & Sugden, 1989; Tversky & Kahneman, 1992, Sharma & Kumar, 2020). 43

Behavioral economics, contrary to popular belief, is not a novel concept, albeit its data driven approach is still fairly new. As McAuley (2013) points out, as early as 1739, David Hume effectively discussed what would later be termed hyperbolic discounting, highlighting the human tendency to favor immediate gains over distant and remote ones (Hume, 1739). Furthermore, in 1759, Adam Smith described the conflict between the rational, calculating 'indifferent spectator' and the impulsive 'fury of his desires' (Smith, 1759). Since then, behavioral economists have found several distinct behavioral characteristics in Smith's works, including loss aversion, overconfidence, and an interest in transactional fairness (Ashraf et al., 2005). The discipline of marketing also has long recognized the psychological underpinnings of consumer behavior. Concepts familiar to marketing professionals, such as prospect theory's findings on reference-point dependence and consumers' difficulty in understanding and comparing low-probability risks, are also central to behavioral economics. Advertising strategies typically focus on the short-term advantages of a product rather than its long-term expenses. (McAuley, 2013). 44

Empirical investigations have been conducted across various markets, including Germany, the United Kingdom, France, Japan, the United States, and Canada, to evaluate validity and generalizability of the sentiment effect (Baker et al., 2012). The sentiment effect in behavioral finance refers to the phenomenon where the mood or emotions of investors affect their decision-making regarding the buying and selling of stocks or other financial assets. This effect is based on the idea that investors' attitudes and feelings can influence their perception of the market, leading them to overreact or underreact to market news and events. For example, when investors are feeling optimistic and positive about the market, they may be more likely to buy stocks and other financial assets, even if the fundamentals do not 45

support such a decision. Conversely, when investors are feeling pessimistic and negative, they may be more likely to sell, even if the assets are undervalued. The sentiment effect can lead to market bubbles or crashes, as investors' emotions can cause them to push stock prices to extremes. The sentiment effect is also related to other behavioral finance concepts, such as herding behavior, which alludes to investors' propensity to copy other market participants' actions, rather than making independent decisions based on their own research and analysis. These studies have consistently found that investor sentiment negatively predicts aggregate stock market returns across countries (Schmeling, 2009). Additional studies have explored the relationship between investor sentiments and market returns in private markets (Ling et al., 2014), as well as the impact of investor sentiments on options prices (Han, 2008; Sharma & Kumar, 2020).

- 46 The study of the effects of cognitive and emotional deficits on investment decisions in the area of behavioral finance is a central theme. Investment mistakes caused by these biases can be grouped into two groups: how investors feel and how they think. Social factors can also influence financial choices, although most recent research has concentrated on psychological factors influencing investor decision-making (Statman, 1995; Baker and Nofsinger, 2002, p. 97).
- 47 The study of behavioral finance deviates from traditional finance, which assumes that people always behave rationally, by incorporating human fallibility into its models of financial markets and behavior of its agents which may be irrational (Thaler, 1993). The concept of behavioral finance, applying psychology to financial behavior, acknowledges that investors may not always act rationally but are always “human” (Shleifer, 2000, p. 10; Baker and Nofsinger, 2002, p. 97). The relaxation of the usual assumptions of traditional finance allows for the examination of systematic departures from rationality in investor behavior.
- 48 Behavioral finance is relevant as investors are often prone to committing specific investment errors that can cause harm to their wealth (Shefrin, 2000). Understanding these biases and correcting for them may lead to improved investment results, although it does not guarantee excess returns (Kahneman and Riepe, 1998).
- 49 The psychological phenomena in finance can be divided into three categories: heuristic-driven bias, inefficient markets and frame dependence (Shefrin, 2000). The foundation for some of the heuristic-driven biases can be traced back to the concept of prospect theory developed by Kahneman and Tversky (1979).

In conclusion, behavioral finance sheds light on the real-life behavior of investors and acknowledges the impact of cognitive and emotional biases on investment decisions. It is crucial for investors and policy makers alike to understand these biases and take steps to mitigate their effects on investors financial well-being at a regulatory level. 50

Various mental shortcuts and biases that can impact an investor's decision-making process. The human brain tends to simplify complex information and use heuristics to process information more efficiently. This leads to systematic errors and psychological biases, such as the belief that individuals are better decision makers than they actually are and the tendency to seek information that confirms their beliefs (Baker and Nofsinger, 2002). In the following, the core biases will be briefly identified. 51

3.1.1 Representativeness bias

One such bias is representativeness, where our mind makes the assumption that objects with similar features are comparable. This results in investors making judgments based on stereotypes and leads to confusion between a good company and a good investment. For example, investors may classify firms with strong earnings and high sales growth as good companies and good investments, but the stock of these firms can become overpriced as their popularity drives prices higher. A study by Lakonishok, Shleifer & Vishny (1994) found that the 10 % of firms considered to be "glamour" stocks, or those with high growth prospects, "earned an 11.4% return during the purchase year. This compares to a return of 18.7% for the value stocks", or those with minimal growth prospects, as good businesses do now automatically make for good investments. 52

Investors also err by assuming previous stock returns are representative of future returns. For example, investors may chase after stocks that have had strong performance in the past, but initial research by De Bondt & Thaler (1985) revealed that the stocks that performed poorly over the following three years, typically outperform the winners by 30%. Similarly, investors may buy stocks that have recently increased in price, believing the past trend will continue (combined with fear of missing out and procyclical behavior), but a study by Dhar and Kumar (2001) found that such stocks only increased by 0.6% on average in the week prior to buying. 53

3.1.2 Familiarity bias

- 54 The familiarity bias is a well-documented phenomenon in finance where people tend to prefer familiar things, including stocks (Huberman, 2001). Investors often concentrate their portfolios in securities of companies with a local or regional presence, even if that means missing out on potential gains from international diversification (French & Poterba, 1991). For example, American financial managers favor companies with local headquarters (Coval & Moskowitz, 1999).
- 55 Another form of the familiarity bias is when staff members purchase a sizeable percentage of the company's shares they are working for. This is often compounded by the representativeness bias, where employees allocate even more of their assets to the company's stock after its price increases (Benartzi, 2001).

3.1.3 Cognitive dissonance

- 56 Another factor that can impact an investor's decision-making process is cognitive dissonance, where the brain filters memories to avoid dealing with conflicting information. This can result in investors adjusting their beliefs about the success of past investments and recalling performance as better than it actually was (Akerlof & Dickens, 1982). A study by Goetzmann and Peles (1997) questioned two investor groups about their mutual fund returns and found that the average recollection of performance was higher than the actual performance, indicating the presence of cognitive dissonance.
- 57 The mood and optimism of investors also play a big part in their choice. A positive mood encourages judgements that are more optimistic, whereas a negative mood encourages judgments that are more pessimistic or of more critical and analytical nature (Nofsinger, 2002a). There is evidence to suggest that the sun has an impact on mood, which then has an impact on financial choices. For instance, individuals tip 50 % more on sunny days than on days when it's raining (Rind, 1996). The level of sunshine also appears to affect stock market returns, with sunny days having higher returns compared to non-sunny days (Kamstra, Kramer and Levi, 2003).

3.1.4 Endowment effect

The endowment effect refers to the situation where people place a higher value on an object that they own and are trying to sell, compared to the amount they would be prepared to pay to purchase the same object (Kahneman, Knetsch and Thaler, 1990; idem 1991). Thaler (1980) named this behavior, which is caused by the pain people associate with giving up something they own rather than overvaluing the object itself. The endowment effect can impact investors by causing them to hold onto their investments. This is seen in a study by Samuelson and Zeckhauser (1988), where students were given a substantial amount of money with different investment choices and chose to hold onto the type of investment they inherited, rather than choosing based on the risk and return ratios. 58

3.1.5 Overconfidence bias

The overconfidence bias is a pervasive phenomenon in the field of finance, and it affects investors' behavior and decision making. This bias refers to the belief that individuals have superior aptitude for completing challenging jobs, like selecting winning stocks, compared to their actual abilities. The ego trap, as referred to by Belsky and Gilovich (2010), is driven by several psychological factors, including the false sense or illusion of control and knowledge. 59

This illusion of knowledge stems from the abundance of information available to investors, which can lead them to think they comprehend the market more thoroughly than they truly do (also linked to the availability bias). This illusion is compounded by investors' tendencies to perceive new knowledge as supporting their existing beliefs. On the other hand, the illusion of control arises from individuals' beliefs that uncontrollable occurrences can be influenced by them. Presson and Benassi (1996) demonstrated “*that choice, task familiarity, information, and active involvement*” are key attributes that foster this illusion. 60

Barber and Odean (2002) found that these characteristics are frequently displayed by online investors., which leads to overconfidence in their decision making. 61

Past studies in the US have also shown that men are more likely than women to be overconfident when performing duties deemed masculine, including investing. Research showed that single men engage in the highest 62

amount of trading, with married men following, then married women and single women (Barber and Odean, 2001a; Beyer and Bowden, 1997). This overconfidence contributes to poor returns (Barber and Odean, 2000) as too much trading includes higher risk exposure and comes with paying more taxes and commissions.

- 63 In an effort to comprehend the overreliance of small investors on their competence, Graham et al. (2009) conducted a study that revealed self-perceived competence as a key determinant of trade frequency. Investors who felt competent were however also more likely to trade frequently and maintain diversified portfolios, whereas portfolio diversification in general is a valid investment strategy. This overconfidence was more prevalent among male investors, those with higher education, and those with larger portfolios (Bikas et al., 2013).

3.1.6 Status quo bias

- 64 Status quo bias, which involves preferring the default or do-nothing option when faced with choices, can also affect investors (Samuelson and Zeckhauser, 1988). Tversky and Shafir (1992) developed the theory of "*choice under conflict*" and found that the decision to delay activity increases when several attractive options are available.

3.1.7 Law of small numbers

- 65 According to the theory known as the law of small numbers, individuals can identify patterns in seemingly random data and base future predictions on those patterns (Nofsinger, 2002b). Investors tend to believe that the stock market is not random, leading to the overinference of short sequences and faulty predictions about the future (Rabin, 2002). De Bondt (1993) found that investors' responses to the question of whether the stock market will be bullish, bearish, or neutral are highly correlated with historical market trend, demonstrating the law of small numbers in action.

3.1.8 Anchoring

- 66 Reference points and anchoring refer to the phenomenon where investors become fixated on particular stock prices and compare them for the current

stock price (Benartzi & Thaler, 1995). Heath, Huddart & Lang (1999) found that in stock option exercises “*the most likely reference point used is the highest stock price of the previous year*”, and that when a stock price rises above its 52-week peak, the rate of option exercise nearly doubles. The reference point determines whether an investor views their position as a profit or loss.

3.1.9 Mental accounting

The concept of mental accounting plays a significant part in self-control and judgement in regard to financial goals (Thaler, 1980). This process involves the separation of different financial goals into separate mental accounts, allowing for easier tracking of progress. However, Barberis and Huang (2001) note that psychological biases, such as the disposition effect, can be exacerbated and amplified by this process. 67

Investors' perception of portfolio risks can also be impacted by mental accounting, as it can lead to overlooking the interaction between investments (Shefrin & Statman, 2000). This can result in investors taking more risk than necessary in order to achieve the intended return. 68

3.1.10 Disposition effect

The impact of emotions like greed, fear, hope, pride, and regret is also important in investment decision-making (Baker and Nofsinger, 2002). Investors have a propensity to hang onto their losers for an excessive amount of time and sell their winners too soon, due to the desire for pride and the fear of regret, which is referred to as the disposition effect (Shefrin & Statman, 1985). This emotional bias can have negative effects on returns, as good-performing stocks tend to continue performing well after they are sold, while poorly performing stocks continue to underperform (De Bondt & Thaler, 1985, 1987). This effect is attributed to heuristic-driven biases stemming from conservatism, overconfidence as well as salience (Shefrin, 2000). 69

Studies have shown investors are more apt to sell their profitable stocks than their unsuccessful ones (Odean, 1998). For example, Odean (1998) found that winners were sold when they represented 23% of the investor's total gains, while losers were sold when they represented 15.5% of the port- 70

folio's unrealized losses. Additionally, a winner stock sold by an investor was found to outperform matching stocks by 2.35% the following year, while the loser stocks that were held underperformed by -1.06% (Odean, 1998). Grinblatt and Keloharju (2001) found similar results when studying sell trades in the Finnish stock market, with individual investors being more likely to sell stocks that experienced an increase in price and less likely to sell stocks that experienced a decrease in price.

3.1.11 Attachment bias

- 71 Investment behavior is not just a result of rational thinking, but also of psychological biases. One such bias is attachment bias, where investors get emotionally attached to a security, often to the extent of disregarding any negative information about the company (Baker and Nofsinger, 2002). The attachment can stem from various sources, such as working for the company or having a personal connection with it. This attachment can lead to hanging on to the security for too long, even when facing bad news, leading to significant losses (Baker and Nofsinger, 2002).

3.1.12 Prospect Theory – loss aversion and risk seeking

- 72 Furthermore, emotions also play a crucial role in changing risk preferences. The presence of large gains or losses can induce different emotional responses, leading to different investment decisions. Large gains can result in greed, causing investors to take on more risk, as seen in the tech boom of the late 1990s (Thaler & Johnson, 1990). On one hand, large losses can lead to loss aversion, where investors avoid taking any risks or on the other hand the “*double or nothing*” approach may be chosen, also termed the “*get evenitis*” phenomenon, where investors take on additional risk to try to recover the losses (Kahneman & Tversky, 1979; Shefrin, 2000). The way people react to gains and losses is a crucial factor in their investment decisions, as per the concept of prospect theory.
- 73 In conclusion, attachment bias and changing risk preferences due to emotions are two significant psychological biases that affect investment behavior. These biases need to be acknowledged and understood to make informed investment decisions.

