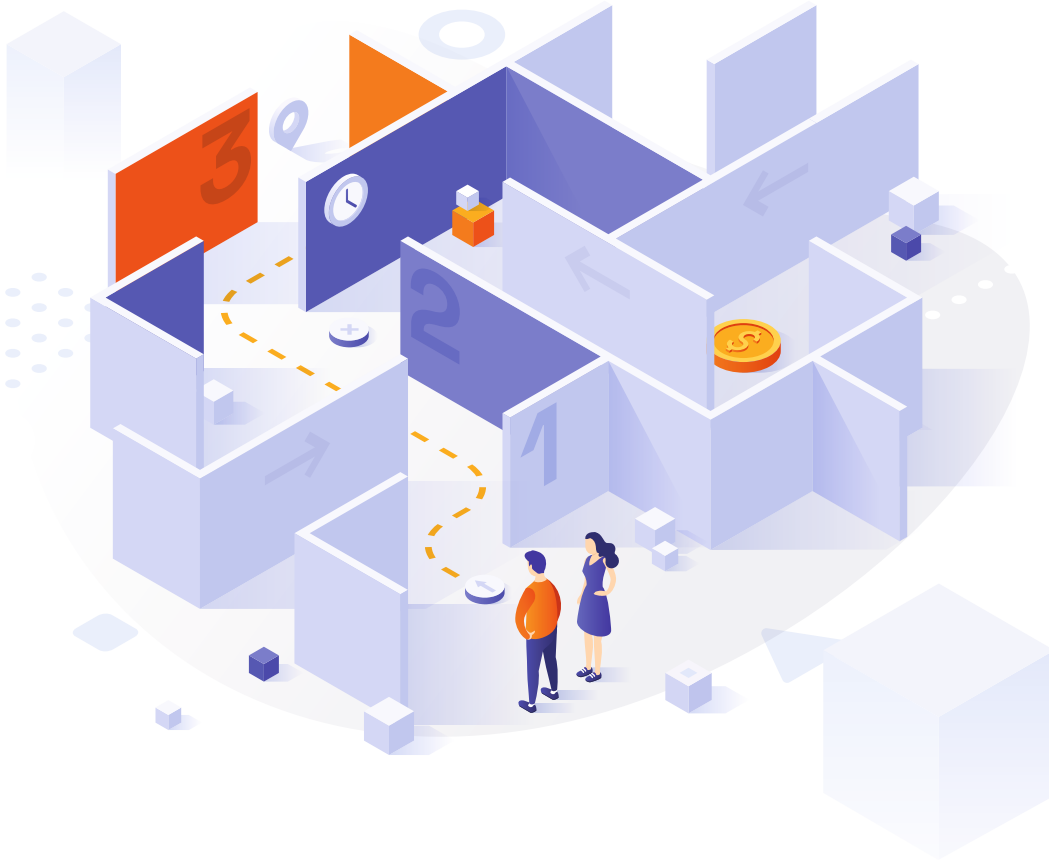

Jana Přílučíková

BEHAVIORAL FINANCE

Why We Make Financial Decisions the Way We Do

Tomas Bata University in Zlín
Faculty of Management and Economics

To Aninka, Milánek
and my students

BEHAVIORAL FINANCE

Why We Make Financial Decisions the Way We Do

JANA PŘÍLUČÍKOVÁ

Tomas Bata University in Zlín
Faculty of Management and Economics

KATALOGIZACE V KNIZE - NÁRODNÍ KNIHOVNA ČR

Přílučíková, Jana, 1985-
[Behaviorální finance. Anglicky]
Behavioral finance : why we make financial decisions the way we do / Jana Přílučíková. -- First English edition. -- Zlín : Tomas Bata University in Zlín, Faculty of Management and Economics, 2025. -- 1 online zdroj
"This English edition is translated from the Czech original, Behaviorální finance: proč se o penězích rozhodujeme tak, jak se rozhodujeme (2024). Translated and edited by the author."--Rub titulní stránky.
Obsahuje bibliografie a rejstřík

ISBN 978-80-7678-379-9 (online ; pdf)

* 336 * 336.7 * 159.955.5 * 336.7:159:95 * (048.8) * (0.034.2:08)
– finance
– osobní finance
– rozhodování
– behaviorální finance
– monografie
– elektronické knihy

336.7 - Finance [4]

This publication has been approved as a monograph by the Scientific Board of the Faculty of Management and Economics, Tomas Bata University in Zlín, as part of its publishing plan for 2025 and financially supported by the IGA/FaME/2024/005 grant.

Author:
© Assoc. Prof. Ing. Jana Přílučíková, Ph.D.

Reviewed by:
Tanweer Ali, M.A., Ph.D, CFA
Ing. Lukáš Brych, CFA
Prof. Ing. Boris Popesko, Ph.D.
Ing. Michal Stupavský, CFA

Title: Behavioral Finance: Why We Make Financial Decisions the Way We Do

Author: Assoc. Prof. Ing. Jana Přílučíková, Ph.D. (ORCID: 0000-0003-0204-187X)

Publisher: Tomas Bata University in Zlín

Edition: First English edition

This English edition is translated from the Czech original, *Behaviorální finance: proč se o penězích rozhodujeme tak, jak se rozhodujeme* (2024). Translated and edited by the author.

Year of publication: 2025

ISBN 978-80-7678-378-2 [print version]
ISBN 978-80-7678-379-9 [electronic version]

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PREFACE

Financial decision-making is a process that fundamentally affects not only our economic situation but also our quality of life. Alhough finance is traditionally perceived as an area based on rational thinking, facts and figures - reality shows that financial decisions are significantly influenced by other factors, such as cognitive, emotional, and social factors, as well as external influences. These factors can fundamentally influence our decisions and lead to systematic erors, the consequences of which can range from anxiety and decision paralysis to financial losses, debt, and to missed investment opportunities.

This monograph provides an overview of behavioral finance, a scientific field that combines economic theory with psychology and examines why people often act contrary to traditional financial models. Based on theory and practical examples, it reveals how mental shortcuts (heuristics), biases, and emotions shape our financial choices and encourages readers to engage in self-reflection.

The book aims not only to explain the key principles and concepts of behavioral finance but also to focus on three key cognitive heuristics of micro-behavioral finance - availability, anchoring, and representativeness - exploring their influence on decision-making, and ways to mitigate their effects. The book is intended not only for experts in finance and psychology, but also for the general public.

I believe that this publication will open the door to a deeper understanding of behavioral finance for readers and encourage them to reflect not only on subconscious thought patterns.

"Every decision is a new opportunity to do better."

Jana Přílučíková

(UN) REASONABLE FINANCIAL DECISIONS ?

Psychology permeates the entire landscape of finance.

Hersh Shefrin

1.(UN)REASONABLE FINANCIAL DECISIONS

1.1. INTRODUCTION

In our daily lives, we face numerous decisions that affect our financial future and overall satisfaction. The way we make decisions about money—how we assign value based not only on the benefits and risks associated with a financial choice—shapes the direction of our journey. Sensible decisions lead to a more secure financial future and greater freedom. Unwise decisions will, sooner or later, result in financial difficulties.

Yet many of us make unreasonable choices in our everyday lives—we do not create a financial plan, we do not save, we allow our spare cash lie idle, we succumb to impulse purchases, we spend carelessly, and we take on irresponsible debt. We often invest in unprofitable or excessively risky investment instruments. Why do we tend to behave carelessly and make *irrational* financial decisions?

REFLECTION

1. **How would you rate your ability to make reasonable and effective financial decisions on a scale of 1 to 5? Why are we generally prone to making unreasonable financial decisions?**

   1 = I tend to make unreasonable or ineffective decisions even only in simple situations.
   3 = Moderately reasonable.
   5 = I always consider things carefully, regardless of how complex the situation is.

2. **Can you recall a situation where you recently made a quick and thoughtless financial decision that you later recognized as a mistake and regretted?**
   YES
   NO

3. **What circumstances and reasons could lead people to make unwise financial decisions that they later regret (e.g., giving in to peer pressure, emotions, or not considering the long-term consequences)?**

1.2. CORE CONCEPTS

In the past, economists tried to answer the aforementioned question by offering a hypothetical key to (the best) financial decisions. Traditional economic and financial theory recommends choosing options that promise the highest risk-adjusted return—but this commonly accepted idea is based on the assumption that people act rationally in all circumstances. This significantly limits the validity of this theory.

Let's consider this situation.[1] A man is faced with the decision of whether to give his beloved a rose worth $5 or the same amount of money in an envelope. If the man were thinking rationally, he would say that the rose will need to be watered, will eventually wilt and end up in the trash, while the money could be used to buy something more useful, or deposited in a savings account and eventually used for a nursing home. Rationally, a rose has no practical use; it cannot be eaten or drunk, while money on the other hand, offers the possibility of buying anything needed or saving for a future purpose.