3.1.13 Social norming

Social interactions play a crucial role in shaping an individual's investment decisions, both directly and indirectly. According to Ellison and Fudenberg (1995), people learn from one another by observing the behavior of others and inferring their beliefs through talking. As a result, informational cascades develop, which serve as the foundation for certain models of investor herding (Bikhchandani, Hirshleifer & Welch, 1992; Banerjee, 1992). According to a survey by Shiller and Pound (1989) of 156 high-net-worth investors, investor interest in a stock was sparked in more than half of the instances by a recommendation from someone else, and the average number of people the investor spoke to after buying the stock was 20. This phenomenon may also be related to the familiarity and availability bias. 74

The media can have a significant impact on individual investors. Business and investment authors frequently sensationalize their work by weaving an engaging tale, while journalists search for the best quotes, which don't always provide in-depth investment analysis (Nofsinger, 2002b). The media also tends to maintain investors' attention on certain stories for an extended length of time, causing an *"attention cascade"* that can contribute to speculative bubbles (Shiller, 2000). 75

Peer groups can also greatly influence investment decisions. Social norms within peer groups can shape the preferred beliefs and decision-making processes of individuals within that group. The social environment of the investor, such as conversations with peers about day trading or international stocks, can cause the investor to adopt similar investment practices (Ellison and Fudenberg, 1993). 76

Additionally, the advent of the Internet has significantly impacted on how people make investment decisions (Barber & Odean, 2001b). It provides a platform for interaction and exchange of ideas, such as through newsgroups and chat rooms for investing. Internet investing's emergence saw a surge in trading activity in the late 1990s and early 2000s (Baker and Nofsinger, 2002). Social norming of peer groups and the further advance of web platforms also in the decentralized finance context (e.g., virtual asset exchanges) may further increase these effects as well as bring forward other interactive phenomena. 77

The trading decisions of investors worsened after switching to online trading when the internet and online investment brokerages emerged as the stocks they bought underperformed the market by an average of -0.33% per month, and the stocks they sold outperformed the market by 0.21% per 78

month (Baker and Nofsinger, 2002). It remains to be examined whether parallels can be drawn to emerging decentralized platforms powered by distributed ledger technology, like blockchain, where digital assets or tokenized rights, like securities in form of tokens may be exchanged on a peer-to-peer basis.

3.1.14 Interim conclusion

- 79 Overcoming psychological biases in investment decision-making is challenging, as simply learning about them may not eliminate them (Belsky and Gilovich, 1999). Furthermore, many of these biases may have both positive and negative consequences, and they may also conflict with one another. To overcome these biases, investors can use various strategies such as understanding and avoiding cognitive biases, establishing investment goals and restrictions, creating quantitative investment standards, and diversifying assets (Van Eaton, 1999; Nofsinger, 2001). For example, diversifying, proper asset allocation including review and reallocation of investments can help reduce the risk of losses and shield against psychological biases, as long-term asset allocation decisions account for about 90% of total financial returns (Brinson, Singer & Beebower, 1991; Ibbotson & Kaplan, 2000).
- 80 While research on heuristic-driven bias, frame dependence, and inefficient markets has since further developed, more detailed, subdivided and partly overlapping finding and phenomena have crystallized, the historical outline above still represents the basis for biases related to investments and behavioral finance.

3.2 *Biases in financial investment behavior*

3.2.1 Investor decision making process and consumer biases

- 81 Financial markets have become increasingly competitive, with many players offering a plethora of investment alternatives (Sahi, Arora, and Dhameja, 2013). Making financial investment choices is a crucial part of managing household finances, which should lead to financial satisfaction and improved quality of life. However, the abundance and complexity of available financial products have increased the complexity of decision-making and the impact of heuristics and biases (Sjoberg and Engelberg, 2009). Given

this scenario, it is crucial to understand how individual investors make decisions, particularly the role of investor biases.

Behavioral Finance is concerned with the study of how different biases affect a person's investment decisions (Tversky and Kahneman, 1974). Psychological biases are sometimes referred to as "*Systematic Errors in Judgment*" in the behavioral finance literature (Kahneman and Riepe, 1998). The joint consideration of beliefs and values is essential to form preferences about risky options, which can create distortions in the decision-making process (Ritter, 2003). Moreover, individual past behaviors can have an emotional impact on future thinking, making decision-making even more subjective, and leading to biased behavior (Pompian, 2011). Knowing the cognitive biases that can affect a person's decision-making when investing and how they affect financial planning and management is necessary for identifying and designing better investment policies, practices, and products that suit individual needs. 82

Humans are not capable of always acting economically and rationally (*homo oeconomicus*) as in traditional finance theory, leading to the use of heuristics (colloquially referred to as rules of thumb), and acting on preferences and beliefs to deal with information overload, which results in biased behavior (Montier, 2002). Psychological biases are common in investors, as established and some of the most frequently observed ones next to framing effects were elaborated in the previous section. Investors are said to desire to maximize their risk-adjusted financial returns over a specified time period, according to conventional theories of investor behavior and this goal primarily influences the investments they make (Williams, 2007). However, a person's morals and beliefs can have an impact on their internal standards, leading to decisions deviating from the most optimal rational choices (Cummins and Nistico, 2002). Biased behavior is considered a flaw by standard finance models, assuming human beings are rational agents. But people are susceptible to biases due to cognitive limitations, and these biases have been seen in all living things, and they are thought to be a useful aspect of the mechanisms that allow people to make judgments and choices (Haselton and Nettle, 2006). Therefore, psychology and the departure from standard theoretical models like the *homo oeconomicus* are relevant for the study of financial markets and financial behavior (Sahi, Arora, and Dhameja, 2013). This, in turn, is vital for public policymakers for identifying necessary regulatory provisions to ensure investor protection (individual aspect) next to the other aim of regulation which is financial market stability (collective aspect). 83

- 84 In a study on individual investor behavior in financial investment decisions, several themes emerged based on interviews conducted with investors. One such theme was the tendency of people to prefer known risks or to have a preference for certainty. People tended to give preference to outcomes that were certain, rather than uncertain, to feel more secure and have less ambiguity. This often resulted in investing in instruments they had some knowledge of, which offered fixed returns or security of principal, making them feel more at peace with the investment decision. Another theme that emerged was the tendency of people to rely on a point of reference, which acted as a guiding factor for their investment decisions. People found satisfaction in relying on reference points, which included best performance and rate of return amongst others. This gave them a benchmark to judge their investments. People also tended to make investment decisions based on how available information was. Before making their investment choices, people also had a propensity to double-check and confirm the information they had been given. Some individuals displayed a propensity to play it safe by investing in instruments they were familiar with, showing less willingness to take risks with their money. The risk preferences for people varied based on the source of the money, with those who have earned their money through their hard labor investing in safe and secure instruments, while money which was earned more easily was also invested in riskier options. Additionally, some people considered the company's degree of social responsibility and its ethics when making investment decisions, while others relied on financial experts for their investment decisions (Sahi, Arora, and Dhameja, 2013).
- 85 The framing of the decision influenced the choice of the people, as it was observed that when the same option was presented in different ways, people made different choices (related to loss aversion, as in one framing the opportunities were highlighted, while in another framing of the same option, the risks were highlighted). These results demonstrate how individual investors behave when choosing investments, indicating the importance of understanding investor behavior for investors, financial advisors, and researchers in making informed investment decisions. In addition, once decisions were made, people thought the results were unavoidable. Others tend to steer clear of certain investment decisions out of a fear of regret (also related to loss aversion), and in order *“to avoid this feeling of regret, people prefer the tried and tested investments”* (which may be seen as part of the status quo bias), while still others made investment choices based

on past performance of specific financial products and prospective trends (Sahi, Arora, and Dhameja, 2013).

In summary, it is again established that these behavioral biases may have significant implications for individual investment decisions. While Financial institutions and advisors can use these findings to provide better investment advice to their clients and mitigate the impact of these biases on their investment decisions they might also exploit them to their advantage, thus making regulatory provisions necessary. 86

It is important to acknowledge that investment decisions inherently involve uncertainty and risk, which can lead to biased behavior (Sahi, Arora, and Dhameja, 2013). As Olsen (2007, p. 53) states, “*bias is not necessarily bad as long as it leads to the results that the decision maker wishes*”. Therefore, it is crucial to comprehend the reasons behind these biases and how they aid individuals in coping with the demands of decision-making. The study conducted by Sahi et al. (2013) showed that investor biases play a crucial role in financial investment behavior and that financial service providers can gain valuable insights into the behavior of financial consumers by using psychographic variables such as investor bias. 87

3.2.2 Interim conclusion

The complexity and abundance of available financial products have made financial investment decisions more intricate, influenced by heuristics and biases, and thus making it crucial to understand how individual investors make decisions, particularly the role of investor biases. This is especially relevant in the context of public policy with regard to financial market regulation, where investor protection and financial market stability are key aims. The study of how different biases affect a person's choice of investments, known as behavioral finance, has demonstrated that psychological biases are common in investors, leading to biased behavior. Although biased behavior is considered a flaw in standard finance models, it is an essential component of mechanisms for making choices and decisions. 88

Furthermore, the increasing popularity of decentralized finance models, which will be discussed in more detail in section 4 of this work, has introduced new challenges in terms of regulating the financial market. These models often operate outside the traditional regulatory framework and rely heavily on individual investors making informed decisions. As such, understanding the behavioral tendencies of individual investors is even more 89

important in this context. Policymakers will need to consider these findings when designing regulatory provisions to ensure investor protection and financial market stability in the evolving landscape of financial markets and products. They will also need to consider regulation to avoid exploitation of investors decision making processes by financial service providers.

3.2.3 Behavioral corporate finance and managerial biases

- 90 One of the most frequently observed psychological biases among managers is overconfidence, which refers to an unwarranted belief in their abilities and the accuracy of their predictions. Overconfident managers tend to rely on their internal resources before considering external financing options, prefer riskless debt to equity, and believe their firms are undervalued in the market. This behavior results in higher debt levels than rational managers and may lead to suboptimal capital structure decisions. In addition, overconfident managers tend to underestimate the cost of investment projects and overestimate their potential value (Bilgehan, 2014).
- 91 After Modigliani and Miller's (1958) seminal work on capital structure, numerous studies have attempted to explain the factors that determine a company's capital structure, including the optimal combination of debt and equity. However, these studies have predominantly relied on traditional finance theories. In contrast, recent research in behavioral finance has emphasized the importance of a manager's behavioral characteristics in the capital structure decision-making process. This insight has led to the emergence of behavioral corporate finance, which abandons the conventional rationality assumptions in favor of more sensible behavioral hypotheses in order to better understand the various financial choices made by firms (Bilgehan, 2014).
- 92 Several studies have investigated the impact of psychological biases on capital structure decisions using empirical analysis. For example, Ullah et al. (2012) found that managers tend to be risk-averse, and that there is a positive correlation between a company's size and profitability and its capital structure. Barros and Silveira (2007) observed that managerial optimism and overconfidence can significantly affect a firm's capital structure decisions. Fairchild's (2009) study examines the influence of both managerial overconfidence and moral hazard on the choices related to a company's capital structure. the first of which anticipates a positive correlation between overconfidence and debt, and the second of which indicates

that overconfident managers may decrease debt due to their overestimation of future investment opportunities. The study provides further evidence to support previous empirical studies which identified a positive correlation between managerial overconfidence and debt and offers a new finding that overconfidence could lead to a reduction in debt due to the manager's overestimation of investment opportunities. A study by Malmendier, Tate, and Yan (2010) shows that overconfident managers prefer to use cash or risk-free debt and view external financing as unduly costly. The study also discovered that early-life experiences, such as experiencing the Great Depression during childhood or serving in the military, could result in more daring decisions regarding capital structure later in life.

In conclusion, psychological biases play a crucial role in corporate capital structure decisions, and managers' behavioral characteristics should be taken into account when analyzing financial decision-making. The literature reviewed suggests that biased managers tend to make suboptimal capital structure decisions by relying on internal resources before considering external financing options, preferring riskless debt to equity, and undervaluing the cost of investment projects. However, rational managers may make better capital structure decisions by taking into account firm-specific characteristics and market conditions (Bilgehan, 2014). 93

3.2.4 Interim conclusion

The psychological biases in the managerial decision-making process in the behavioral finance and capital structure decisions context, highlights the role of behavioral factors in shaping financial decision-making, particularly in relation to capital structure. Given the potential impact of such biases on firm financing decisions, these findings have important implications for public policy related to financial market regulation. For example, policymakers may need to consider measures aimed at reducing the impact of behavioral biases on decision-making processes, such as implementing stricter disclosure and transparency requirements, enhancing financial education and literacy initiatives, and promoting the adoption of more objective and rigorous decision-making processes within firms and financial intermediaries. 94

In addition, policymakers may need to consider the part market factors play in shaping financial decision-making and explore the potential for market-based mechanisms to incentivize more rational decision-making 95

and mitigate the impact of behavioral biases. Overall, the findings underscore the need for policymakers to take a more holistic approach to financial market regulation, which takes into account the influence of behavioral factors on financial decision-making and seeks to promote more rational and informed decision-making processes within firms.

3.2.5 Behavioral biases, financial literacy and demographic variables

- 96 Previous studies have established connections between investors' demographic profiles and their investment behavior (Cronqvist & Siegel, 2014). Researchers have investigated the relationship between demographic variables and behavioral biases in investment decision-making. Key demographic variables that have been studied include gender, age, marital status, education, occupation, annual income, and experience. For instance, studies have found that male investors have a tendency of being more overconfident compared to their female counterparts (Kumar & Goyal, 2016; Barber & Odean, 2001a; Bhandari & Deaves, 2006; Lin, 2011), while females are more susceptible to herding bias (Eagly & Carli, 1981). There are also newer indications that female CFOs are less tax aggressive (Francis et al., 2014). Furthermore, research has shown that investors' familiarity and overconfidence biases diminish with age and wealth (Tekçe et al., 2016).
- 97 Marital status has also been linked to specific behavioral biases, with unmarried investors exhibiting higher levels of overoptimism, overconfidence, and loss aversion than their married counterparts (Ates et al., 2016). Education appears to play a role as well, as more educated investors exhibit a lower impact from disposition effect (Goo et al., 2010) and higher overconfidence (Bhandari & Deaves, 2006; Deaves et al., 2010). Investors with less education, however, tend to be more vulnerable to representative bias (Ates et al., 2016). Occupation has been found to be strongly associated with overconfidence, optimism, and the disposition effect (Prosad et al., 2015), while annual income has been shown to influence overconfidence and the disposition effect in different ways (Dhar & Zhu, 2006; Kumar & Goyal, 2016; Lin, 2011). Lastly, investment experience has been linked to higher overconfidence levels (Glaser et al., 2004; Ates et al., 2016).
- 98 Understanding investment behavior requires having financial literacy, which is the capacity to make wise judgments and choices about managing money (Noctor et al., 1992). Numerous studies have looked into the connection between behavioral biases and financial literacy (Dhar & Zhu,

2006; Takeda et al., 2013; Fernandes et al., 2014). However, the literature on this topic, particularly in the Indian context, remains limited (Sahi & Arora, 2012; Baker et al., 2019). Financial literacy is a critical aspect of modern societies, and the improvement of decision-making in the financial sector is vital to economic stability. Formal financial education courses and seminars are not the sole drivers of financial literacy improvement. Instead, a combination of factors, including information quality, structure, and accessibility, as well as institutional parameters, plays a significant role in enhancing individuals' ability to process and understand financial information. With regard to financial education and policy interventions the two most prominent approaches within behavioral economics are the bounded rationality approach, advanced by (Simon, 1978, 1987), pursuant to which it is suggested that people face limitations in their ability to make decisions based purely on reason, and therefore they are more likely to choose a satisfactory option rather than an optimal one (sufficing instead of optimizing or perfecting) as well as the errors and biases approach, which posits that individuals are prone to systematic errors in judgment, leading to deviations from rational decision-making, pioneered by Kahneman and Tversky as outlined previously (Altman, 2012).

Both the errors and biases approach and the bounded rationality approach have implications for the design of financial education programs. While the former emphasizes the need to correct for cognitive biases through education, the latter highlights the importance of enhancing individuals' capacity to process and understand information. Key policy recommendations include promoting transparency and clarity in financial product information, changing default options for pensions and credit limits, and enhancing the regulatory environment to detect and deter financial fraud. Moreover, to modify the incentive system to ensure that individual investors assume responsibility for the outcomes of their choices, especially for influential decision-makers within financial organizations (Altman, 2012).

The implications of these findings extend to financial educators, advisors, policymakers, and regulators. By understanding the decision-making processes of investors, financial advisors can offer tailored services based on clients' predispositions. Policymakers and regulators can also benefit from these insights by improving financial education and policies aimed at enhancing financial capability, resulting in individual and overall economic wellbeing.

- 101 Traditional economic theory assumes that individuals possess unlimited cognitive capacity to process and use all available information optimally (Hayek, 1945; Simon, 1957). However, recent literature reveals that overconfidence and cognitive limitations significantly influence financial decision-making (Shiller, 2005, 2008). Overconfidence can manifest as a belief in one's abilities or the veracity of acquired information. It often leads to the dismissal of vital market signals, adversely affecting investment decisions (Shiller, 2008). Studies conducted in experimental economics and psychology have provided insights into the role of overconfidence in exacerbating financial crises and contributing to the economic disparities observed between individuals and countries. Furthermore, research has demonstrated that individuals' savings decisions appear random, contrary to what life-cycle models forecast, where agents are believed to save money in their early years to use it in their later years (Garcia, 2013, with further references).
- 102 Limited cognitive capabilities result in individuals resorting to heuristics or simple rules of thumb, rather than employing more complex decision-making processes (Akerlof & Shiller, 2009). The findings from both behavioral finance and financial education literature converge on this aspect, highlighting the human tendency to utilize shortcuts in the face of overwhelming information (Garcia, 2013). Studies, as cited by Garcia (2013) including Townsend (1994), Foster and Rosenzweig (1995), Easterly and Levine (1997), Zak and Knack (2001), Adato et al. (2006), Giné et al. (2006), Cassar and Crowley (2007), Cassar and Wydick (2010) and Chantarat and Barrett (2012), have highlighted the significance of trust in financial decision-making, particularly concerning the role of social networks and trust in financial transactions. These studies indicate that trust can sometimes diminish or even negate the use of available information in financial decision-making, as individuals may prioritize social relationships over objective information. Financial transactions are influenced by various factors beyond economic variables, including trust, reciprocity, altruism, and social relationships. In some cases, high levels of trust can even reduce individuals' reliance on available information when making financial decisions (Giné et al., 2006).
- 103 The insights from these studies do not invalidate the internal rigor of traditional financial theories; rather, they call for a generalization or expansion of existing frameworks to encompass the observed aspects of human behavior concerning information processing and overconfidence (Akerlof & Shiller, 2009). By incorporating these factors, it is possible to create

more comprehensive models of financial decision-making, better suited to explain individual and collective financial behaviors in various economic contexts (Garcia, 2013).

Ultimately, the role of information, confidence, and cognitive abilities in financial decision-making warrants further exploration. 104

3.3 The role of bias in financial regulation

Regulatory bodies exist to prevent market failures and promote financial stability. However, their decisions are often affected by the psychological biases of various political actors, including voters, public officials and media commentators (Hirshleifer, 2008). The theory of psychological attraction in financial regulation suggests that these biases, as well as regulatory ideologies that exploit them, are responsible for shaping regulatory policies. The approach proposed by Hirshleifer (2008) highlights the importance of several key elements of psychological biases, such as “*salience and vividness, omission bias, scapegoating and xenophobia, fairness and reciprocity norms, overconfidence, and mood effects*”. Additionally, emergent effects arising from the interactions of people affected by psychological biases, such as availability cascades and ideological replicators, also play a crucial role in regulatory outcomes (Hirshleifer, 2008). 105

Hirshleifer (2008) addresses the issue of financial regulation and how the irrational behavior of those involved in the political process impacts the results of regulatory decisions. He proposes a new approach to financial regulation that acknowledges that regulatory bodies, politicians, and voters are prone to systemic biases, which he calls the psychological attraction approach to regulation (in contrast to Kelsen’s pure theory of law as mentioned in the introduction) and he notes that if psychological biases have an impact on actions taken in financial markets, they should also have an effect on actions taken in politics. 106

3.3.1 How attention and presentation impact information processing and memory retention

In public discourse, politics can be seen as a competition for attention. To this end, political competitors utilize slogans that are easily understood, plausible, and memorable. According to Nisbett and Ross (1980, p. 45), psy- 107

chological research has demonstrated that focus is directed towards salient stimuli which stand out from other stimuli in the surroundings, and towards striking stimuli such as narratives about individual experiences and emotionally stimulating information. Regulatory debates are particularly influenced by such personal stories and extreme events due to their high salience and vividness, which are more memorable and attention-grabbing (Hirshleifer, 2008).

108 Loss salience is another important factor that influences the perception of regulation. Loss aversion refers to the aversion of losses in relation to a specific reference point (Kahneman & Tversky, 1979), which is one feature of what is also referred to as negativity bias. Loss salience, on the other hand, refers to being more concerned with financial losses than the gains of others (Wilson et al., 2006; Hirshleifer, 2008). This emphasis on losses is heightened at the societal level as discussions or media coverage tend to be skewed towards sharing negative and emotionally charged news. According to Heath et al. (2001), news media tend to report shocking and horrible news, and people also spread information more quickly when it makes them feel disgusted than when it doesn't.

109 When making financial decisions, losses tend to stand out more than gains, leading to a focus on worst-case scenarios in risk analysis instead of more comprehensive measures like variance that consider the full range of possible outcomes. Loss salience is the driving force behind the widespread use of the Value at Risk method in risk management, which prioritizes the potential for maximum loss as a risk metric. In addition, media coverage of high-profile losses in derivatives trading, such as the Barings scandal, can create a link in people's minds between derivatives and losses, which can result in the belief that derivatives are inherently risky and the possibility of mitigating risks through hedging is ignored. As a result of these attentional effects, there is often pressure to impose more regulations on derivatives (Olsen, 1997; Koonce et al, 2005).

3.3.2 The impact of omission bias on decision making, social norms and pro-cyclical behavior

110 In the realm of behavioral economics, the concept of omission bias has been widely studied and found to play a significant role in shaping decision-making behavior (Ritov & Baron, 1990). Omission bias refers to the inclination to prefer inaction or omissions, even when the cost of inaction

outweighs the cost of action (while both omission and status quo bias involve a preference for inaction over action, omission bias is specifically related to the evaluation of harmful actions, whereas status quo bias involves a general inclination towards favoring the present state of things.). This cognitive bias is evidenced in a range of decision-making contexts, from vaccination choices to investment decisions (Hirshleifer, 2008).

Individuals may shy away from diversifying their investment portfolios, choosing instead to stick to a familiar or perceived safe investment option, even when the risk of loss is higher than that of the alternative option. One particular manifestation of omission bias is observed in the corporate world, where hedging is often employed as a means of mitigating risk. While hedging can be an effective means of avoiding losses, observers affected by omission bias often view hedging losses as avoidable because they could be eliminated by refraining from hedging in the first place. In such cases, the risk-reducing effect of hedging is often overlooked, and the potential for loss is viewed as higher when hedging is employed (Hirshleifer, 2008). 111

Omission bias can also have significant implications for regulatory policies designed to protect unsophisticated investors. Del Guercio (1996) highlights how US courts often evaluate the prudence of investment choices in isolation, rather than considering them as part of a broader portfolio. Regulations to safeguard less knowledgeable investors or consumers from securities or asset classes that are thus perceived as risky may impede efforts to reduce risk through diversification (Hirshleifer, 2008). 112

Beyond omission bias, xenophobia is another psychological phenomenon that can have a significant impact on decision-making behavior. Xenophobia refers to the fear or hostility towards strangers or foreigners and is thought to have an evolutionary basis in kin selection (Hamilton, 1964). Self-serving attribution bias is another source of conflict, which can lead individuals to view themselves as right and others as wrong and can extend to group-serving interpretations (Taylor & Doria, 1981). These biases can contribute to intense forms of group-based antagonism, fueling xenophobic attitudes towards outsiders (Beck, 1999). 113

The restriction of foreign ownership and control of domestic enterprises may be influenced by xenophobia. Studies indicate that people in Europe are less likely to trust countries with different religious beliefs and genetic makeup, which can lead to reduced trade, direct investment as well as portfolio investment (Guiso et al, 2006). Additionally, in situations where something goes wrong, people often seek to assign blame to a visible and 114

relatively powerless out-group or scapegoat, which can foster support for regulation to prevent future misconduct (Hirshleifer, 2008).

115 Fair exchange, or the rule of reciprocity, is another essential component of conduct that influences decisions and requires the punishment of violators to maintain mutually beneficial exchange (Hirshleifer, 1987). This norm is especially important in cases of usury, in which lending of money without interest is viewed as fair, despite the fact that the value of money varies over time. Medieval Christian beliefs on usury, which, like ancient Greek theories, argued that money is barren and incapable of reproduction like animals or crops, mirrored this confusion (Hirshleifer, 2008, with further references). Reciprocity norms contribute to the tendency to scapegoat intermediaries. Despite the fact that intermediaries add value to transactions, this is not always immediately apparent to buyers and sellers. Buyers often underestimate the costs incurred by intermediaries, such as those associated with product promotion, storage, and delivery, etc. Middlemen have often been viewed as parasites or price gougers, and the idea that they offer limited actual worth is implied in the proverbial statement "*eliminate the middleman*." This notion dates back at least to the time of Jesus, who ejected foreign exchange dealers from the temple, and is also reflected in English common and statute law, which made commodity speculation a crime (Herbruck, 1929).

116 Despite the potential benefits of speculative activities, which include shifting resources to prevent losses, allowing inventors to profit from their creations, and enhancing asset price efficiency, the prevailing belief is that in a zero-sum game, speculators gain at the expense of others. This notion is reinforced by the idea that speculation causes hardships for consumers by raising prices. Adam Smith once compared the fear of speculators to that of witches. The correlation between speculative behavior in financial assets and volatility of markets as well as market crashes is often misinterpreted as causality, particularly with short sellers who actually help prices stabilize. As a result, many countries impose regulations on speculative activities, including increased taxation on capital gains earned over a short period, increased taxation on securities transactions and limitations or prohibition on short-selling. Unfortunately, such regulations can be misguided due to biases against speculation, leading to misconceptions about derivatives, which are sometimes perceived as manipulative tools. Although manipulation does occur, the notion that derivatives lack any legitimate purpose makes them vulnerable targets for regulation (Hirshleifer, 2008).

In summary, the influence of psychological biases on decision-making behavior is complex and multifaceted, with implications for a wide range of economic and regulatory contexts. Understanding the nuances of these biases is crucial for developing effective policies that support mutually beneficial exchange and mitigate against adverse consequences. 117

As already pointed out previously, human decision-making can often also be flawed by overconfidence, a tendency to overestimate one's own abilities and ignore limitations. This overconfidence can have significant consequences when it comes to policy decisions, particularly with regard to regulating markets. As pointed out by and Hayek (1978), the complexity of millions of interacting individuals with diverse preferences and information makes it impossible for central planners to fully understand the spontaneous order that emerges from market interactions. Markets are a collection of solutions to problems that have evolved through trial and error, with some carefully designed and others the result of biologically evolved adaptations. The human brain has evolved to comprehend social interactions as a result of individual causes and effects, rather than the intricate interdependence of market institutions that have evolved over time. This *“lack of understanding of the idea of spontaneous order, combined with general attentional constraints”* and a desire for solutions to perceived problems, can lead to the adoption of too many remedies and excessive activism in regulatory strategies (Hirshleifer, 2008). 118

One example of such activism is the suggested solution of transactions taxes to limit speculation in capital markets, which has been advocated by leading economists such as Keynes, Tobin, Stiglitz, and Summers (Hirshleifer, 2008; Stiglitz, 1989; Summers and Summers, 1989). While proponents argue that excessive speculation results in exaggerated responses, excessive volatility, and misallocation of capital, transactions taxes on stock trading can destroy liquidity and suppress the opinions of speculators. Instead, markets have many potential avenues for internalizing the potential social costs of irrational speculative trading, such as through the influence of exchanges on liquidity and firms' choices about their liquidity. However, policymakers may still believe that they can manage market fluctuations and may be overconfident in their ability to come up with effective methods for controlling interest rates or the money supply in order to avert bubbles and crashes. This illusion of control can lead to calls for more active intervention and new regulation after adverse outcomes (Hirshleifer, 2008). 119

- 120 Overall, policymakers need to be aware of their own overconfidence biases and limitations when making decisions about regulating markets and consider the rich adaptation of economic institutions that have developed through long-term evolutionary processes. They should also be wary of adopting apparent solutions, which may have unintended consequences and ignore the complexity of market interactions.
- 121 The influence of heuristic decision-making on financial regulation has been shown to be problematic when it is applied to domains that require careful analysis, as it can lead to significant errors (Kahneman, 2003). Furthermore, short-term moods have been found to impact judgments and decisions related to long-term prospects, and mood contagion has been shown to potentially cause errors to aggregate at the societal level (Hatfield et al., 1994).
- 122 Judgments about financial regulation can also become prevalent based on little information, as rational inference processes can recruit further support for measures and potentially create information cascades that may lead to widespread deference to the accepted viewpoint (Bikhchandani et al., 1992; Banerjee, 1992). Conformity-seeking tendencies might solidify common mistaken judgments to become seemingly uncontested truths, reinforcing this tendency (Hirshleifer, 2008).
- 123 Frequently, hazards gain widespread public attention in abrupt surges, causing individuals to assess the occurrence or significance of an event based on their capacity to recall specific instances of it, which is referred to as the availability heuristic (Tversky & Kahneman, 1973). This can result in a phenomenon known as availability cascades, where the more a risk or problem is discussed, the more significant it appears to be, creating a procyclic or self-perpetuating cycle of behavior (Kuran & Sunstein, 1999).
- 124 Evidence becomes more biased in favor of an increasingly one-sided stance during an availability cascade centered on a perceived threat, leading to political pressure on the government to action and put a halt to the perceived threat (Brenner et al., 1996).
- 125 When individuals experience negative emotions, they tend to have a more pessimistic outlook and engage in critical thinking. As a result, when bad news emerges, there is often a push for new regulations as a precautionary measure. In times of financial distress, public attention tends to shift towards misconduct, leading to increased pressure to tighten financial controls and prosecute those who are perceived to have acted wrongly. This cycle creates a self-reinforcing regulatory environment that benefits those who are able to take advantage of the situation, such as public prosecutors

(Hirshleifer, 2008). The phenomenon of new regulations manifesting in response to bad news in the financial regulatory sphere may not be based on concrete evidence or may not be the most effective response to an issue at hand. This adhocism in public policy making or ad hoc regulation made on a case-by-case basis may be influenced by emotional responses to specific situations rather than a comprehensive and evidence-based approach. This can result in a patchwork of inductive case law-based regulations that are not necessarily effective or coherent. In contrast, a more deductive approach based on codified law and evidence-based decision-making may result in more effective and efficient regulations that are better suited to addressing issues in a comprehensive and evidence-based manner.