If we looked at the matter purely rationally, we might consider buying a rose to be unnecessary. However, this would not be a very wise decision, as his partner would probably not be very pleased if she received the financial equivalent of a beautiful rose in cash instead. In fact, by giving a rose, a man is telling his partner and those around her that he is thoughtful and considerate and that she is lucky to have him. He is giving her the opportunity to feel special and loved.

This simple example shows that money, in addition to its useful properties—such as buying food or saving—also has significant expressive and emotional aspects. These aspects shape the subjectively perceived value of money, which often differs from the actual price. This difference between price and actual value, perceived mainly through emotions, distracts us from rational economic decisions. In reality, our decisions are influenced not only by logical reasoning, but also by cognitive biases, emotional state, social environment, and cultural factors. Assessing whether a decision is (un)reasonable often remains a mystery.

Acquiring financial knowledge through courses and literature is only part of the equation. Financial decisions—whether deliberate or, on the contrary, full of recurring mistakes that we often do not even realize and later regret—are influenced by factors that go far beyond the boundaries of pure rationality.

This book focuses on financial decision-making in the real world of "ordinary" people who are neither completely rational nor completely irrational—more precisely, people who sometimes behave sensibly and sometimes foolishly. It is inspired by an alternative interdisciplinary perspective known as behavioral finance, which integrates insights from scientific fields such as psychology, sociology, anthropology, and neuroscience into financial concepts. Through psychological and socio-cultural insights, it brings a refreshing understanding of the mistakes we tend to repeat when making financial decisions.

We will find that thoughtful assessment of financial matters is not just a question of financial knowledge and analytical thinking, but also depends on one's emotional state, personality traits, thought patterns, biases, and the external environment, including social ties and time constraints. In other words, factors that are often overlooked in traditional financial models, even though they have a key influence on our decisions. The book also provides techniques for better understanding and controlling these dynamics and guiding our actions toward more informed and thoughtful decisions that lead to a more secure financial future and greater freedom.

FROM THE PERSPECTIVE OF TRADITIONAL FINANCE

How to make financial decisions that lead to the optimal choice, assuming the ideal of a fully rational individual.

To better understand why we are prone to irrational behavior when making financial decisions and how to avoid certain mistakes, let's start by looking at rational behavior. Rational behavior has long been defined by the principles of classical economics and finance.

In classical economic theory, the assumption of rationality is understood as the expectation that actors, whether individuals or companies, will act with the goal of maximizing their utility when making decisions. Classical financial theory is based on neoclassical economics, which assumes that a rational actor is a utility optimizer. This means that they strive to maximize the values that are the subject of their preferences, such as wealth, knowledge, recognition, security, time, or leisure.[2] [3] According to the traditional economic utility function of money, the following applies:

- More money is undoubtedly better than less (axiom of dominance).
- The marginal utility of additional money spent decreases as the rational actor's wealth increases.

Other axioms assume that a rational actor is not influenced by the way alternatives are presented (axiom of invariance or axiom of consistency) and that their choices are independent of proportional changes in alternatives (the axiom of independence).[4] For example, introducing a third option that does not affect the ratio between the first two should not influence the initial decision.

Classical financial theory, a key element of financial literacy and maturity courses (for a more in-depth study, see[5] [6]), is based on traditional economic principles and provides a solid foundation for studying our behavior. Before we dive into the more entertaining aspects of irrational behavior and the mistakes we humans make when making financial decisions, let's briefly revisit the basic assumptions of traditional financial theory. It specifies the ideal scenario normatively, i.e., how we should behave, as opposed to behavioral theory, which describes what actually happens (descriptive approach).

The three basic rational axioms of traditional finance are[5]:

- Every investor prefers more money to less money.
- Every investor prefers less risk to more risk.
- Every investor prefers to receive the same amount of money sooner rather than later because of the time value of money.

FROM THE PERSPECTIVE OF PSYCHOLOGY

How psychological factors influence the financial decisions of real people.

Psychology serves as a bridge between philosophy and physiology. It is often perceived as a mysterious field full of exaggerated stereotypes, as depicted in films. People often imagine figures in white coats working in mental institutions, conducting laboratory experiments on rats, or analyzing patients on couches with the aim of controlling their minds. Although these ideas are exaggerated, there is a bit of truth behind them.[7] [8]

The term "psychology" comes from the Greek words *psyche* and *logia*, meaning the study of the mind (by extension, the soul) and behavior. It examines the mental processes that take place in our minds and influences our thoughts, speech, and behavior.[7] [8] It encompasses various fields, including cognitive psychology, social psychology, and positive psychology—all focused on understanding human thoughts, emotions, and actions, with the ultimate goal of achieving psychological well-being at different stages of life and fulfilling the innate desire to find meaning in life.[8] [9] Studies have shown that a sense of meaning in life is associated with positive outcomes such as job enjoyment, overall satisfaction, and happiness, while a lack of meaning is associated with negative states such as depression and anxiety.[10]

Psychology also plays an important role in explaining financially imprudent and erroneous behavior. Psychological factors such as risk perception, the framing effect, cognitive dissonance, and the tendency to succumb to emotions and cognitive biases are important concepts for understanding the behavioral patterns of financially imprudent

people and for explaining financial anomalies that cannot be explained by traditional financial theories.[11]

Findings from psychology are integrated into finance by the relatively new field of behavioral finance (formally since the 1980s), in which considerable progress has been made in many aspects. Behavioral finance has become an established and distinct field of study for better understanding the influence of cognitive heuristics, biases, and emotions on people's financial decisions and how they affect developments in financial markets through the study of the behavioral patterns of individual and institutional investors and financial advisors.[12] [13] It is a field that challenges the assumption of full rationality present in traditional financial and economic models and explains that individuals often deviate from rational decision-making due to psychological biases.[12] [13]

The psychological perspective also reveals why we are prone to irrational behavior and the attention bias when making financial decisions—often without even realizing that we have been this *inattentive*. We may even be convinced that we have behaved rationally, even though the reality is the opposite. The attention bias can influence decision-making in various situations, including the financial environment, where investors may be so absorbed in monitoring certain market indicators that they neglect other factors that influence their investment decisions. This example illustrates that the human mind has its limitations, which are worth understanding more deeply in order to achieve better decision-making.

1.3. QUIZ

1. **Why do we generally tend to make imprudent financial decisions?**
   a. Lack of financial knowledge
   b. Emotional and social influences
   c. Both of the above

2. **Which of the following does not describe behavioral finance?**
   a. A traditional economic approach
   b. An alternative interdisciplinary perspective
   c. Psychological and socio-cultural insights

3. **Why is it important to deepen not only our financial knowledge, but also understanding of our personality traits, individual thought patterns, and how the external environment influences our decision-making?**
   a. These factors have a key influence on decision-making
   b. These factors are irrelevant and studying them brings no benefit
   c. These factors limit financial advisory

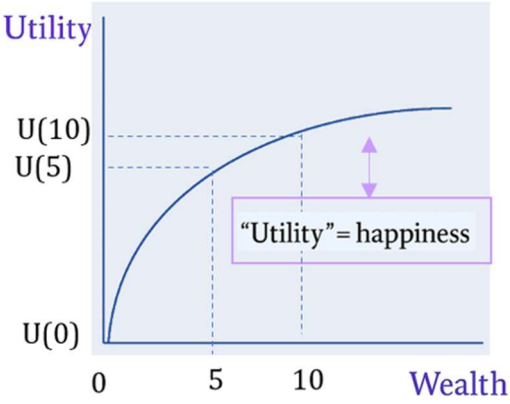
4. **What is the main assumption of traditional economic and financial theory regarding the optimal choice of an individual?**
   a. People always act rationally
   b. People are sometimes rational, sometimes irrational
   c. People are completely irrational

5. **Traditional economic and financial theory**
   a. Attributes utilitarian properties to money
   b. Attributes emotional and expressive aspects to money in addition to utilitarian properties
   c. When choosing the optimal financial option, it takes into account not only utility, emotional, and expressive properties, but also the influence of social ties and individual personality traits

6. **One of the three fundamental axioms of traditional finance states that when making financial decisions, the actor**
   a. Prefers more risk than less
   b. Prefers more money than less
   c. Prefers less money than more

1.4. ADDRESSED PROBLEMS

1. **One of the most common graphs we encounter in economics (especially in microeconomics, which is the study of our behavior as individuals) is the utility function of money. This tells us that more money is undoubtedly better than less (see graph U(10)> U(5)), but also that the marginal utility of additional money spent decreases as the wealth of a rational actor increases (see graph: U(5)-U(0) > U(10) - U(5)).**[4]



Source: Own elaboration with the use of [3] [4]

Do you agree?