3.3.3 How ideological dimensions may shape financial regulation

Ideologies, such as religious, political, and economic ones, shape financial regulation by spreading from person to person as “*cultural replicators or memes*” (Hirshleifer, 2008; Dawkins, 1976). Ideologies are made up of such memes, which affect our thoughts and actions. Ideologies are made up of fundamental memes or straightforward concepts that shape our perceptions and actions. For instance, by forbidding usury and influencing attitudes toward inequity, religious ideology directly affects financial policy. Communist ideology and other utopian ideas encourage strong feelings against private property and the equality rule. Many intellectuals throughout history, including Plato, Aristotle, early Christian thinkers, Confucius, and Thomas Aquinas, shared this rejection. In popular culture, where businesspeople are frequently portrayed as criminals, ideologies that encourage envy of the wealthy and the belief that commerce is inherently evil, such as those based on class struggle, are common (Hirshleifer, 2008). 126

In addition, the idea of commerce being a zero-sum game strengthens the assembly of socialist memes, as the perception that trade is a zero-sum game is prevalent and more attractive during a stagnant economy when individuals seek explanations and scapegoats for their struggles (Rubin, 2002). In times of change and uncertainty, utopian mass movements thrive, attracting individuals with low self-esteem who seek a cause beyond themselves (Hoffer, 1963). In light of this, according to the psychological attraction approach, when faced with challenging circumstances, people are more likely to gravitate towards socialism, whereas during periods of expansion and creativity, liberalism tends to be favored (Hirshleifer, 2008). 127

- 128 The financial “*ideology of anti-short-termism*” (Hirshleifer, 2008) utilizes cognitive biases to foster its replication. In the 1980s, the notion that American businesses were excessively focused on short-term goals, leading to uncompetitiveness, underinvestment, and a lack of innovation, became popular, despite the lack of evidence to support this theory. This criticism appealed to psychological biases, leading to the development of the anti-short-termism ideology (Hirshleifer, 2008).
- 129 To many individuals, the financial system may appear complex and challenging to understand, leading to a receptiveness to conspiracy theories, which claim that a malevolent group possesses the power and intention to cause harm. During market crashes, accusations of foreign enemies engaging in bear raids or cabals of Jewish bankers or speculators controlling the financial system have garnered support. Most individual investors lack an understanding of how and to what degree key actors in the financial industry might influence market risks, leading to a predisposition toward attributing market crashes to intentional manipulation by powerful individuals or groups, rather than the interaction of many individuals, none of whom possesses significant power. The intricacy of the financial system is compounded by its specialized terminology, sensationalized media reports on market fluctuations, and the perceived uncontrollability of risks such as market crashes and bank runs (Hirshleifer, 2008).
- 130 According to the theory of psychological attraction, regulatory actions are based on the psychological biases of regulators and political actors, as well as the development of regulatory ideologies that take advantage of these biases. But also the rational self-interest approach faces the conundrum of implicitly relying on psychological biases as well. The psychological attraction theory also explains why regulatory mistakes are not immediately rectified and why many countries accept regulations that discourage young companies from going public. This theory also suggests that regulatory responses to perceived problems are often ineffective and predicts a tendency for overregulation and a buildup of rules over time. To control the effects of psychological biases on future policy decisions, inertia can be introduced into the political system by means of constitutional restrictions, for example separation of powers, irrevocable rights, and requirements for supermajority votes (Hirshleifer, 2008).

3.3.4 Interim conclusion

The role of bias in financial regulation is significant and complex. It is necessary for policymakers to recognize the impact of psychological biases on regulatory decisions, including salience and vividness, loss salience, and omission bias. Ideological dimensions also play a significant role in shaping financial policy. Policymakers must also be aware of their own biases and limitations to develop effective policies that support mutually beneficial exchange and mitigate against adverse consequences. Reactive financial regulations may not be effective as they are often based on ad hoc, case-by-case regulations (inductive) rather than evidence-based policymaking. A more deductive approach, relying on evidence-based aspects of decision-making, might be more effective in addressing issues comprehensively and efficiently. 131

The incorporation of constitutional limitations into the political system may further help curb psychological biases' implications on forthcoming policy choices. The outlook for financial regulation is unpredictable, but understanding the nuances of psychological biases is crucial to adapt to the constantly evolving financial landscape. By acknowledging the role of biases in financial regulation and adopting measures to mitigate them, policymakers can ensure a stable and prosperous economic future. 132

There are several potential measures that could be taken to mitigate biases in financial regulation. One approach is to increase transparency and accountability in the regulatory process, such as by requiring public disclosure of the rationale for regulatory decisions, and by subjecting regulatory bodies to external audits or oversight. Another approach is to introduce checks and balances into the regulatory process, such as by requiring a supermajority or unanimous vote for significant regulatory decisions, or by creating an independent regulatory body with a mandate to oversee the actions of other regulators. 133

Additionally, policymakers could consider introducing cognitive training programs for regulators to help them recognize and counteract common biases, such as confirmation bias or loss aversion. This could include training in decision-making techniques that promote more thorough analysis of available information, as well as techniques for managing emotional responses and avoiding common cognitive pitfalls. 134

Finally, policymakers could consider adopting a more adaptive approach to regulation, which involves regularly reviewing and revising regulatory frameworks in response to changing circumstances or emerging risks. 135

This could help to ensure that regulations remain relevant and effective over time, and that they are not unduly influenced by biases or outdated assumptions.

- 136 Ultimately, the goal should be to develop a comprehensive grasp of the elements that affect regulatory decision-making, and to develop strategies for promoting more effective and equitable regulation over the long term.

3.4 Regulatory behavior or behavioral public policy with regard to regulation

- 137 The financial crisis of 2008 revealed that a deregulated financial market in the United States was inadequate in protecting the public interest. The crisis proved that managers of financial intermediaries had the potential to generate risks of such magnitude that they endanger the entire financial system and not just their individual organizations (Grosse, 2012). In response, policies and governance mechanisms were proposed to restrict destructive behavior in financial institutions. Better risk management and accountability for managers were suggested as critical elements in preventing another financial crisis. Pre-established penalties for outcomes such as systemic risk or loss of money, including the drawback of previous bonuses, could hold managers accountable for their actions (Grosse, 2012).

- 138 To prevent future crises, stricter limits on credit extension by financial institutions and borrowers were proposed, as well as a predetermined strategy for providing backup funding to sustain the operations of the financial system during periods of turmoil. Additionally, regulating financial institutions by raising capital requirements and limiting leverage of non-bank institutions were suggested measures (Grosse, 2012). Grosse (2012) also notes that the US regulator was also played a role that led to the global financial crisis, by pushing mortgage loans to encourage growth in the housing sector, thus encouraging an ultimately detrimental behavior leading to the exaggerated yet astute question – “*Who will regulate the regulators?*”.

- 139 This question definitely is not an easy task to answer and while the position may be taken that certain mechanisms may be implemented as checks and balances to the regulatory policymaking process, it remains unclear, how such checks and balances may be implemented. At least a glance of an answer may be found in the insights of behavioral finance and neuroscience. Behavioral economics and finance research have had a significant impact on policymaking, with many applications focusing on addressing individual biases and cognitive constraints. However, it is equal-

ly crucial to comprehend how psychological biases can lead to collective dysfunction in financial regulation and accounting policy (Hirshleifer & Teoh, 2017), which might be called the “economics of regulation”.

Policy formulation in the realms of behavioral economics, finance, and accounting research has primarily centered on remedying the impacts of individual biases and cognitive limitations, with a focus on protecting investors and phenomena like nudging (Sunstein & Thaler, 2003). Nonetheless, it's crucial to acknowledge the potential impact of these biases on a collective level and how they can cause a so-called collective dysfunction, which can result in inadequate financial regulation and accounting policies. This contrast can be simplified as the differentiation between effective regulations for flawed users and ineffective policies that arise from the biases of designers, which can be unnecessary or harmful. Effective regulations should provide information that considers users' cognitive limitations and biases, while ineffective policies are the result of designers' psychological biases (Hirshleifer & Teoh, 2017). 140

Behavioral accounting research has identified several biases and cognitive limitations that can impact investor and auditor decisions, leading to the proposal of various methods to enhance accounting rules and regulation (Maines & McDaniel, 2000; Hodder et al., 2001). These principles also apply to financial regulation in general (Hirshleifer & Teoh, 2017). 141

While over time, some effective market regulations have been developed playing a crucial role in a market's functionality, rules and regulations are also influenced by the irrational aspects of human psychology (Waymire & Basu, 2008). Social processes can further distort popular ideas about regulations, which may be even more biased than individual opinions (Hirshleifer & Teoh, 2017). 142

The issue of irrationality in financial regulation extends beyond the influence of interest groups through lobbying efforts, as psychological biases can also make flawed regulations appear attractive to inexperienced political actors (Hirshleifer & Teoh, 2009; Hirshleifer, 2008; Daniel et al., 2002; Caplan, 2001). Up until recently, economists did not take the influence of political actors' irrationality on financial regulation into account (Hirshleifer & Teoh, 2017). 143

According to Hirshleifer and Teoh (2017), the way a regulatory ideology is presented to the public, including its emotional and attention attracting elements, is critical to its success. For example, policies that are framed as regulating a specific group of greedy wrongdoers or protecting a clearly identifiable set of victims are typically more appealing than policies that 144

improve abstract notions of social welfare or save lives statistically (Jenni & Loewenstein, 1997).

145 The argument made is that recognizing the significant role that irrationality plays in policymaking does not necessarily imply that interventionist government policies are negative. Rather, irrationality may aid in addressing obstacles that could hinder the development of improved policies (Hirshleifer & Teoh, 2017).

146 The significance of recognizing the impact of psychological biases on shaping accounting policy and financial regulation is further underscored by the fact that individuals are more likely to resist transparent taxes compared to hidden ones, which is being made use of for example by implementation of withholding taxes (McCaffery & Baron, 2006).

147 In this context, politics can be viewed as a battle for attention, with simple slogans and sound bites used to shape debates. Understanding the limitations of how voters process information is crucial in comprehending regulatory outcomes, as politicians use arguments that exploit listeners' heuristic cognitive processes (Hirshleifer & Teoh, 2017). Salient stimuli that stand out from the environment tend to attract attention, making them more memorable. Moreover, attention is also attracted to vivid stimuli, such as those that elicit emotions or present compelling narratives (Nisbett & Ross, 1980: 45). On the issue of financial regulation, there is a sharp contrast between the tangible gains that come with protecting victims of fraud and the hidden and diffuse costs that arise from imposing regulations on the general public. Protecting victims of financial fraud is a visible and emotionally charged issue, making it more salient to voters and politicians alike. However, the costs of regulation, such as decreased innovation or decreased access to credit, may not be as apparent or may not directly affect voters. This disparity in salience can lead to a focus on immediate gains at the expense of long-term consequences. It is important to recognize this dynamic when designing financial regulations, as failing to consider the hidden and diffuse costs can lead to unintended consequences that ultimately hurt the very people the regulations were meant to protect.

148 Individuals have a propensity to mentally divide payoffs into distinct accounts, even if they have the freedom to move funds between them, which can lead to gains or losses being undervalued until a re-evaluation trigger occurs. Consequently, transactions are often only recognized once they are complete, such as at the point of product delivery, which supports the revenue recognition principle in accounting. Additionally, conservatism is a fundamental principle in accounting that has been ubiquitous across

history and countries. Users tend to avoid the possibility of disappointment and believe that conservatism can alleviate this disappointment (Hirshleifer & Teoh, 2009). People often evaluate their decisions in relation to potential gains compared to a lower reference point or losses relative to a higher reference point. They have a strong aversion to even minor losses when measured against a significant reference point, which is called loss aversion (Kahneman & Tversky, 1979). According to Hirshleifer and Teoh (2017), this tendency extends to social perceptions, and individuals are more concerned about the losses of others than their gains, which they refer to as loss salience. Correspondingly, both investors and analysts' risk perceptions focus disproportionately on the potential for significant losses. However, financial professionals often concentrate on worst-case scenarios when managing risk, such as the value-at-risk methodology, which measures risk by the maximum possible loss (Hirshleifer & Teoh, 2017).

3.4.1 Diversification and the value of financial intermediation

The omission bias, or the tendency to prefer inaction over action, can also shed light on why investors frequently overlook diversification and why regulators, who are tasked with safeguarding investors, sometimes prohibit them from diversifying. Regulations intended to shield novice investors from risky financial products or asset classes, regardless of their potential benefits, limit diversification by their very nature (Del Guercio, 1996). This bias may also explain why historical cost accounting is often more appealing to investors, as revising the valuation of an asset requires taking action, while valuing it at historical cost is passive (Hirshleifer & Teoh, 2009). Negative publicity is common for firms that incur significant losses from derivative transactions. However, media coverage does not always clarify whether these transactions were speculative wagers or risk-hedging measures for the company. Individuals with an omission bias may view hedging, which aims to reduce risk, as risky and unnecessary, as they perceive any action as potentially hazardous. This can lead to the perception of risk-reducing strategies as dangerous, despite their potential to prevent avoidable losses (Hirshleifer & Teoh, 2017). 149

In the context of decentralized finance and crypto assets, regulations that aim to shield investors from the risks associated with such markets or asset classes can also constrain diversification opportunities. These regulations may deter investors from venturing into the decentralized markets, despite 150

the potential for diversification benefits. Furthermore, the preference for omission over commission bias can lead investors to overlook the potential benefits of diversifying into crypto assets, as they may be hesitant to take action and invest in a new and unfamiliar asset class. As a result, regulations aimed at protecting investors from risky assets may ultimately increase overall risk by limiting diversification opportunities. Therefore, it is essential to strike a balance between safeguarding investors and allowing for diversification in regulatory frameworks.

151 People consider caring preferences as significant since it allows them to care for those in need while exchanging resources with others (Haidt, 2012). However, individuals tend to evaluate the level of neediness in others based on historical benchmarks, and recent losses are perceived as posing a more severe burden. This is evident in the overwhelming sympathy shown towards individuals whose were destroyed in natural disasters, which frequently overshadows the persistent concerns of poor individuals who are homeless (Hirshleifer & Teoh, 2017). This is another consequence of the concept of loss salience. The idea of an equitable distribution of resources is a key reference point for assessing fairness, and as a result, norms of equal distribution are common (Camerer & Thaler, 1995). The inherent inclination of individuals to sympathize with the less fortunate and harbor a dislike for those who do not may result in their disapproval of sellers who charge exorbitant prices to people living in poverty, particularly during periods of distress, which results in price ceilings and usury laws. These laws are designed to regulate lenders who impose high interest rates to high-risk borrowers, especially during disaster periods. It is a common paradox that regulations designed to protect people living in poverty can ultimately harm them by preventing mutually beneficial exchanges. Usury laws aim to prevent individuals who are prone to present bias (colloquially referred to as “instant gratification” and related to hyperbolic discounting) from borrowing and over-consuming. When discussing usury laws, the conversation often centers around the exorbitant interest rates and avarice of lenders, while neglecting to address the imprudent spending habits of people living in poverty and the need to limit their consumption (Hirshleifer & Teoh, 2017).

152 The majority of individuals have limited comprehension of how financial intermediation generates worth, resulting in the perception that speculators, bankers, and other intermediaries are exploitative by nature. The act of middlemen shifting resources across time or place and the trust placed in financial intermediaries to carry out transactions can result in buyers

paying more for a commodity or service. This seemingly goes against the principle of fairness in exchange, as demonstrated by the medieval concept of the just price (*iustum pretium*), which equates to the cost to the seller. Medieval Christian teachings and beliefs maintained that the just price for a claim to future consumption is equal to the current consumption unit, resulting in a zero-interest rate. This concept is founded on a common economic perception or intuition that ignores the potential for utilizing resources efficiently to yield profits in the future. The belief that positive interest rates are unjust is prevalent across various religions, cultures and eras scattered around a global scale, including Islamic finance, which opposes the concept of positive interest rates (Hirshleifer & Teoh, 2017).

3.4.2 Regulation of investors? Balancing investor protection and diversification in regulatory frameworks

The phenomenon of in-group bias, which describes people's propensity to display a favorable bias towards their own group in contrast to those outside of it, along with xenophobia, has been determined as significant factor which contributes to biased economic exchange and policymaking (Brewer, 1979). This tendency is visible in the realm of financial regulation, where anxieties or animosities towards foreigners fuel limitations on foreign ownership and control of domestic enterprises and, in certain instances, even lead to the government's ownership of specific industries (Hirshleifer and Teoh, 2017). Additionally, lower levels of trust have been found to be linked with reduced trade in goods, portfolio investment, and direct investment in countries with varying religions and lower genetic similarity in European nations, which suggests that in-group bias can cause economic bias, according to the research conducted by Guiso et al. in 2009. 153

Another consequence of in-group bias is scapegoating, which involves blaming visible, unpopular, and relatively weak out-groups for hardships (Aronson et al, 2020, p. 452). This behavior fosters a desire to punish and regulate offenders. However, it is worth noting that such outrage does not always lead to optimal regulatory outcomes. In the Enron scandal of 2001, while the managers of the company who committed genuine misdeeds were targeted, the anger was also directed towards staff members whose pensions were invested in stocks of the company. Having diversified portfolios would have been the best prophylactic approach to stop such consequences. This implies that enhancing investor education or adopting nudges or 154

regulations that promote diversified investing may be more effective than regulation focused on potential culprits rather than victims, as proposed by Hirshleifer and Teoh in their 2017 research.

155 The concept of regulating investors or peers to protect them may seem counterintuitive, but it may pose a practical approach to safeguarding their interests. This is due to the fact that many investors lack the knowledge and expertise required to make informed investment decisions, making them vulnerable to scams and high-risk investments. Regulations can provide guidelines and standards that ensure investors make informed choices and are protected from fraudulent practices. As part of this, regulations can encourage diversification and risk management, which can help investors mitigate potential losses. In addition to traditional regulations, policymakers can also use framing effects and nudging techniques to influence investor behavior and protect them. By framing investment options in a certain way, policymakers can encourage investors to make choices that are in their best interest. Framing effects refer to the manner in which information is conveyed to individuals and how it can affect their perception and decision-making. For example, emphasizing the risks and potential losses associated with a high-risk investment can discourage investors from making impulsive decisions. Alternatively, based on the above findings, highlighting the potential benefits of a diversified investment portfolio to nudge investors to make more balanced decisions (even including some investments deemed riskier) may seem more prudent than a mere focus on isolated risk-classes of a singular investment. Nudging involves designing policies and regulations in a way that encourages certain behaviors without mandating them. Policymakers can nudge investors towards more responsible investment choices this way, by suggesting portfolio diversification to ultimately lower the risk of loss instead of just pointing out potential risks of isolated investment choices. The first approach may lead to more diversified investment portfolios of investors which are intrinsically less prone to losses from a statistical point of view while the latter approach may just do what it is intended to do – make aware of risks of losses attached to a single investment decision without actually presenting a mitigating strategy. Conversely, individuals participating in fully decentralized systems as peers, as described in Chapter 4, could be considered service providers based on their interactions. Consequently, they might be subject to trade, tax, supervisory, or other regulations.

3.4.3 Negative implications of the fix-it-fallacy on social policymaking

Individuals who are overconfident tend to hold excessively favorable beliefs about themselves, even in the face of conflicting news arrival. This self-deception is closely linked to the illusion of control, which leads people to believe they have the power to influence uncontrollable events, like predicting the winning lottery number. This illusion of control and overconfidence can lead individuals to believe that they can swiftly identify social issues and evaluate potential remedies, despite the fact that making effective public policy requires a deep scientific understanding. The "*fix-it fallacy*" is the belief that complex systems can be fixed with common sense, and this can lead to intervention bias and simplistic, harmful solutions (Hirshleifer and Teoh, 2017). 156

It is important to recognize that market institutions exist for a reason, and lack of understanding of their capacity to develop institutions to address issues may result in the implementation of unnecessary regulations. For instance, some have proposed implementing security transaction taxes to reduce speculative trading and negative externalities, such as excessive volatility, mispricing, and capital misallocation. However, there are various levers that markets can use to control speculative activity, including rules imposed by firms, exchanges, and financial intermediaries. Exchanges and listing firms can influence security liquidity through their rules, while firms can control their own liquidity by deciding how much information to disclose and which exchange to list on. Mutual funds can reduce the frequency of withdrawals by imposing back-end loads or even blocking withdrawals entirely by operating as a closed-end fund. However, if such methods of regulating speculation can address the externality problem depends on the parties involved and their ability to negotiate effectively and efficiently (Hirshleifer, 2008; Hirshleifer and Teoh, 2017). 157

The "*fix-it fallacy*" refers to the idea that complex problems within an adaptive system can be solved through simple solutions. This mindset often leads to intervention bias, where social policy advocates promote naive solutions to complex problems. However, sometimes a passive response to social or medical problems can be a stronger default option than intuition suggests. The *fix-it fallacy* often results in a preference for simplistic, harmful solutions over potentially beneficial ones when action is required. Hind-sight bias reinforces intervention bias, as people tend to believe they had foreseen events after the fact. The idea that regulators should be in charge of regulating fluctuations in asset markets is a demonstration of the *fix-it* 158

fallacy. However, market prices reflect the aggregated knowledge of many professionals, each with specialized knowledge about different parts of the economy, making it unlikely that even expert regulators can systematically recognize when an asset is overvalued. Moreover, overconfidence makes observers write off market institutions as failures without fully considering their potential costs and benefits. For instance, critics of American business often criticize its short-termism. The ideology of anti-short-termism is illogical and unsupported by evidence, and its major prediction in the 1980s - that Japan would surpass the USA in growth and innovation - was proven wrong. Nonetheless, the emotional connection of the component ideas of anti-short-termism “*makes them highly attractive to people when bundled together as an ideology*”, perpetuating critique of business short-termism (Hirshleifer & Teoh, 2017; Hirshleifer & Teoh, 2009).

159 Even when decision-makers act rational, information cascades can still hinder informed decision-making, as demonstrated by Banerjee (1992) and Bikhchandani et al. (1992). These cascades can spread ill-informed ideas, causing regulatory booms and busts. These information cascades are fragile, as public opinion can quickly turn against a regulation when new information arises, resulting in waves of optimism or pessimism similar to stock market bubbles (Bikhchandani et al, 1992). One form of information cascade is the attention cascade, driven by the availability heuristic, where individuals evaluate the frequency or importance of an occurrence based on their ability to recall examples (Tversky & Kahneman, 1973). When a threat gains public attention, it is perceived as more prevalent and significant, creating a self-reinforcing cycle that amplifies public pressure for regulation (Hirshleifer and Teoh, 2017).

160 Interestingly, negative mood can lead individuals to scrutinize evidence with greater skepticism and adopt a more negative outlook, which results in informal standards loosening during good times and a tightening during bad times. Therefore, firms may engage in greater earnings management during good times when they are subjected to less investigation and suspicion. However, during bad times, accounting irregularities come to light due to firm failures, leading to increased pressure for regulatory oversight. This motivates law enforcement and politicians alike to pursue instances of misconduct with increased vigor, reinforcing the cycle. The relationship between public perception and regulation indicates that formal regulation is typically tightened during difficult times and relaxed in prosperous ones. This could be the explanation of why laws that restrict investor rights

or enable greater risk-taking by banks are often implemented following periods of market growth (Hirshleifer and Teoh, 2017).

To address the impact of information cascades, decision-makers should 161
examine the social processes that influence regulatory sentiment and practice
anticyclical measures to break the ever-strengthening regulatory policy-
making cascades. It is critical to be aware of the potential for attention
cascades, which can be fragile and subject to rapid shifts in public opinion.
Therefore, decision-makers must exercise caution when responding to such
cascades, avoiding being swayed by the contagious sentiment. Self-reinforcing
feedback-loops on financial market regulatory policymaking may only
be countered, by the again counterintuitive, anticyclical breaking of (emotionally
driven) ever strengthening regulatory policymaking cascades. As
outlined, an inert or passive response by the legislator may pose a stronger
default option in such cases than the need to reactively try to fix things
by implementing regulations on an ad hoc basis. Conversely, as already
outlined in the previous chapters on the topic of diversification, investors
should take on or be more actively nudged by policymakers to take on
a more active role with regard to asset portfolio diversification decisions
while the legislator should practice itself in omission of (over-)regulation of
financial intermediaries and financial institutions.

In this context, it is also required to further explore the extent to which 162
social interactions (e.g., on social networks) influence investor beliefs and
result in belief divergence in response to public information, private information,
or fake news (Hirshleifer et al, 2023; Giglio et al, 2021), and how the
dynamics drive economic outcomes and how this may be reflected in
public policy.

3.4.4 Exploring the role of regulatory ideologies in shaping economic public policy

Ideologies are powerful cultural traits that can exert significant influence 163
on economic regulation and behavior. There have been instances where
ideologies have resulted in regulatory excesses, leading to disastrous state-
controlled economies under communism or ineffective methods of economic
regulation, like the imposition of price controls and implementation of
restrictions on international trade (Hirshleifer & Teoh, 2017).

Even in market economies, anti-market ideologies remain prevalent and 164
may form the basis of much regulation, often rooted in hostility towards

wealth and the wealthy. Additionally, regulatory ideologies can also reflect animosity towards certain religious or ethnic groups, prompting calls for regulation targeting these minority groups. In some cases, regulations may even be formulated under the influence of conspiracy theories, which are built on hostility towards a particular group and draw on a psychological desire for a straightforward explanation for societal problems, as highlighted by Slovic et al. (2002). Questions that cannot be answered are not substituted by questions which can be answered but actually are answered with answers which are believed to be correct in such a case. As such it may be argued that conspiracy theories serve both as a mediator and moderator on social complexity and may thus serve as a mechanism to reduce social complexity.

165 The susceptibility of financial markets to significant fluctuations and the need for simplistic explanations makes individuals vulnerable to conspiracy theories that offer uncomplicated and plausible explanations for market booms and busts. During economic downturns, individuals may be inclined to attribute their hardships to external factors to preserve their self-esteem, which is evidenced by the popularity of conspiracy theories (D’Acunto et al, 2015; Pipes 1997). The belief that pursuing profit is synonymous with greed has been pervasive across cultures for millennia and has been advocated by renowned thinkers such as Aristotle, Confucius, and others. This perspective has been the driving force behind “*socialist and communist ideologies that reject private property and the freedom to engage in exchange*” as their core tenets (Hirshleifer and Teoh, 2017).

166 Furthermore, the application of constant-sum thinking, a straightforward mental shortcut for assessing business dealings that involves a conflict of interest over price and quality, reinforces the notion that trading for profit is unethical. However, anti-market ideology is not solely based on morality, as the attraction of socialism may arise from an overconfidence in the capability of a select group of technocrats to govern an economy. Ideologies are cultural characteristics that tend to propagate when they can effectively leverage human cognitive and emotional predispositions to support their core beliefs. “*Ideologies usually include a moral perspective about how people should transact with each other socially and economically. The psychological attraction approach to regulation suggests that anti-market ideologies will prosper during hard times*” as individuals tend to prefer attributing their hardships to external factors (Hirshleifer and Teoh, 2017). In this regard, additional empirical research is necessary to investigate

the connection between economic circumstances and the popularity of anti-market ideologies pursuant to Hirshleifer and Teoh (2017).