ANALYSIS[4]

We would probably intuitively agree that more money is better. Imagine that we have no money and suddenly earn $40. We feel satisfied.

Another $40 still makes us happy, but it does not give us the same feeling of joy as the first $40. In doing so, we demonstrate another rule of traditional economics, which states that as wealth increases, the feeling of happiness from each additional unit decreases.

Note that we are already using the word happiness, but the vertical axis in the graph is labeled utility. This is a figurative economic term for happiness (also satisfaction). In this book, we will prefer the term happiness, because utility seems to be an emotionally cold term for most people, and we are really thinking about what makes us content and joyful. This is what drives us to work harder or more efficiently.

Let's focus on the problem of measuring the level of perceived happiness in the graph. While there is a scale for measuring wealth dollar by dollar, there is no way to measure perceived happiness unit by unit because it is not established in traditional economic and financial theory. We can therefore only look at the relative changes in happiness that come with earning more money, i.e., each additional dollar earned brings us more joy, but usually not as much joy as the previous dollar earned.

2. **A risk-averse investor is faced with a choice between two stocks (A and B). What decision should the investor make based on rational consideration, including the calculation and comparison of the risk-adjusted returns of both stocks, given that they know the probabilities of expected returns for both investments A and B?**

Return of stock A	Return of stock B	Probability
3 % p.a.	16 % p.a.	0.2
6 % p.a.	11 % p.a.	0.3
10 % p.a.	5 % p.a.	0.3
17 % p.a.	4 % p.a.	0.2

ANSWER

A rational risk-averse investor would choose stock B, because it offers a higher risk-adjusted return. Why?

ANALYSIS

Both investment options have the same average expected return (r_{exp}) of 8.8 % p.a.:

Stock A: $r_{exp} = (0.03 * 0.2 + 0.06 * 0.3 + 0.1 * 0.3 + 0.17 * 0.2) = 0.088 \rightarrow 8.8\ \%\ p.a.$

Stock B: $r_{exp} = (0.16 * 0.2 + 0.11 * 0.3 + 0.05 * 0.3 + 0.04 * 0.2) = 0.088 \rightarrow 8.8\ \%\ p.a.$

However, stock A has a higher risk (volatility „σ"):

Stock A: $\sigma =$

$$\sqrt{(0.088 - 0.03)^2 * 0.2 + (0.088 - 0.06)^2 * 0.3 + (0.088 - 0.1)^2 * 0.3 + (0.088 - 0.17)^2 * 0.2}$$

$$= 0.04792 \rightarrow 4.8\ \%\ p.a.$$

Stock B: $\sigma =$

$$\sqrt{(0.088 - 0.16)^2 * 0.2 + (0.088 - 0.11)^2 * 0.3 + (0.088 - 0.05)^2 * 0.3 + (0.088 - 0.04)^2 * 0.2}$$

$$= 0.045563 \rightarrow 4.6\ \%\ p.a.$$

Investment B shows a higher risk-adjusted return (return-to-risk ratio):

Stock A = 8.8/4.8 = 1.83% p.a.

Stock B = 8.8/4.6 = 1.91% p.a.

3. **Ask yourself how much you would be willing to pay in dollars to play the following game, in which a fair coin is tossed. If it lands on heads, you win $20. If it lands on tails, you win $8. Is this choice rational?**

ANSWER

A rational actor would be willing to pay up to $14. But why?

ANALYSIS

A rational actor, seeking to optimize utility, would first calculate the expected value of the game, which is derived from the probability of each outcome and the corresponding rewards. In this case, since the coin toss is random and there is a 50 % chance of landing on heads or tails, the expected value would be (0.5 * $20) + (0.5 * $8) = $14. A rational actor would therefore be willing to pay up to $14 if they only took the expected value into account. This calculated theoretical value of $14 is the game's expected value.

However, in the real world, for people who are not experts in probability tasks, the result would often depend on subjective assessment. The difference between the theoretical expected value and the decision-maker's subjective choice may arise from individual preferences, risk tolerance, financial position, and emotional factors, which is an area explored by behavioral finance. Some may be willing to pay more for the chance of a higher win, while others may prefer a lower win with less risk.

As early as 1953, the Allais paradox, introduced by Maurice Allais, pointed out inconsistencies in decision-making preferences. The Allais paradox is a well-known example in which

expected utility theory does not apply. It suggests that people's decisions are influenced more by emotions, risk perception, and psychological factors than by rational assessment of probabilities and expected values. It also shows that people often prefer combinations with a higher chance of winning, even if this does not rationally align with probabilities and expected values.

In practice, people often misjudge probabilities and are influenced by psychological factors when making decisions in risky situations. Subjective assessment and perception of risk therefore often play a key role in people's decision-making processes and may prevail over rational consideration.

4. **Try the most famous attention test on the website** https://youtu.be/vJG698U2Mvo **and count how many people in white T-shirts catch the basketball. Write down the result.**

ANSWER

15

REFLECTION

This task was primarily about becoming aware of the tendency to overlook other things around us—even those that are obvious—because we are paying close attention to one specific thing. In other words, there is an error in our thinking—in this case, the bias of inattention (attention bias). We often do not even realize that we have been inattentive in this way. We may even be convinced that we have acted rationally, even though the reality is the opposite. This example shows that the human mind has its own limitations, which are worth understanding more deeply in order to achieve better judgment and decision-making.

Attention bias can influence decision-making in various situations, including the financial environment, where investors may be so absorbed in monitoring certain market indicators that they neglect other factors that influence their investment decisions.

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BASIC PRINCIPLES
OF BEHAVIORAL FINANCE

Behavioral finance is finance for normal people, like you and me — normal people, neither rational nor irrational.

Meir Statman

2. BASIC PRINCIPLES OF BEHAVIORAL FINANCE

2.1. INTRODUCTION

Behavioral finance and behavioral economics are closely related fields that examine the influence of psychological and cognitive factors on economic and financial decisions. Although both fields share certain features, there are important differences between them.

Behavioral economics is a broader discipline that draws on insights from psychology to understand economic decisions. This discipline extends its reach beyond the financial sphere to include areas such as public administration, education, healthcare, the labor market, and consumer behavior. It examines how cognitive biases, heuristics, and emotions influence economic decision-making and behavior, with an emphasis on deviations from the traditional economic model in the areas of preferences, beliefs, and decision-making.[1] [2] [3]

In contrast, behavioral finance is a specific branch of financial studies that applies the principles of behavioral economics solely to the area of financial decision-making. It focuses on the influence of psychological factors and irrational behavior on the decision-making of individuals as savers, investors, and borrowers, on the valuation and assessment of the value of financial assets, and, in aggregate, on financial markets.[1] The results of research in the field of behavioral finance are published in the renowned *Journal of Behavioral Finance*, which has been published quarterly since 2000 by Taylor and Francis. However, financial topics from a behavioral perspective are also published in other prestigious journals, such as the *Journal of Economic Literature*, *the Journal of Economic Perspectives*, and the *Journal of Financial Economics*. These scientific journals contribute significantly to the development of knowledge in the field of behavioral finance and provide a platform for rigorous research in the context of financial decision-making.

Both disciplines recognize the limitations of traditional economic and financial theories in explaining the behavior of individuals and markets in the real world. Both fields accept the concept that individuals

do not always act strictly rationally, as traditional economic and financial models would assume.[4]

In particular, they agree that in practice, the axioms of independence, consistency, and dominance (see Chapter 1), on which traditional financial and economic theories are based, are not always followed. In parallel, both disciplines emphasize the importance of understanding predictable patterns in decision-making to overcome the obstacles that prevent behavioral change and the achievement of improved results, whether in an economic or financial context. Both perspectives also recognize the critical importance of psychological factors in shaping economic and financial decisions.

In this chapter, we will build on the previously examined neoclassical economic assumptions about optimal behavior in financial situations. We will focus on alternative theories that explain how people actually behave in predictable ways, often contrary to economic and financial axioms. In other words, we will look at the basics of behavioral finance—how our behavior influences our financial decisions.