Hirshleifer and Teoh (2017) argue that it is more important to avoid creating bad regulation than to focus on identifying and enacting good regulation for malicious actors or as they call it: “good rules for bad users”. They highlight that during economic downturns and attention cascades, the pressure for regulation increases, which can lead to extreme dynamics for unsophisticated regulatory ideologies. Therefore, political inactivity or inertia may act as a protective measure against hasty and impulsive changes in regulation. While mostly unrelated to financial markets, attention cascades may also have played a role in shaping COVID-19 policymaking and public perceptions of the pandemic which potentially might have been countered through political inertia. 167

3.4.5 Advancing policy instruments research: Addressing key gaps and enhancing public policy outcomes on the crossroads of behavioral finance and neuroscience

In recent years, the study of policy instruments and their combinations in policy mixes has emerged as a vital area of inquiry in the realm of public policy research. One critical aspect of policy instrument research revolves around the dimensions of multilevel governance (MLG) and their implications for tool choice and program creation. Policymaking frequently involves a range of actors and institutions operating at various levels, such as local, state, national, and even international orders of government. These different actors and institutions often possess divergent goals and instrument preferences, making the reconciliation process a complex interplay of inter- and intragovernmental negotiating and decision-making (Biela et al., 2012; Bolleyer & Borzel, 2010). However, the precise manner in which MLG arrangements influence tool choice and system selection remains an open question (Capano & Howlett, 2020). 168

One particular area of interest involves the role of MLG arrangements in European Union policy fields, where higher levels of government can sometimes just make a proposal on general policy guidelines and objectives, while in other instances, they are able to impose instruments for lower orders of government to adopt (Biela et al., 2012).

Another crucial area of investigation concerns the process of calibration, which encompasses the contextual actions and decisions through which 169

policymakers adjust policy instruments to address specific targets. While empirical evidence documents the prevalence of various types of calibrations, there is a dearth of knowledge about the underlying patterns and regularities that guide policymakers as they undertake such adjustments (Ostrom, 2003; Hall, 1993). These adjustments, which may entail modifying the number of law enforcement officers in response to potential unrest, increasing hospital bed capacity in anticipation of disease outbreaks, revising subsidy distribution rules to better address poverty, or ultimately implementing new financial market regulation in the wake of market crises, highlight the need for a more nuanced understanding of how policymakers fine-tune their instrument choices during policy implementation (Capano & Howlett, 2020).

170 A third essential aspect of policy instrument research pertains to the distinction between substantive and procedural tools, with the latter often receiving less scholarly attention despite their significance in shaping policy interactions within sub-systems (Klijn et al., 1995). Substantive tools focus on the technical arrangements of policy alternatives, while procedural tools encompass the procedures and actions required to coordinate the actions of various policy actors involved in determining, developing and implementing policies (Howlett, 2019). To advance the field of policy instrument studies, it is necessary to explore the full range of procedural tools, including well-established techniques such as specialized investigatory commissions and government reorganizations (Schneider & Sidney, 2009).

171 In the field of public policy, research on policy instruments has yielded significant progress in understanding various aspects, such as the basic types of tools (Howlett, 2000), the factors influencing policymakers' choice of instruments (Capano & Lippi, 2017), changes in governance modes (Le Galès, 2011; Capano et al., 2015), the formation of "*instrument constituencies*" (Voß & Simons, 2014; Béland & Howlett, 2016), the political and policy effects of specific instruments (Edler et al., 2016; Jordan & Matt, 2014; Borrás & Edquist, 2013; May et al., 2005; Campbell et al., 2004), and the consideration of policy instruments as institutions (Lascoumes & Le Galès, 2007).

172 Despite these advances, gaps remain in the understanding of policy instruments, particularly in the context of policy instrument mixes. Unresolved questions include the reasons for policymakers' choice of specific instruments within a mix, the direct impacts of instruments on policy performance, the study of policy mix characteristics and effects, and the functioning of policy instruments in delivering outcomes. These gaps can

be grouped into four clusters according to Capano & Howlett (2020): (i) issues related to comprehension of instruments and mix dynamics, (ii) underexplored behavioral aspects of policy tools, (iii) measurement and methodological concerns, and (iv) matters concerning policy implementation's influence on tool deployment and utilization as well as policy failure or success (Capano & Howlett, 2020).

Financial markets and decentralized finance (DeFi) are continually evolving and growing. As a result, policymakers must grapple with the intricacies of policy instruments and tools to ensure effective governance and regulation. More research is required in order to comprehend the impact of MLG arrangements on policy instrument selection and system selection in financial markets and DeFi and future research should also explore the underlying patterns to enhance knowledge of calibrations and their effectiveness in financial markets. 173

One approach to policy design from a behavioral finance perspective involves the use of framing strategies, which can help to encourage better decision-making by presenting information in a manner that is more readily understood and acted upon. For instance, opting for an opt-out strategy rather than an opt-in strategy can lead to higher participation rates, as it leverages the status quo bias, which causes individuals to prefer the default option. There are also numerous opportunities for further research like the role of technology in influencing investment behavior. (Filbeck et al., 2017). 174

Policymaking and policy design should also take the field of behavioral finance into account. While public policy needs to be further researched as briefly shown above, the same applies for behavioral finance, also in order to connect these disciplines and consider behavioral finance insights with regard to financial market regulations. 175

Firstly, behavioral finance needs to delve further into the psychological underpinnings of economic behavior. While current research has documented various biases and heuristics, a comprehensive understanding of human economic decision-making is still lacking combining existing theories. To fully grasp the cognitive processes driving these biases, researchers must engage with the broader psychological literature and explore factors that shape human behavior, such as emotions, self-control, and social cognition (De Bondt et al., 2008). 176

Secondly, the importance of sociocultural factors in shaping economic behavior cannot be overstated. People's motives, self-image, and outlook are molded by societal expectations and roles, necessitating an examination of the tangible content of people's thought processes. This inquiry must 177

consider social, cultural, and historical contexts to fully comprehend the content, structure, and style of intuitive economic narratives (De Bondt et al., 2008).

178 Thirdly, behavioral finance must move beyond the micro-level study of typical mistakes and adopt a more comprehensive perspective. A deeper understanding of the causes of errors, such as over-optimism, requires examining context-specific factors and the role of individual characteristics. Furthermore, the concept of error must be expanded to consider not just economic efficiency but also broader criteria such as sustainable development, equity, and fairness (De Bondt et al., 2008).

179 Lastly, there is a need to reconcile the focus on individual human frailties with the reality of societal success. The role of institutions in fostering rationality and well-being is paramount, as they enable organization, specialization, and the dissemination of knowledge. Technological advancements, administrative organization, and financial ergonomics all contribute to this process, ultimately enhancing overall system performance and individual well-being (De Bondt et al., 2008).

180 The advancement of behavioral finance therefore necessitates a more integrative and comprehensive approach that combines neoclassical and behavioral elements, incorporates psychological, sociocultural, and historical contexts, and acknowledges the role of institutions in shaping human behavior. By embracing the true nature of human imperfections and bounded rationality, researchers, policymakers, and practitioners can make more informed decisions and contribute to the ongoing evolution of economic and financial systems.

181 Financial decision-making is an intricate process shaped by various cognitive factors and experiences that significantly impact the behavior of individuals, from household members to CEOs as outlined. The neural basis of decision-making, and the role of cognitive science in behavioral finance also plays an important role (Frydman & Camerer, 2016).

182 One critical aspect of financial decision-making is how personal experiences shape decisions on a large scale. For instance, the likelihood of stock market investment was lower for those who lived through the Great Depression compared to later generations (Malmendier et al., 2011). Similarly, people who experienced high inflation rates in the past tended to anticipate higher inflation rates in the future (Malmendier & Nagel, 2016). Furthermore, people from lower socioeconomic backgrounds may harbor views on future stock returns that are more negative in nature (Kuhnen &

Miu, 2017). These findings suggest that personal experiences play a crucial role in financial decision-making (Frydman & Camerer, 2016).

Research has also examined the influence of traumatic experiences on financial behavior. Exposure to violent civil war or natural disasters has been found to alter behavior in subsequent years, sometimes increasing risk aversion. Interestingly, a study on Korean War survivors discovered that individuals aged 4-8 during the war demonstrated a greater aversion to financial risk even after decades have passed (Cameron & Shah, 2015; Eckel et al., 2009; Kim & Lee, 2012). This evidence aligns with reinforcement learning (RL) models in decision neuroscience, which propose that an agent updates the value of an action based on the results of this action (Frydman & Camerer, 2016). 183

Emerging research on the neural basis of financial decision-making suggests that the hippocampus, responsible for storing memory, plays a significant role in economic decisions. Activation in the hippocampus has been observed to correlate with activity in the valuation area of the brain, the ventromedial prefrontal cortex (Shadlen & Shohamy, 2016; Gluth et al., 2015). This implies that the hippocampus may contribute to the effects of experience on financial decisions (Frydman & Camerer, 2016). 184

The integration of cognitive science principles and emerging data sources, such as functional magnetic resonance imaging (fMRI), hormones and genetics may pose fields of future research in understanding financial decision-making. By examining the correlation structure among various biases and determining how they may be called into existence by a common neurological and psychological process, cognitive science can provide valuable insights into the behavioral finance field (Frydman & Camerer, 2016). 185

Moreover, the application of cognitive science to policymaking has resulted in the successful implementation of soft, paternalistic "nudges," which help people avoid mistakes without burdening firms or individuals already making optimal decisions (Camerer et al., 2003, Thaler & Sunstein, 2008). Numerous randomized trials have been conducted to assess the effectiveness of such nudges in improving financial, health, and educational decisions (Frydman & Camerer, 2016). 186

In conclusion, the interdisciplinary study of financial decision- and policymaking is an exciting field that stands to benefit from the synergistic use of mathematical modeling, cognitive and neural metrics, and behavioral observation. By leveraging cognitive science principles, researchers can better understand its implications for behavioral finance and regulatory public policy. 187

3.4.6 Interim conclusion

- 188 In summary, financial regulations aimed at protecting investors are emotionally charged, like calls for reactive and adhocratic regulatory responses in the wake of the bankruptcy of the Bahamas-based cryptocurrency-exchange FTX (FTX Trading Ltd.), and receive more attention, while the hidden costs of regulation, such as decreased innovation or access to markets, may go unnoticed. The failure to consider these costs can lead to unintended consequences that hurt the very people the regulations were meant to protect.
- 189 In the context of decentralized finance and crypto assets, regulations that aim to shield investors from risks may also limit diversification opportunities and increase overall risk by deterring investors from venturing into emerging markets and new types of asst forms, e.g., crypto assets, as part of a diversification strategy. Risk-reducing strategies may therefore be perceived as dangerous, despite their potential to prevent avoidable losses, as a consequence of emotional storytelling and given that the potential for a sound loss prevention strategy is deemed unintuitive.
- 190 From an investor side it is also important to recognize the potential benefits of diversifying into new and unfamiliar asset classes and not let the preference for omission bias hinder investment decisions, which should also be reflected and addressed in regulatory and supervisory policymaking with regard to financial markets.
- 191 Additionally, the idea of regulating investors or peers to protect them may seem counterintuitive, but it is a practical approach to safeguarding their interests because many investors lack the necessary knowledge and expertise required to make informed investment decisions, making them vulnerable to scams and high-risk investments. Regulations can provide guidelines and standards that ensure investors make informed choices and are protected from fraudulent practices, while also promoting diversification and risk management, which can help mitigate potential losses. Policy-makers can use framing effects and nudging techniques to this effect in order to influence investor behavior and encourage responsible investment choices, such as highlighting the potential benefits of a diversified investment portfolio. Such nudges could involve public policies which by design encourage responsible investment choices by suggesting portfolio diversification to lower the risk of loss, rather than just pointing out potential risks of isolated investment choices, which ultimately may be more effective in creating diversified investment portfolios that are inherently less prone to

losses from a statistical point of view, whereas just pointing to the potential risks of an investment choice may only raise awareness of the risks of losses without providing a mitigating strategy. On the other hand, peers acting on truly decentralized systems as outlined under chapter 4 may themselves be classified as service providers, depending on their interactions. In turn it is only logical that such peers may be expose to trade, tax, supervisory or other regulation.

Furthermore, the concept of overconfidence and a false sense of control can lead individuals to believe that they can easily identify social problems and assess potential solutions to resolve them, which can result in harmful and simplistic solutions. This mindset, known as the "fix-it fallacy," often leads to intervention bias, where social policy advocates promote naive solutions to complex problems. However, sometimes a passive response to social or medical problems can be a stronger default option than intuition suggests. Hindsight bias reinforces intervention bias, as people tend to believe they had foreseen events after the fact. It is important to recognize that market institutions have developed to solve problems and thus exist for a reason, and failure to comprehend this aspect can result in implementation of unnecessary regulations. 192

Related to this, it is important to understand social processes that shape regulatory sentiment, as self-reinforcing feedback loops on financial market regulation which can lead to ever-strengthening regulatory policymaking cascades. To counter such feedback loops, it may be necessary to break the cycle through anticyclical measures, meaning in some cases, an inert or passive response by the legislator may be a stronger default option than implementing (bad) regulations on an ad hoc basis. Concludingly, investors should be more actively encouraged to take on a role in asset portfolio diversification decisions, while policymakers should practice restraint in over-regulating financial intermediaries and institutions. 193

3.5 Regulation of centralized Finance

In order to discuss the potential application and shortfalls of regulatory mechanisms of centralized finance to decentralized finance, it must first be established what is defined as centralized or traditional financial market. A financial market is a venue where individuals and entities can engage in buying and selling financial instruments and products as part of the financial economy in contrast to the real economy where products and 194

services are directly traded and transferred. These financial instruments may include stocks or equity-like instruments, bonds or debt-like instruments and non-equity instruments like derivatives. In financial markets, the term "market" can refer to exchanges that facilitate the trade of financial instruments or in legal terms pursuant to article 4 no 1(21) MiFID II: *“regulated market means a multilateral system operated and/or managed by a market operator, which brings together or facilitates the bringing together of multiple third-party buying and selling interests in financial instruments – in the system and in accordance with its non-discretionary rules – in a way that results in a contract, in respect of the financial instruments admitted to trading under its rules and/or systems, [...]”*. Financial markets can be divided into different categories, such as capital markets, commodities markets, money markets, derivatives markets, futures markets, foreign exchange markets, spot markets, interbank lending markets and others. The capital markets can be further divided into primary and secondary markets. Primary markets are where newly issued securities may be subscribed to, while secondary markets allow investors to buy and sell already existing and circulating securities. The money market deals with short-term finance, while long-term finance markets are capital markets. Centralized or traditional finance refers to the conventional financial system in which financial institutions and intermediaries, such as banks, investment firms, brokers and other agents, play a central role in providing financial services, including savings and loans, investment management, payment services and insurance. This system is typically regulated by government agencies (national supervisory authorities) and operates within a well-established legal framework. Centralized finance is often contrasted with decentralized finance, which utilizes blockchain technology and cryptocurrencies to create a more open and transparent financial system that operates without intermediaries. Centralized virtual asset service providers or VASPs are however also part of centralized finance falling under regulatory and supervisory provisions (compare in more detail section 4).