REFLECTION

1. **On a scale of 1 to 5, how would you rate your current knowledge of psychology in the context of financial decision-making?**

   1 = I do not really understand the subject
   3 = Average knowledge
   5 = Deep knowledge of the psychological aspects that influence financial decision-making

2. **Do you think that acquiring and deepening your knowledge of psychology can lead to more sensible decisions and contribute to better financial results?**

   YES NO

3. **What is behavioral finance, and has this field always been respected within the academic community and the financial industry? Do you think that genetic factors play an important role in whether we are more likely to experience financial hardship or achieve financial satisfaction? What is your attitude toward risk?**

2.2. CORE CONCEPTS

THE EVOLUTION OF BEHAVIORAL FINANCE

In the 1970s and 1980s, when traditional theories such as utility theory and efficient market hypothesis were at the height of their dominance, a new narrative began to take shape in the field of finance. Behavioral finance, rooted in individuals' cognitive biases, emotions, and heuristics, became a dynamic field that emerged in response to the shortcomings of traditional financial theories.[5] These theories failed to explain certain phenomena in financial markets or recurring errors made by people in financial decision-making under conditions of uncertainty, and their legitimacy gradually began to be shaken by the discovery of anomalies and excessive volatility in returns in the 1980s.[6] However, behavioral finance was not initially fully recognized as a rigorous approach.

The history of behavioral finance dates back to the 19th century, when this school of thought was pioneered by authors such as Gustave le Bon (The Crowd: A Study of the Popular Mind, 1896) and Selden (Psychology of the Stock Market, 1912). They emphasized the role of psychology in price formation in financial markets. In 1956, Festinger introduced the theory of cognitive dissonance, paving the way for understanding the influence of emotional factors on investment decisions. In 1957, Simon published the idea of bounded rationality in its broadest sense.[7]

A breakthrough came in 1978 when Simon won the Nobel Prize for applying psychology to economics. Then, in the 1970s and 1980s when Tversky and Kahneman introduced key concepts such as mental shortcuts (heuristics) that cause biases,[8] [9] framing,[10] [11] choice psychology, and prospect theory.[12] This theory provides an alternative to the previously dominant theory of rational choice and expected utility. It explains how people tend to make decisions about risky choices, but also those that are not considered risky. This was followed by the era of Richard Thaler, who in 1980 and 1985 introduced the concept of mental accounting and promoted the incorporation of prospect theory into decision-making models.[13] [14] These works were key to

understanding the influence of psychological principles on the perception of financial decisions.

The story continues with De Bondt and Thaler's 1985 discovery and explanation of the stock market's excessive reactions to unexpected news, which laid the foundations of behavioral finance and is often considered its cornerstone.[15] When Thaler and De Bondt presented evidence supporting the hypothesis of excessive investor reactions to negative news in 1985, many academics still considered behavioral finance doomed to failure.[16] Richard Thaler and Werner De Bondt published evidence supporting the theory that cognitive biases, specifically investors overreacting to a long string of bad news, can lead to predictable distortions in the prices of stocks traded on the NYSE.

This idea was well known to practitioners in the financial industry but highly controversial and even illogical to the academic community. The prevailing opinion among academics was that behavioral finance had no future and that its demise was inevitable.

This was followed in 1987 by Yaari's[17] contribution to the dual theory of choice, which broadened the view of decision-making under risk. The 1990s brought further research with influential results. These included determinants of trust and the weighting of evidence presented in 1992 by Griffin and Tversky[18], and the investor sentiment model published in 1998 by Barberis, Shleifer, and Vishny to demonstrate the influence of psychological factors on investor decision-making and how investors' real expectations about future returns lead to irregular stock price reactions to new information.[19] In 1999, Thaler confirmed the earlier idea that mental accounting matters, summarizing its ex-post and ex-ante impacts on individual choices and explaining how it violates the economic principle of substitutability.[20] In the same year, Hong and Stein formed a unified theory of insufficient response, momentary trading, and overreaction of boundedly rational people in financial markets.[21]

The new millennium brought Shiller's influential book Irrational Exuberance[22] , summarizing published research in this area of "new era" economic thinking and the influence of psychological, cultural, and news-related factors on financial decision-making and financial

markets, including possible solutions and measures from 1982 and 1985. In 2005, it was published in its second edition[23], and in 2016 in its third edition[24].

The second edition was among the first to warn of the global financial crisis that began with the subprime mortgage debacle in the US in 2007.

The 21st century brings new perspectives on human decision-making, opens up new topics, and behavioral finance is beginning to be actively applied alongside investor sentiment[25] in corporate finance to explain the projection of behavioral biases into business decisions regarding corporate financing and investments. Psychology plays a key role in the analysis of investment risks and the valuation of financial assets, which, among other influential figures in behavioral finance, is comprehensively summarized for academics by Hersch Shefrin in his books[26 27 28 29 30], which reflect recent events and developments in this dynamically evolving field.

The year 2002 marks an important milestone, when Kahneman won the Nobel Prize for his work on prospect theory, which had a fundamental influence on the development of behavioral finance as a scientific field. Similarly, Shiller later received the prize in 2013 and 2017 for his contribution to behavioral economics by revealing and understanding empirical anomalies in orthodox economics, advancing libertarian paternalism and nudging, and Thaler[31] for developing the theory of mental accounting.

Initially, the development of behavioral finance focused on cognitive biases, but over time, research began to address emotional and sociocultural factors as well. Emotional finance, drawing on a psychoanalytic view of the subconscious mind and dynamic mental states, seeks to explain the influence of emotions on financial decisions. Collectively, they provide us with an explanation for price bubbles and other phenomena in financial markets, such as financial crises or the Bitcoin phenomenon.[32 33]

Today, behavioral finance is a relevant and lively narrative full of new topics. From initial controversy and mistrust, behavioral finance has

evolved into a respected field that reveals how psychology influences financial decision-making. It is seen as an independent and robust approach to financial market research based on cognitive biases and individual psychology, significantly transcending established views in finance and economics.

BOUNDED RATIONALITY

In everyday reality, people often behave irrationally or quasi-rationally[1], in other words, they do not behave rationally. In a financial context, this leads to deviations from the expected behavior according to prevailing financial theories, which are based on the assumption of rationality.

Behavioral finance theory assumes that savers, investors, and other individuals are not always rational, unlike traditional finance theory, which assumes completely logical (rational) behavior by individuals. However, it would be wrong to claim that behavioral finance theory automatically assumes unreasonable behavior—irrationality. Instead, behavioral finance theory assumes the presence of bounded rationality.

[1] The term "quasi-irrational" refers to behavior or decision-making that resembles rationality but contains elements of irrationality (also known as bounded rationality). This can include, for example, behavior that appears to follow a logical process, yet is simultaneously influenced by emotions.

Bounded rationality, one of the basic assumptions of behavioral finance theory, states that people cannot be completely rational in their decision-making because they have limited ability to process information, limited cognitive capacity (ability to think and analyze available information), and limited time to make decisions. Therefore, they cannot always make decisions as traditional economic and financial theory assumes.

Herbert A. Simon, winner of the Nobel Prize in Economics, who formulated the theory of bounded rationality[7] in the 1950s, explains that instead of carefully evaluating all possible options before making a decision, people tend to use a simplified approach. This approach is called satisficing, which means that people accept the first, at least somewhat satisfactory option without considering all available options. In other words, people are more likely to make a satisfactory decision based on their personal preferences and mental shortcuts (heuristics).

Imagine your usual morning. After waking up to your alarm clock, you realize that you have a hectic day ahead of you and quickly think about what to wear in front of your wardrobe. With limited time, you choose clothes that at least partially meet your needs for the day, i.e., in a bounded rational way. In other words, you don't have time to carefully consider and combine every piece of clothing in your closet, as traditional economic theory would suggest. And just as when choosing clothes, in other decision-making situations we often rely on quick and simplified decisions due to limited time and cognitive resources. In this way, bounded rationality influences our everyday choices, including financial ones.

Studying human bounded rationality is key to better understanding our own motivations, psychological and other factors that influence our financial choices. For example, we make decisions based on whether we have enough time, what is currently available to us, whether we are alone while making the decision, and our own willpower and level of analytical skills. Mental preferences and shortcuts, cognitive biases, and emotions influence our behavior and decision-making when it comes to money, leading to quasi-rational decision-making.