- 195 European legislation like the Markets in Financial Instruments Directive and Regulation (Directive 2014/65/EU or MiFID II, ELI: <http://data.europa.eu/eli/dir/2014/65/oj>; and Regulation (EU) No 600/2014 or MiFIR, ELI: <http://data.europa.eu/eli/reg/2014/600/oj>) as well as the final proposal for a Markets in Crypto Assets Regulation (COM/2020/593 final or MiCAR) which is expected to enter into force in 2023 and be fully applicable in 2024 are such regulations of traditional finance (MiFID II and MiFIR) or

centralized finance (MiCAR), as the latter only applies to intermediaries providing virtual asset services.

Regulatory provisions are laws and regulations that set out the rules and requirements for financial institutions, markets, and products. These regulations may cover issues such as disclosure, capital requirements, risk management, and consumer protection. Regulatory provisions are designed to ensure that financial markets operate fairly and efficiently and that consumers are protected from fraud and abuse. Supervisory provisions, on the other hand, refer to the mechanisms used to ensure that financial institutions comply with regulatory provisions. This can include on-site inspections, off-site monitoring, and reporting requirements. Supervisory provisions are typically enforced by regulatory agencies, which have the authority to take enforcement actions such as fines, cease and desist orders, and revocation of licenses. The goal of supervisory provisions is to ensure that financial institutions comply with regulatory standards, thereby promoting sound and compliant operations in accordance with regulatory requirements, in order to safeguard consumers and maintain financial stability. 196

Lancaster's concept of commodity characteristics (1966) may be applied to define financial goods or services, which are expected to have three key features: expected rate of return, security, and liquidity. These features are important to buyers, as they impact the utility of the product. The expected rate of return includes the mean yield and forecast gain or loss net of transaction costs. Security refers to the potential range of returns in different scenarios, while liquidity refers to the ease and cost of conversion into an acceptable medium of exchange. Although all risks are typically factored into the expected rate of return, liquidity is still considered one of the crucial characteristics of financial products due to its significance for households and firms (Heffernan, 1990). 197

Graham and Dodd (1934) defined an investment operation as one that promises safety of principal and a satisfactory return after thorough analysis. Investment operations that do not meet these requirements are consequently considered speculative. The definition has three crucial components: 1) thorough analysis, 2) safety of principal, and 3) satisfactory return. This is also the origin of value investing. However, when decision-makers face complex data and high levels of uncertainty (such as during investment decision-making), they tend to employ heuristics as a simplification strategy. Nevertheless, these intuitive heuristics are susceptible to cognitive bias errors. To minimize the likelihood of succumbing to cognitive biases, 198

Otuteye & Siddiquee (2015) proposed to predefine the decision-making process (or rule) and adhere to it with strict emotional discipline (Otuteye & Siddiquee, 2015).

199 From a legal standpoint there are different jurisdictional interpretations of what may classify as a financial instrument. For example, the Howey Test is utilized by the United States Securities and Exchange Commission (SEC) for determining whether an investment is classified as a security. The test was named after the 1946 U.S. Supreme Court case, *SEC v. W.J. Howey Co.* To qualify as a security, an investment must satisfy all four elements of the Howey Test, which include the following: 1) an investment of money, 2) an expectation of profit, 3) the investment should be in a common enterprise, and 4) the profits should result mainly from the efforts of others. An investment contract that meets all four elements is deemed a security and subject to federal securities laws and regulations (*SEC v. W. J. Howey Co.*, 328 U.S. 293, 1946).

200 Pursuant to Art 4 no 1(44) MiFID II financial instruments are transferable securities, which in turn are defined as those classes of securities which are negotiable on the capital market – to the exclusion of payment instruments – such as shares in companies, partnership shares, depositary receipts for shares, bonds, depositary receipts for securitized debt, and any other securities that give the right to purchase or sell transferable securities, or result in cash settlement based on transferable securities, currencies, interest rates, yields, commodities, or other measures.

201 The term "*classes*" of securities is not specifically defined under MiFID II. However, according to the European Securities and Markets Authority (ESMA; 2019), it can be understood as interchangeable units that are similar to a certain degree and comparable, having essentially the same rights vis-à-vis the same issuer. This interpretation is consistent with the opinions of different national competent authorities (NCAs). In the context of MiFID II, transferability refers to the legal transfer of ownership between parties and is a necessary condition for negotiability of financial instruments. Negotiability is not directly defined by MiFID II but is interpreted as the ability to effectively and legally trade instruments on a capital market. Transferable securities are considered freely negotiable if they can be traded between parties, subsequently transferred without restriction, and if all securities within the same class are fungible. The capital market in this context is broadly defined as any place where buying and selling interests meet, which does not necessarily have to be regulated. Even if a market has not yet formed, the possibility of trading is sufficient for an instrument to be

considered negotiable. To be classified as transferable securities under MiFID II, relevant instruments must be functionally comparable to the typical examples provided in the regulation, such as equity and debt instruments and certain derivatives. The examples in Art. 4(1)(44) are not exhaustive but offer guidance for the classification of other instruments. Relevant instruments must embody a membership or property right comparable to shares or debt securities, with either a profit or return participation right or a financial claim against the issuer and they may not constitute an instrument of payment (ESMA, 2019). Financial instruments under European Union law are therefore defined as transferable securities which are mass-issued, standardized, transferable as well as tradable instruments on the capital market which come with an equity-like or debt like interest or have a derivative character and do not constitute payment instruments.

3.5.1 Considerations when applying behavioral economic findings in real-world situations and policymaking

An important aspect before applying behavioral economic findings to real-world situations and policymaking is to consider the specific context and to critically evaluate the evidence and assumptions underlying the findings. In some cases, the findings may be applicable and useful for guiding policy or decision-making, but in other cases, they may be based on incomplete or flawed data and may not be reliable predictors of behavior. For example Art 1 no 4(b) of the European Prospectus Regulation (Regulation (EU) 2017/1129; ELI: <http://data.europa.eu/eli/reg/2017/1129/oj>) stipulates that the obligation to publish a securities prospectus shall not apply to an offer of securities addressed to fewer than 150 natural or legal persons per member state (the same applies *mutatis mutandis* to the public offering of crypto assets pursuant to Art 4 no 2(d) of the final proposal of the markets in crypto assets regulation or MiCAR).

This essentially corresponds to the so-called Dunbar's number which is often rounded up to 150. The number was the result of an exploratory extrapolation from regression equations describing how the size of the neocortex affects the size of social groups among primates. The predicted group size for humans was 147.8 (Dunbar, 1993). Although it would make for a nice anecdote the 150-person limit as exemption of public offerings pursuant to EU prospectus regulation is unlikely to have been specifically

influenced by Dunbar's research (the fact aside that Dunbar's number has itself been subject to criticism and debate (Lindenfors et al, 2021).

204 The thought mused on above provides an example of another psychological phenomenon, the concept of false pattern recognition or as Sagan (1996, p.45) also called it “the pattern-recognition machinery”, which refers to the tendency to see patterns or connections in data or events that are not there and which are actually random or coincidental. While the connection between Dunbar's number and the EU prospectus regulation may seem compelling, it is important to carefully evaluate the evidence and consider alternative explanations before drawing definitive conclusions or making policy decisions based on such make-do notions.

205 Overall, the field of behavioral economics provides valuable insights into how people make decisions and respond to incentives, but it is important to apply these findings with care and critical evaluation in order to ensure their accuracy and applicability in specific contexts.

206 Conversely to the above, made up example, there is another regulatory mechanism, the liquidity coverage ratio or LCR, which is backed by evidence and was introduced in the wake of the 2007-2008 global financial crisis.

207 In December 2010 a new regulatory regime was introduced by the Basel Committee on Bank Supervision (BCBS) in response to the global financial crisis. Basel III strengthened the existing bank capital rules and introduced a global framework for liquidity regulation for the first time. The framework included the LCR, which requires banks to hold enough highly liquid assets in order to endure market stress for a period of at least 30 days (Keister & Bech, 2012).

208 One of the most well-known externalities or spill overs that pose a risk to the financial system is the occurrence of fire sales by individual banks under duress from their short-term lenders, which can depress asset prices, which in turn may cause a chain reaction resulting in contagion and failure of many banks. Several studies, such as Korinek and Jeanne (2020), Gertler, Kiyotaki, & Prestipino (2016), Brunnermeier & Sannikov (2014), Gertler, Kiyotaki & Queralto (2012), have analysed this issue and found that greater capital adequacy ratios than what individual banks would decide upon are needed to counter these undesirable spill overs. These studies recommend that capital ratios be set such that the constraints on banks' capital do not bind frequently during normal times. Furthermore, according to Gertler and Kiyotaki (2015), the risks faced by banks are significantly increased

by the potential occurrence of bank runs, which means that even higher capital ratios are necessary.

Cifuentes, Ferrucci, and Shin (2005) suggest that liquidity buffers, along with capital, can help mitigate the risks of bank failures and contagion caused by fire sales. Perotti and Suarez (2011) propose that liquidity requirements and Pigouvian taxes can also help address the systemic risks caused by financial intermediaries' excessive reliance on short-term funding by internalizing the externality of systemic fire-sales. Pigouvian taxes are taxes designed to address externalities, which occur when costs or benefits affect third parties who are not directly involved in a transaction. They aim to correct market failures by increasing the cost of activities that generate negative externalities until the social cost and private cost are equal. In the financial system, Pigouvian taxes can be applied to discourage excessive risk-taking and activities that generate negative externalities, thereby encouraging financial institutions to take into account systemic risks. According to Boissay, Collard, & Smets (2016) and Boissay & Collard (2016), regulating capital and liquidity can effectively prevent the accumulation of excessive liquidity in the economy and the resulting decrease in lending quality. In their framework, optimal policies using capital and liquidity tools can eliminate the occurrence of a banking crisis caused by an interbank market collapse.

Kashyap, Tsomocos & Vardoulakis (2014) also advocate that liquidity and capital tools can be used to prevent bank runs. Morris & Shin (1998; 2001) in their framework, called "*global games*", treat bank runs as endogenous and propose higher capital ratios and tools similar to the liquidity coverage ratio (LCR) or the net stable funding ratio (NSFR) to reduce the probability of such bank runs.

While the LCR is a risk mitigating mechanism aimed at financial institutions, other regulatory mechanisms at an investor level which might be applied by design or by default as a policy could refer to stop-loss rules. As Kaminski and Lo (2014) showcased, whether stop-loss rule can stop losses depends "*on the return-generating process of the underlying investment as well as the specific dynamics of the stop-loss policy itself.*" They demonstrated that stop-loss policies can generate a positive stopping premium "*under more empirically plausible return-generating processes such as momentum or regime-switching models*", in contrast to Lei and Li (2009), who argue that the benefits of such strategies mainly come from reducing risk, rather than enhancing returns.

- 212 The implementation of particular stop-loss policies can increase the effectiveness of a portfolio compared to simply buying and holding, and significantly lower risk by decreasing the volatility of the strategy, which is applicable in real-world situations. These aspects intersect with the behavioural finance literature (flight-to-safety, disposition effect, ambiguity aversion, loss aversion, etc), which suggests that different regions of the brain are responsible for handling gains and losses and that investors may make irrational trading decisions following significant losses. Stop-loss policies may be effective because of the non-linear characteristics of stock and bond returns, where avoiding downward momentum and taking advantage of “*asymmetries in asset returns following periods of negative cumulative returns*” can be beneficial (Kaminski and Lo, 2014).
- 213 This implies that regulators could consider implementing stop-loss policies or encouraging their use in certain contexts. Additionally, the study highlights the importance of considering non-linearities and behavioural factors in financial regulation. Regulators should take into account the potential impact of cumulative losses and the disposition effect on market dynamics, as well as the possibility of irrational forces temporarily dominating the market during times of significant losses.
- 214 An opposite example, which might arguably fall under the “*bad regulation*” section for maintaining financial market stability is the definition of persons known to be close associates of politically exposed persons (PEPs) which, as per FATF (Financial Action Task Force) Guidance on politically exposed persons, recommendations 12 and 22, (2013), are individuals who are closely connected to a PEP, professionally, but also socially or politically. While the incrimination of mere social connections is problematic if they lead to exposure and burdens when acting on financial markets, the regulation can be too broad, leading to potential privacy violations. One potential solution to this for centralized as well as decentralized finance could be the use of privacy-enhancing tools, which would only identify historical transactions and their beneficiaries when necessary or indicated rather than by default.
- 215 However, with regard to PEPs or other due diligence questions recent court decisions in Liechtenstein and Austria have emphasized the importance of the protective purpose of bank and insurance supervision regulations. In the case OGH 05 CG.2017.107, LES 2020 156 in Liechtenstein the Liechtenstein Supreme Court found that anti-money laundering standards in the Due Diligence Act did not have a protective purpose for the individual client, but rather aims to protect the financial system and state

interest in combating money laundering, organized crime, and terrorism financing. The court rejected the plaintiff's argument that the bank had violated its duty of care under the Due Diligence Act and the claim for damages was dismissed. From a methodological point of view, the decision was criticized for not differentiating between the objectives of a law and its protective effects (Stern, 2022).