However, we also gain a better understanding of how financial markets actually work. Investors are not always rational, and therefore markets can be inefficient. The bounded rationality of individuals can lead to inefficiencies in markets, contrary to the traditional efficient market hypothesis (EMH)[34], which considers market efficiency and fairly priced financial products to be an important paradigm. In an inefficient market, asset prices may deviate from their true value (e.g., the existence of overvalued and undervalued stocks) due to investor sentiment, creating room for anomalies such as speculative bubbles and financial crises. This opens opportunities for arbitrage, but due to bounded rationality, these opportunities may be overlooked. Alongside bounded rationality, *inefficient markets* and *limits to arbitrage* are key assumptions of behavioral finance.[32 35]

DECISION FRAMES

Another key prerequisite for behavioral finance is the concept of decision frames. Decision frame (also known as framing) is an established term in the field of behavioral economics and finance. This concept captures the idea that people make decisions based on information that is intentionally or unintentionally presented (framed) to them in a positive or negative light.[36] In other words, the same information can be communicated either positively or negatively, which has a significant impact on human decision-making.[37]

The concept of framing can be simplified using a glass of liquid. Although the same glass contains the same amount of liquid, some people may see it as half full, while others see it as half empty. It is a matter of perspective whether we perceive the glass with optimism or pessimism. Similarly, if a salesperson tries to sell us this glass, they will emphasize the optimistic perspective—i.e., the opportunities—rather than the pessimistic one associated with potential problems and risks.

Framing also plays an important role in the financial world. According to behavioral theory, the way information is presented influences us when making investment and other financial choices, and even significantly so. Financial professionals and marketers often try to present information in an appropriate way to maximize positive perceptions and minimize concerns or resistance from investors and clients. Through positive framing, they emphasize opportunities to improve the financial situation in the form of potential returns and select successful past results at the expense of negative framing, which would emphasize possible risks, loss of investment, uncertainty, or past failures.

In the field of finance, we also often encounter "opt-in" (with the option to sign up, voluntary participation) and "opt-out" (with the option to unsubscribe, automatic consent unless disagreement is expressed) decision-making frameworks, mainly in the online environment. These frameworks significantly influence our decisions regarding financial offers, which highlights the importance of understanding how they work in order to better protect our financial and personal interests.

The "opt-in" framework, as behavioral financial theory states, provides us with greater control and transparency in our communication with financial institutions. Conversely, the "opt-out" framework, where choices are automatically preselected for us, places the responsibility on us to actively select another option and thus express our disagreement with the preselected choice. However, previous research shows that we tend to remain passive in the "opt-out"[38] scenario, which can be used by financial marketers.

According to behavioral finance theory, framing is a cognitive bias to which we are predisposed, i.e., we respond to a given financial choice based on how it is presented to us. This contradicts traditional financial and economic theories, particularly the axiom of independence.

DUAL PROCESS THEORY

Dual process theory is a concept that has been known in psychology for more than 40 years and states that the human brain processes information and makes decisions based on two mental processes: subconscious (automatic) and conscious (creative). Approximately 20 years ago, the two modes were named and described in an article by Daniel Kahneman and Shane Frederick, and later in Daniel Kahneman's book Thinking, Fast and Slow as *"System 1"* and *"System 2"*.[39] [40]

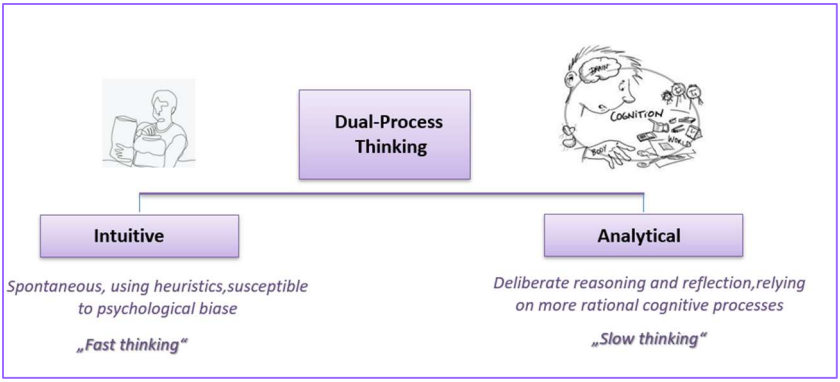
System 1 represents *fast*, intuitive (spontaneous) and effortless decision-making based on the use of heuristics, and emotions often lead to misjudgment due to the influence of related biases.

System 2, on the other hand, represents *slow*, analytical thinking that requires more effort and judgment based on logic and planning. For example, it is triggered when we want to calculate a mathematical problem.

Modern cognitive research has confirmed that the process of analytical thinking and experiencing thoughts (deliberate thinking, also known as cognitive reflection) takes place in the prefrontal cortex of the brain (PFC), while emotions are associated with the amygdala complex of the brain (amygdala, also known as the emotional center), which is responsible for quick (intuitive), often emotionally influenced, rash actions.

Realizing that we think in two modes simultaneously is important for understanding our decisions in various situations, including financial ones, with key implications for financial education, investing, and risk management. [8 40 41 42 43]

Dual Process Theory



Source: Own elaboration

Let's imagine two chocolates. One with attractive packaging and the other with a picture of an ugly spider. It is possible that we will reject the chocolate with the spider. This was a quick decision made by System 1, which deals with immediate answers to simple questions. When we see attractive packaging, System 1 "advises" us that it could be a tasty treat. With a little effort, System 2 comes into play and "asks" what the cocoa bean content is in the chocolate on the other side of the utrition facts table—it could be excellent chocolate after all.

The ability to adopt both of these modes of thinking is particularly important in decision-making and problem-solving, where it is necessary to combine the speed and efficiency of intuitive thinking with the thoroughness of analytical thinking.

Dual process thinking influences decision-making in the areas of investment, behavioral economics, risk behavior, consumer behavior, advertising, and education. It is the basis for examining how psychological factors shape human decision-making in different contexts, with System 1 leading to quick but sometimes erroneous conclusions, while

System 2 leads to more rational decisions. Dual process thinking allows us to switch between quick, intuitive decision-making and slower, analytical thinking depending on the situation.

Dual process thinking is another building block of behavioral finance. It helps explain why investors can and often do succumb to psychological biases and make decisions based on quick and emotionally charged reactions (System 1), especially in uncertain financial conditions, when rational consideration and thorough analysis would be more appropriate (System 2).

It might seem that intuitive thinking is a negative phenomenon. However, it would be wrong to say so. It can help in situations where we are threatened with analysis paralysis, which occurs when excessive analysis can lead to a task never being completed. The key is therefore a balanced approach, combining both ways of thinking appropriately according to the specific circumstances and demands of the situation, and preferring deliberation in those situations where it is most appropriate. Simply being aware that these two thought processes occur simultaneously will lead to a slightly more secure financial future. In the field of finance, this recognition is important for high-quality decision-making.

Knowledge of cognitive reflection, duality of thinking, and theory of mind is also valuable in interpreting the intentions of other people. People with higher cognitive reflection, as measured by IQ and other tests, tend to act less impulsively and prefer rational reasoning when solving more complex tasks. They are also better at solving probability tasks, for example, and make fewer causal errors. This helps them avoid mistakes associated with heuristics and related psychological biases. Conversely, people who take an intuitive approach often make quick decisions with a higher risk of error. The ability to infer the intentions of others and assess whether they have more information is a valuable tool in predicting the direction of the financial market and understanding the motivations of other market participants.

HEURISTICS AND COGNITIVE BIASES

The basic assumption of behavioral finance theory is that savers, investors, and other individuals do not always behave rationally (a broader perspective). From a narrower perspective, behavioral finance theory further assumes that people can be influenced by psychological factors such as mental and emotional patterns of behavior called mental shortcuts (heuristics) and associated psychological biases, as well as sociodemographic and cultural influences (a more specific perspective).

According to behavioral finance theory, it is precisely these subconscious thought processes and emotions that play a key role in people's financial decision-making, which is essential for understanding the dynamics of financial markets. As a result of behavioral, mental, and emotional preferences and biases in information processing, people may make decisions that do not always align with the best (optimal) choices and that may lead to costly financial mistakes that hinder a better financial future.

What is a heuristic (mental shortcut) and its related psychological biases? Imagine a picturesque town where Mr. James Wise (who relies on his own heuristic) lives. When deciding which restaurant to go to for dinner, he chooses based on the number of cars in front of the entrance. His simple thought pattern is clear—many cars mean excellent food. This heuristic has repeatedly provided him with pleasant experiences, and despite a few exceptions, he has come to rely on it.

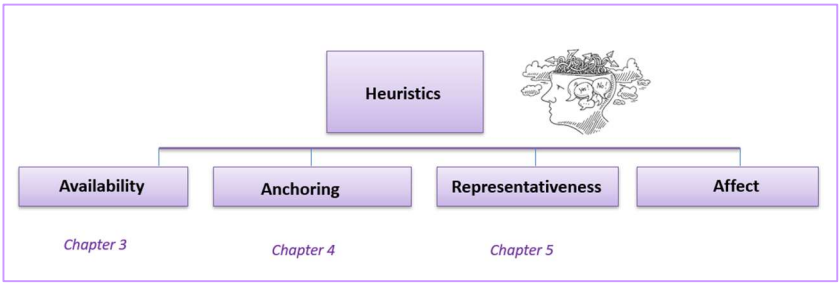
The whole town was permeated with similar heuristics. People relied on various simplified procedures to help them make quick decisions. However, there were also unexpected moments in this town. Sometimes heuristics led to mistakes—biases. For example, Mr. Wise, who always chose a restaurant based on the number of cars in front of the entrance, one day came to a place where there was a large group of people at a company party. His heuristic failed because he witnessed an exceptional situation, and in the end, he did not enjoy the food as much as he had (prejudicially) imagined ("distorted").

Some heuristics worked well for people in the town, while others, as in Mr. Wise's case, may have been less reliable. Simple thought patterns can therefore help us find our way in the complex world of decision-making, but at the same time, they can lead to unforeseen mistakes.

Heuristics are simplified thought processes, also known as rules of thumb, that help us solve tasks and make choices more quickly and efficiently, although they can lead to systematic errors (biases). In behavioral finance, heuristics refer to a quick and easy way of making decisions in financial matters, which helps avoid analysis paralysis. Their use allows people to make quick decisions, but they often lead to errors.

The authors of a behavioral finance publication published by Oxford University Press in 2019[32] list the following four key heuristics among the heuristics that we tend to apply collectively, often unconsciously. We will take a detailed look at three of the cognitive ones—representativeness, availability, and anchoring heuristic—in the following chapters.

Key Heuristics



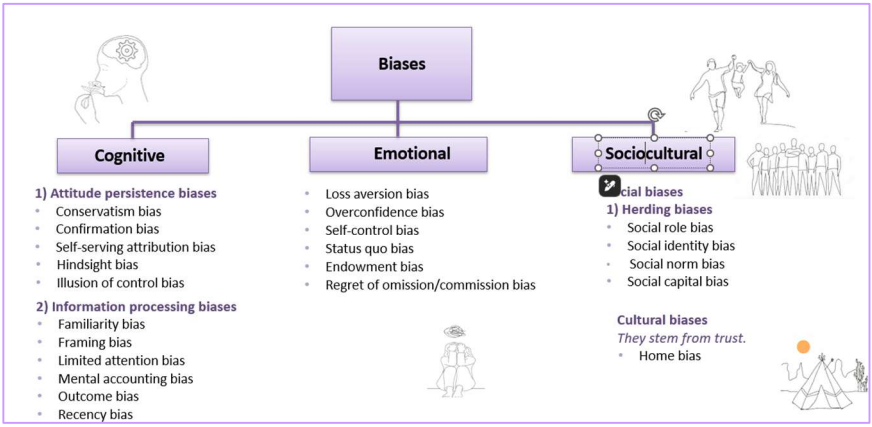
Source: Own elaboration

The first edition of the book you are currently reading focuses closely on cognitive heuristics. You will be able to read about the emotional heuristics of affect and related biases in its second expanded edition.

This book also introduces a graphically sorted categorization of key psychological biases related to the aforementioned key heuristics, divided into cognitive, emotional, and socio-cultural biases. Some of us

are more susceptible to them than others, depending on various individual factors, such as the level of fluid and crystallized intelligence, cognitive reflection, emotional stability, the influence of personal long-term attitudes and preferences, age, but also persistence in a state of cognitive dissonance or lack of sleep.[32]

Key Psychological Biases



Source: Own elaboration

The term bias is commonly used in academic publications to describe distorted or systematically skewed patterns of thinking. It conveys the notion of clouded judgment and prejudiced reasoning. These psychological biases are associated with key heuristics, which, according to behavioral finance studies, we humans are prone to succumb to.

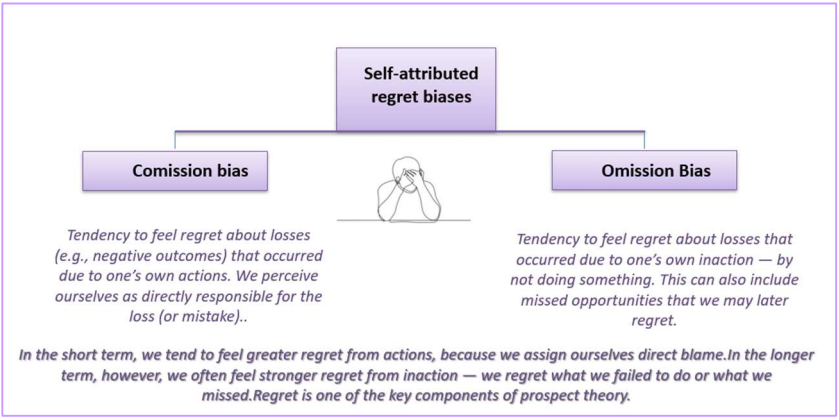
Being aware of them is therefore crucial for financial decision-making. Knowledge of these biases also allows us to focus on specific tactics to reduce errors in financial or other decisions influenced by these distortions.

REGRET THEORY

Behavioral finance builds on the idea from behavioral economics that emphasizes that fear of regret has a key influence on decision-making. People therefore actively minimize potential regret, even though this may not mean the optimal decision. Regret theory suggests that we try to avoid situations that could lead to failure or error.[44] [45] [46] We therefore tend to be naturally averse to regret (regret aversion). Regret, which according to psychological theory we perceive as the pain associated with the awareness of loss (e.g., a potentially better financial situation), leads us to avoid risky decisions.

Regret of omission bias involves a strong feeling of regret for not acting, while *regret of commission bias* brings even more intense regret for actions that led to a mistake and for which we are directly responsible. People tend to regret both mistakes caused by active decisions and mistakes caused by their own inaction. We feel stronger regret for our actions that led to a mistake than for inaction that led to a mistake, because in the first case, we feel more responsible for the mistake and, as the "direct" culprit, we feel greater regret (guilt). In the second case, we may blame ourselves unjustifiably, precisely because we did not intervene. Aversion to feelings of regret influences our tendency to avoid responsibility for potential negative outcomes, and we may therefore remain inactive in situations that could lead to feelings of guilt.[44] [45] [46]

Biases Associated with Self-pity due to Self-inflicted Mistakes



Source: Own elaboration

In the context of behavioral finance, it is assumed that regret and the desire to avoid regret often shape our financial preferences and strategies, and therefore we tend not to evaluate potential financial gains and losses rationally. When making financial decisions, we may be subject to regret aversion bias, which contradicts the concept of maximizing expected utility in traditional financial theory. Even though we may have a rational desire to take advantage of financial opportunities, for example, we are often overwhelmed by fear of possible failure and concerns that we will be directly responsible for it, thus succumbing to a bias of regret from commission that is even stronger than from inaction. Studies also show that, with hindsight, we tend to feel greater regret from omission than from commission.[48] [49] [50]

PROSPECT THEORY, VALUE FUNCTION, AND PROBABILITY WEIGHTING FUNCTION

Prospect theory is a psychological theory developed by Daniel Kahneman and Amos Tversky.[51] It is based on the insight that people are not rational utility-maximizing machines, as assumed for a long time in traditional economic and financial theory. Instead, it acknowledges that human decisions are influenced by emotions, perceptions (both conscious and subconscious), context (environment), and reference points. Loss aversion is one of the key concepts of this theory—it reveals that people tend to give greater weight to losses than to gains of the same magnitude.

This concept has significant implications in the field of financial decision-making. Prospect theory and its concepts, such as loss aversion, also have important applications in behavioral economics and finance. In addition to loss aversion, regret theory and regret aversion also play crucial roles in prospect theory. That is, when people make decisions and subsequently find themselves in an unfavorable situation, they experience regret over what might have been if they had chosen differently. This significantly influences their future decision-making and ileads them to avoid choices that could potentially lead to regret or fear of regret.

According to this theory—which offers an alternative to the traditional expected utility theory—we are more willing to take risks in order to avoid losses (fear of realizing a loss). This helps explain our tendency to hold onto losing investments longer than is rational (a phenomenon known as the disposition effect), which affects our behavior in various contexts.

Loss aversion has its roots in evolutionary psychology and is a deeply embedded psychological phenomenon. Historically, people were highly alert to potential threats and losses, which was essential for survival. Since the loss of resources (food, shelter, social status, etc.) could be fatal for individuals or groups, evolution equipped the human mind with mechanisms that amplify the negative impact of losses and

reduce tolerance for them. However, the implications of loss aversion are much broader.

Although the theory was initially designed by its authors for contexts with an emphasis on financial decision-making, its concepts can be applied to many aspects of human behavior and social interaction. For example, it can influence decisions in politics, where voters may prefer candidates who promise to minimize losses and risks. Loss aversion can also play a role in interpersonal relationships, where individuals invest more effort in maintaining existing relationships to avoid losing friends or partners.