3.5.2 Who does banking regulation protect?

A central question which is not as obvious as it may seem is who banking regulation is supposed to protect. There are opposing interests of individual investor protection and the protection of financial market stability on a collective level. In order to shed light on the change over time of the answer to this question, at least from a European centered perspective, a selective assessment of guiding decisions of the Austrian Supreme Court under consideration of European law and decisions of the European Court of Justice is made. The focus was on put on overarching objectives and policy implications and how public policy – subject to the relativism of societal values, may change over time and thus be interpreted differently. 216

3.5.3 Case study 1

A legal case decided by the Austrian supreme court in 2006 (ECLI:AT:OGH0002:2006:0010OB00142.06Y.1017.000) involved a bank that purchased bonds from another bank which subsequently went bankrupt. The bonds were not intended to be kept in the purchasing bank's assets but rather to be resold to customers. At the time of purchase, the selling bank was already insolvent, which was not known by the purchasing bank's board. When the insolvency of the selling bank was announced, the bonds were still held by the purchasing bank. The bankruptcy administrator of the purchasing bank sued to recover the loss caused by the bond purchase. The court found that the purchasing bank was not protected by the relevant banking regulations, and thus no government liability existed. The court also determined that the purchasing bank's claim for damages was not valid, as the bank's board had failed to exercise appropriate due diligence in purchasing the bonds. Finally, the court found that the bond purchase was not causally linked to the failure of the government to super- 217

wise the selling bank, as the board of the purchasing bank would not have purchased the bonds had it known the selling bank was insolvent.

218 The legal assessment in this case revolved around the question of whether a bank that purchased bonds from another bank, which later became insolvent, has a right to claim compensation under the Austrian Official Liability Act (Amtshaftungsgesetz) for the failure of the banking supervisory authority to exercise its oversight duties. According to Austrian law, a mere financial loss is not sufficient to trigger liability under official liability statute. Instead, the claimant must show that the supervisory authority violated an absolute right, breached a protective statute, or engaged in reprehensible behavior. In this case, the only potential ground for liability is a breach of a protective statute. However, for liability to exist, the breached regulation must have been intended to protect the claimant against financial losses. This requirement is met if the violated norm had the prevention of financial harm as one of its purposes.

219 The Austrian Banking Act (Bankwesengesetz) at that time stipulated that the banking supervisory authority, under the supervision of the Federal Ministry of Finance, is responsible for ensuring compliance with banking regulations and protecting the interests of depositors and creditors. The primary goal of the Act is to ensure the functioning of a stable banking system in the interest of the national economy. However, the Act also aims to protect creditors of banks from losses resulting from banking transactions. Therefore, the Austrian government was in general deemed liable for the violation of its oversight duties towards the creditors of a bank. Ultimately the court ruled that the claimant cannot seek compensation under the Official Liability Act for other reasons, as the claimant, as a distributor of the bonds, was acting on its own behalf and not on behalf of the bank's creditors. Therefore, the banking supervisory authority had no duty to protect the claimant's financial interests in this case as there was no breach of a protective statute that was intended to protect the claimant from financial harm.

220 The European Union already had a different approach to bank regulation at that time, which allows member states to exercise banking oversight solely in the public interest (ECLI:EU:C:2004:606). Under this approach, depositors and investors have no individual rights to banking supervision. Instead, the EU requires member states to provide deposit insurance schemes to protect the interests of depositors. The EU Court of Justice has ruled that as long as the deposit insurance scheme is in place, individuals cannot claim compensation for a lack of banking supervision.

3.5.4 Case study 2

Another case in front of the Austrian Supreme Court decided in 2007 (ECLI:AT:OGH0002:2007:0010OB00269.06Z.0327.000) concerned the insolvency of an Austrian bank that occurred due to fraudulent behavior of its management and inadequate internal controls, which were confirmed as such by the bank's auditors, who nevertheless reported that the controls were satisfactory. As a result, the bank supervision authorities were not alerted, and the bank's insolvency caused significant losses for its depositors. To provide them with additional compensation beyond the statutory deposit insurance, the Austrian banking associations established a support organization, which issued a notice inviting depositors to submit claims for redemption of their deposits up to a certain amount. The support organization later paid out over EUR 4 million to depositors, including those who had filed claims with the deposit insurance scheme. The support organization subsequently sued the Republic of Austria for compensation for the losses incurred by depositors, alleging that the fraudulent activities and inadequate controls were the result of the negligence of bank auditors, who were regarded as officials of the state. The lower courts found in favor of the support organization, ruling that the auditors were indeed state officials and that the organization was entitled to seek compensation for the losses incurred by depositors. The Republic of Austria appealed the ruling to the appellate court, which confirmed the lower courts' decision. 221

The Austrian Supreme Court rejected the argument of the Republic of Austria that the application of the Official Liability Act to bank supervision, including the treatment of bank auditors as part of the supervisory authority, is contrary to EU law. The court confirmed its previous decisions recognizing claims for damages based on official liability of the Republic of Austria for the mistakes of bank auditors. The court argued that granting claims for damages in certain exceptional cases does not violate EU law, as it is a sanction for wrongful and unlawful behavior. The court also clarified that the fact that bank auditors are required to be "independent" under EU law does not contradict the liability of the supervisory authority for their mistakes. 222

The court further addressed the issue of whether the claims for damages of depositors have been transferred to the plaintiff. While the court found that the lower court's decision on the transfer of claims was not sufficiently reasoned the court then argued that, in the absence of a specific contract, the transfer of claims can be inferred from the circumstances. In this case, 223

the Austrian Supreme Court found that the transfer of claims includes not only the claims against the bank but also the claims for damages against the supervisory authority. The court argued that it is reasonable to assume that the parties would have agreed on the transfer of all claims, including the claims for damages, if they had been aware of their existence. The court noted that the payment made by the plaintiff to the depositors fully satisfied their claims and that allowing depositors to retain their claims for damages would result in double compensation, which was not intended by the parties.

224 Overall, the decision provides a detailed legal analysis of issues such as the liability of the supervisory authority for the mistakes of bank auditors, the transfer of claims for damages, and the plaintiff's standing to bring the claim for official liability.

3.5.5 Case study 3

225 In a more recent case decided by the Austrian Supreme Court in 2022 (ECLI:AT:OGH0002:2022:0010OB00091.22X.0714.000) a plaintiff was seeking compensation from the defendant, the Republic of Austria, for damages incurred as a result of the defendant's alleged failure to perform its supervisory duties over a bank. The plaintiff argues that the defendant's failure to exercise proper oversight and initiate legal action against the bank's management allowed fraudulent and criminal activities to occur, leading to the bank's collapse and the plaintiff's loss of funds.

226 The court rejected the plaintiff's claim, arguing that the defendant was not responsible for the protection of the plaintiff's assets but only for ensuring the stability of the banking system as a whole. The court also found that the defendant's official liability was limited by law and did not extend to the protection of individual creditors or depositors. The court held that the plaintiff's claim was therefore not legally justified, and the defendant was not liable for the plaintiff's losses. The court also rejected the plaintiff's arguments that other government agencies, such as the state prosecutors and the bank's auditors, were responsible for the bank's failure and, as such, liable for the plaintiff's losses.

227 Regarding governmental liability, the court notes that under the Austrian Act on Official Liability, public entities are liable for damages caused by their officials in the course of carrying out their duties, if such officials acted unlawfully and with fault. However, for a claim for mere financial

loss to be successful, it must be shown that the unlawful behavior violated an absolute legal right, a protective law, or constituted conduct contrary to morality.

The court also explains that the principle of the purpose of the law is 228 an essential criterion for determining the scope of official liability. The purpose of the norm is a separate criterion of liability alongside unlawfulness and causation. Both the claimant and the nature and origin of the damage must fall within the scope of the norm's protective purpose. The court emphasizes that not every protection that a norm provides is relevant to the determination of the scope of official liability. The court stresses that failure to consider the limits of the causal connection between the unlawful conduct and the damage would result in an unlimited scope of liability for public entities. Therefore, it is crucial to examine whether the legal obligations of a public entity exist solely in the interest of the general public or also in the interest of the specific individual harmed by the unlawful conduct. If the protective purpose of the norm only concerns the interests of the general public, any impact on individual interests would be considered mere reflex effects, which would not be sufficient to establish official liability.

Furthermore, the liability of the Financial Market Authority (FMA) for 229 damages caused by its employees or bodies in the execution of federal laws was addressed. Due to legal amendments the official liability of the FMA got restricted in contrast to the first two cases discussed before. The new provision limited the definition of damages to those directly caused to legal entities subject to supervision. The purpose of the amendment was to exclude damages that only have a reflex effect on the assets of third parties from the obligation to compensate. The constitutionality of this provision was challenged, but the Constitutional Court upheld it, stating that the aim of the provision is to limit liability to directly affected legal entities subject to FMA supervision. The court further clarified that the purpose of banking and financial market supervision is to ensure the smooth functioning of the sector as a vital part of the economy, and therefore, the protection of creditors is only an abstract or institutional protection. As a result, only the directly affected supervised legal entities are entitled to compensation under the public liability law.

Additionally, the court referenced older literature that suggests that from 230 a European Union law perspective, it is not necessary to grant bank creditors claims for damages resulting from a breach of supervisory duties. It is further explained that the European Union's banking supervisory

objectives focus on specific mechanisms and are not designed to protect individual creditors. The European Court of Justice (ECJ) confirmed that national authorities responsible for supervising credit institutions cannot be held liable for damages resulting from inadequate supervision if there is an EU directive in place ensuring the compensation of depositors (ECLI:EU:C:2004:606; ECLI:EU:C:2021:249). The European Union's legal framework has not significantly changed since this decision, and the EU legislature has not indicated a desire to impose strict liability on national supervisory authorities or states for damages resulting from inadequate supervision. The author also discusses the requirements for a successful claim of state liability under EU law, which includes the existence of a concrete EU legal norm that grants individual rights, a sufficient degree of qualification of the infringement, and a causal link between the damage and the infringement. In the case at hand the Austrian Supreme Court did not initiate a preliminary reference procedure with the ECJ under Article 267 TFEU (Treaty on the Functioning of the European Union).

- 231 The legal case analyzed above highlights a shift in banking regulation from prioritizing individual investor protection to prioritizing collective financial market stability. This shift is evident in the rulings that exempt the state from liability for damages caused by a bank's failure to protect individual investors, which ultimately resulted out of deficiencies in supervision, as well as in the legal rationale for these rulings, which emphasizes the importance of maintaining the stability of the financial system as a whole. The decisions reflect a recognition that individual investor protection is sufficiently met by deposit protection schemes (limited to EUR 100'000.-) and that above that banking supervisions pursues the purpose of ensuring the stability of the financial system as a whole and therefore banking supervision focuses more broadly on the overall health of the financial markets.
- 232 Likewise, Stern (2021) argues that the protection of individual creditors is not the purpose of banking supervision, and that limitations on state liability for damages are necessary to avoid moral hazard, noting that the debate over the purpose of banking supervision in Austria has been reignited by the *Commerzbank Mattersburg* case, as well as more relevant internationally, the *Wirecard* scandal.
- 233 The European law and regulations aim to harmonize banking regulations and ensure financial stability, soundness of banks, protection of investors, and prevention of criminal activities. However, the European lawmakers have not explicitly defined the purpose of banking supervision, and there is no hierarchy or ranking of objectives. As it is, the primary objective of

banking supervision is to ensure the functioning of banking and financial markets, as it forms the basis for achieving other goals such as investor protection and financial stability (Stern, 2021). While the general definition of goals by the European policymaker is high, this makes it difficult to deduct a more concrete purpose of banking supervision. It is important to protect against the undermining of prudential supervision objectives, with one such structural goal being minimizing costs for taxpayers as much as possible (recital 5 of the Bank Recovery and Resolution Directive or BRRD; ELI: <http://data.europa.eu/eli/dir/2014/59/oj>) and another structural goal being equal competition in the European single market (Stern, 2021).

The European bank regulatory system has a variety of prudential and supervisory instruments to internalize the potential and extent of a creditor or systemic threat. These are largely designed to reduce the risk before the outbreak of a financial crisis, including requirements for minimum equity, bail-in capital instruments, and liquid assets. To ensure critical functions of financial intermediaries, the resolution authority may even interfere with the rights of creditors, for example, write off liabilities or convert them into equity as part of a bail-in. This may involve bank rescue at the expense of creditors. The focus of the bank supervision may be subsumed to be on the institutions and the financial system, rather than the interests of individual creditors, although there are certain protections in place, such as deposit guarantee schemes. The instruments are calibrated to reduce the probability of a bank's failure, thus contributing to financial stability, which in turn promotes confidence in the financial markets. The protection of individual creditors is not explicitly demanded by these prudential requirements (Stern, 2021). 234

3.5.6 Interim conclusions

In conclusion, various aspects of banking regulation, supervision, and liability, focusing on recent court cases in Austria and the broader European context have been explored. 235

Effective banking regulation requires a delicate balance between protecting individual investors and ensuring the stability of the financial system as a whole. Behavioral economics can provide valuable insights into how people make decisions and respond to incentives (or more general: nudges), but their findings must be applied with care and critical evaluation in order to ensure their accuracy and applicability in specific contexts. Addi- 236

tionally, regulators should consider non-linearities and behavioral factors in financial regulation, and should take into account the potential impact of cumulative losses and the disposition effect on market dynamics. Finally, there has been a shift in banking regulation from prioritizing individual investor protection to prioritizing collective financial market stability, which has been reflected in recent legal rulings in Austria and Liechtenstein, in line with European decisions. The purpose of banking supervision is to ensure the stability of the financial system as a whole, and limitations on state liability for damages are necessary to avoid moral hazard.

237 Key principles and core statements that emerged include:

- The purpose of banking supervision is to ensure the functioning of banking and financial markets, as it forms the basis for achieving other goals such as investor protection and financial stability.
- The protection of individual creditors is not the primary purpose of banking supervision, and limitations on state liability for damages are necessary to avoid moral hazard.
- The liability of supervisory authorities or states for damages resulting from inadequate supervision is limited, and individual creditors may not have a claim for damages resulting from a breach of supervisory duties.
- The European bank regulatory system has a variety of prudential and supervisory instruments to internalize the potential and extent of a creditor threat or systemic threat. These are largely designed to reduce the risk before the outbreak of a financial crisis, including requirements for minimum equity, bail-in capital instruments, and liquid assets.

238 Overall, these principles highlight the tension between individual creditor protection and the broader goals of financial stability and market functioning. While individual creditors may not have a direct claim for damages resulting from inadequate supervision, various prudential and supervisory instruments are in place to reduce the risk of bank failure and promote confidence in the financial markets. The case of the Silicon Valley Bank (SVB) in California early in 2023 demonstrated a different approach in the US, where essentially a bail-out occurred with the deposits being restituted to depositors, while the bank itself, along with investors, etc, won't be saved.