Prospect theory further explains that decision-making occurs in two phases. The first phase—known as the editing or framing phase—determines how individuals perceive and categorize the choice at hand, for instance, whether it is seen as a chance to gain (positive framing) or as a potential loss (negative framing). Once the options are framed, the theory moves to the second, evaluation phase. This phase consists of two key components: the value function and the probability weighting function, which are the core elements of prospect theory.

VALUE FUNCTION

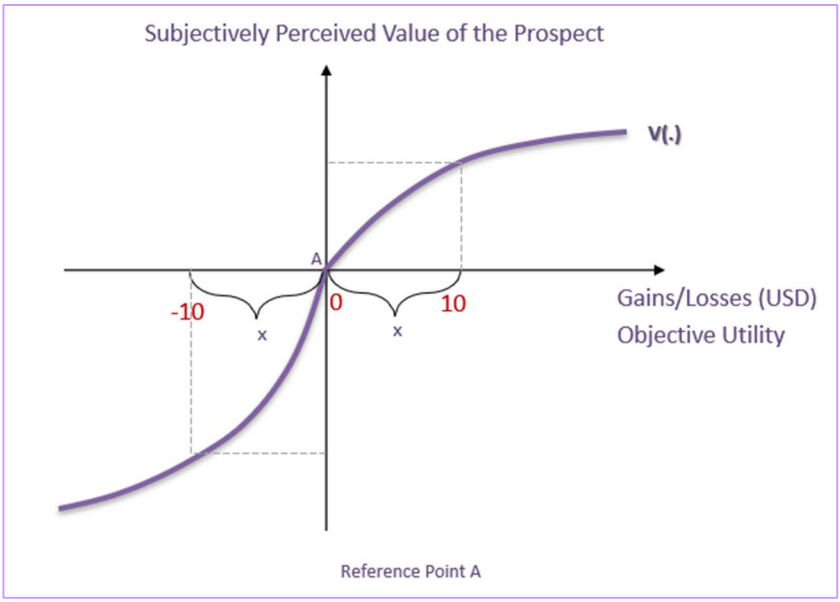
The first component of the evaluation phase is graphically represented by the value function. The value function within prospect theory shows that people tend to perceive utility (from joy to sadness) subjectively based on whether the prospects are associated with gains or losses, which stands in contrast to the theory of marginal utility. Simply put, the value function tells us how individuals react to gains and losses depending on whether they are in the positive or negative domain. It has been shown that people are risk-averse in the domain of gains, meaning they tend to prefer certainty.

On the other hand, they are willing to take risks in the domain of losses—that is, they are willing to gamble to avoid a loss. The value function explains that individuals tend to feel the pain of losses more strongly than the pleasure from gains of the same magnitude, a phenomenon known as "loss aversion". This loss aversion has

significant implications for decision-making, especially in the financial realm.

The value function has objective utility on the horizontal axis and perceived value on the vertical axis. This function differs from standard normative models by including the left side of the graph, which shows how people respond to losses. In this way, prospect theory departs from standard economic models, which do not reflect how most people actually make decisions. There are three important aspects of the value function that effectively distinguish it from expected utility.

Value Function in Prospect Theory



Source: Own elaboration with the use of- [47]

The first important element is how value is linked to the original reference point or the starting point of an activity or choice. In most situations, it is assumed that this reference point reflects the person's current position, but the model does not necessarily require this. It may also be a future aspiration level or some form of social comparison. A key insight of the model is that people evaluate choices based on how

they differ from their current situation—not according to absolute values. In other words, relative changes carry more weight than absolute ones.

The second important element offered by the value function relates to the model's central assumption: the tendency of people to be more risk-averse in the domain of gains and more risk-seeking in the domain of losses. This phenomenon is explained by the disposition effect (see disposition effect).

The third important element of the value function is the recognition that people feel losses more intensely than they enjoy equivalent gains. In other words, we experience greater emotional pain from a loss than pleasure from a gain of the same magnitude. Studies suggest that the emotional intensity associated with losses is typically 2.5 times stronger than that associated with gains of the same size, further reinforcing our inherent loss aversion. This phenomenon is often explained by our regret aversion, which influences our decision-making and relates to emotional responses to negative outcomes. In the context of financial decision-making, regret aversion manifests in a tendency to overestimate potential regret from losses and underestimate potential regret from gains. [12 32 35]

The second component of the evaluation phase is characterized by the weighting function.

WEIGHTING FUNCTION

According to prospect theory, we evaluate financial opportunities and threats further by assigning subjectively perceived *decision weight* to chance or risk, rather than applying an objective approach. This phenomenon, known as the base rate neglect bias, involves the underestimation or overestimation of objective probabilities and is described within prospect theory through the weighting function.

The weighting function, also referred to as the probability weighting function, is the second key component of the evaluation process in prospect theory. Its purpose is to explain our predisposition to

perceive the likelihood of financial opportunities and the risks of financial threats subjectively, which affects our decision-making and thus our financial success or failure. This function also helps us understand how this happens.

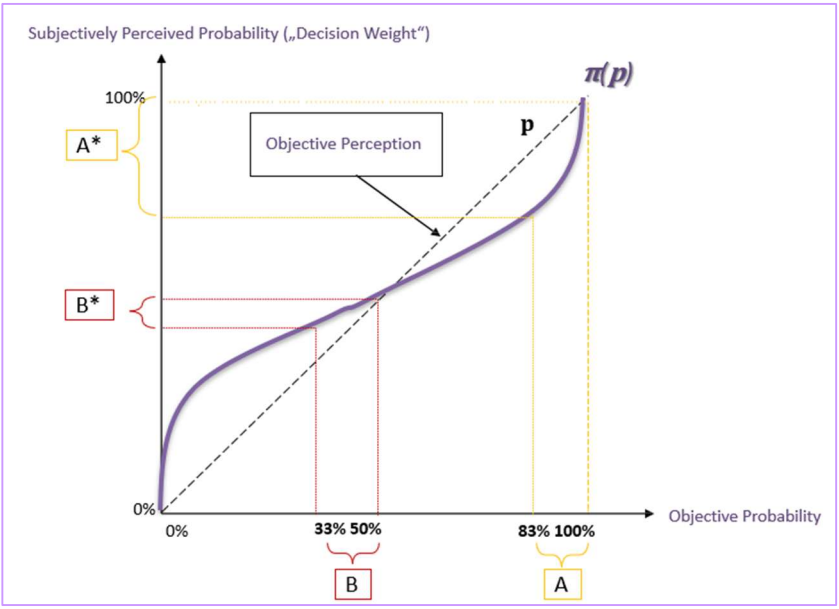
The weighting function captures two key insights about human behavior. First, we tend to respond differently to prospects depending on whether we perceive them as certain, impossible, or somewhere in between (i.e., the probability lies between certainty and uncertainty). Prospects that are almost certain tend to appear more significant and are often perceived as absolutely certain (*certainty*), leading us to overestimate the probability. Conversely, events that are highly unlikely are often viewed as completely impossible (*uncertainty*), and we tend to underestimate their probability. Although this is not justifiable from a normative standpoint, experimental evidence shows that most of us actually behave this way.

Second, we have a tendency to assign more weight to low probabilities than would be normatively justified, and less weight to medium and high probabilities. This leads to a tendency to overestimate small probabilities and underestimate large ones. As a result, we display irrational caution in the face of high probabilities and irrational risk-seeking in the case of low probabilities. The predisposition to overestimate small probabilities in many real-life situations may result in an amplified impact of rare events in financial markets. Two other cognitive factors play an important role in probability weighting: the certainty effect and overconfidence bias—both will be discussed in later chapters.

In the original version of prospect theory from 1979[12], the authors did not formally define a mathematical model but discussed the desirable properties of a weighting function. The weighting function is determined with respect to a reference point, and thus measures the subjectively perceived relative (not absolute) probability of gains and losses relative to that reference point. If we were fully rational in our calculations—i.e., if the axiom of rationality were adhered to—we would use objective probabilities (represented in a graph by a dashed 45° line). Instead, subjectively perceived probabilities form an *S*-

shaped curve of the weighting function, which also reflects the subjectively perceived impact of the given choice.

Weighting Function in Prospect Theory



Source: Own elaboration with the use of- [47] [52]

Research confirms that we have a tendency to make errors when evaluating probabilities by assigning non-objective decision weights influenced by emotions, beliefs, cognitive biases, or mistaken judgments about correlations and causalities, which subsequently affects our financial decision-making.

Behavioral finance knowledge can help us escape from the cognitive and emotional traps we may easily fall into when thinking about the connections between events and forming often incorrect assumptions about causality and subjective probabilities in the world around us. In the context of the environment we find ourselves in, we often make hasty and erroneous financial decisions under time pressure due to these flawed assumptions we form.[12] [35] [52]

CUMULATIVE PROSPECT THEORY

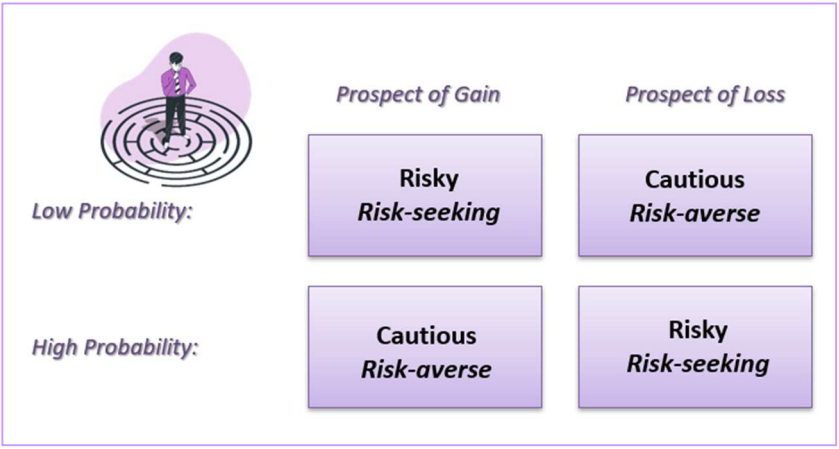
The mathematical specification of prospect theory was first introduced in its later version, published in 1992,[52] under the name Cumulative Prospect Theory with a weighting function in the shape of an S-curve.[35]

Cumulative prospect theory (CPT) deepens our understanding of decision-making by emphasizing its dynamic nature and evolution over time. Unlike the original version, which focuses on a single decision-making moment, the extended version examines the processes and factors leading to a decision over time. This theory explores how people integrate their past experiences with new information, interpret it subjectively (through framing, evaluation, and weighting), and adjust their preferences in response to current events. Understanding this theory can help us better manage impulsive reactions and plan financial goals and strategies more effectively.

A central feature of (cumulative) prospect theory is reference dependence, which emphasizes that the value function is not based on absolute asset value—in contrast to traditional economic and financial theory—but on changes relative to a reference point (the status quo value). Considering loss aversion explains the characteristic curvature of the value function. The accumulation of past experiences and new information affects the subjective weighting of probabilities. To explain the characteristic curvature (S-curve), the principles of diminishing sensitivity and loss aversion are applied.[35] [12] [52] [53]

Based on experimental findings, the extended version of the theory identifies four patterns of risk attitudes depending on probability and event type. It states that we tend to be cautious (risk-averse) when it comes to gains and more risk-seeking when facing likely losses. Conversely, we tend to behave risk-seeking regarding gain prospects but are more cautious when facing losses that are less likely to occur.[12] [35] [53] [52]

Four-Component Framework of Individuals' Risk Attitudes Based on CPT



Source: Own elaboration with the use of-[52]

The reason why we tend to take greater risks and act more carelessly in the case of more probable losses, while being more cautious toward more probable gains, is explained by the disposition effect.

DISPOSITION EFFECT

The disposition effect, named in 1985[54] by H. Shefrin and M. Statman, reveals interesting behavioral patterns among investors in financial markets.

On one hand, there is a *tendency to sell profitable investments too early*. This means that even when we achieve gains, we tend to sell the asset quickly to lock in the profit. On the other hand, the opposite pattern follows—*a tendency to hold on to losing assets for too long*. We may cling to our loss-making investments in the hope that the market will reverse and the asset's value will rise. Furthermore, it has been found that the disposition effect is amplified when framing is involved.[55]

This unusual contrast in investor behavior can be explained by the psychological phenomenon known as the disposition effect. The key motivation behind this behavior is the effort to minimize feelings of regret. Investors want to avoid negative emotional reactions associated with unsuccessful investments.

This effect contradicts the traditional economic principle of rational decision-making, which assumes utility maximization and loss minimization. It is a key insight of behavioral finance that helps us understand irrational patterns of behavior in financial markets. If we want to achieve more effective investment behavior, it is essential to be aware of these tendencies and work on mitigating them.[56]

The disposition effect is not limited to stocks; it can also appear in other financial decisions, including, for example, holding on to poorly performing cryptocurrencies.[57]

CRITICISM OF PROSPECT THEORY AND FUTURE DIRECTIONS

Political and psychological research has voiced not only support but also criticism of prospect theory. Critics argue that the theory fails to fully explain how people construct different frames for their decisions and that the original experiments may be outdated. They also point to insufficient consideration of the range of emotions and to differing results in political predictions compared to other models. However, more recent work by Daniel Kahneman, co-author of prospect theory, has begun to explore the hedonic aspects of financial decision-making and risk-taking—such as individuals' feelings of satisfaction and joy—which could offer valuable insights into decision-making beyond the realm of money.[58]

To gain a deeper understanding of the factors leading to financial immaturity, tendencies toward irresponsible and erroneous financial decisions, and financial distress, current cognitive-behavioral perspectives could benefit from integrating insights not only from hedonic psychology, but also from biosynthesis[59] and epigenetics, to examine more deeply the roles of environment and genetics.

Epigenetics, which studies the influence of the environment on gene expression, has confirmed that we are not genetically predetermined to behave in a certain way, including financial behavior. According to epigenetic theory—based on quantum physics and formulated at the end of the 20th century by Dr. Bruce Lipton—our decisions are shaped by subconscious patterns formed from the third trimester in the mother's womb until the age of seven. These patterns significantly influence our adult behavior, though not the genes themselves.[60] [61] [62]

For example, a child growing up in an environment where money is wasted and debts recur is likely to exhibit similar behavior in adulthood—not because they inherited a specific gene, but because of subconscious programs "recorded" mainly during that early childhood period.

According to epigenetic theory, which asserts that we are not controlled by our genes, we can—through our own will—reprogram these patterns effectively with new ones. In doing so, we can change faulty habits and act in accordance with our goals not only in the financial domain, but also in many others, including health and life satisfaction.[63]

It was once believed that the brain becomes fixed after reaching adulthood. Modern research shows, however, that the human brain retains neuroplasticity throughout life, meaning it continuously evolves—enabling learning, adaptation, and behavioral change at any age. As a result, we are capable of changing dysfunctional, ingrained behavioral patterns at virtually any stage of life and consciously replacing them with patterns that better support our development and quality of life—for example, building our own secure financial future.[64]

2.3. QUIZ

1. **Which factors influence the formation of financial decisions according to epigenetic theory?**
   a. Subconscious patterns ("programs") acquired during early childhood that can be changed by will
   b. Subconscious patterns ("programs") acquired during early childhood that cannot be changed through personal effort
   c. Genes (DNA), which can activate on their own and which we cannot change

2. **Who named the disposition effect?**
   a. H. Shefrin
   b. M. Statman
   c. Both

3. **Which term indicates that the value function depends on changes relative to a reference point, rather than absolute asset values?**
   a. Reference dependence
   b. Disposition effect
   c. Loss aversion

4. **What shape does the weighting function of cumulative prospect theory have?**
   a. U-shape
   b. V-shape
   c. S-shape

5. **What attitude toward risk does a person take in the face of a low-probability loss according to cumulative prospect theory?**
   a. Rather risk-seeking attitude
   b. Rather cautious attitude
   c. Rather cautiously risk-seeking attitude

2.4. ADDRESSED PROBLEMS

1. **Decision-making about financial alternatives: Imagine you are facing two financial decisions and your task is to choose which of the two options in the first and second financial offer you prefer. Record your decisions in both financial choices.**

   Decision 1:
   Option A: A guaranteed gain of $250.
   Option B: 25% chance of gaining $1,000 and 75% chance of gaining nothing.

   Which financial offer do you prefer, A or B?

   Decision 2:
   Option C: A guaranteed loss of $800.
   Option D: 75% chance of losing $1,000 and 25% chance of losing nothing.

   Which financial offer do you prefer, C or D?

   Now reflect on whether you acted rationally in your decisions and whether you failed to adhere to any axioms of traditional financial theory. If so, which one?

ANSWER

If you chose A and D, you are aligned with approximately 50% of the population who decide based on these financial scenarios. This means that you will lose $800 with a 75% probability and gain $250 with a 25% probability.

ANALYSIS

Now let's compare options A and D with options B and C. They are very similar. However, B and C are the better choice in both cases. Both involve the same 75% probability of losing money, but the loss is lower ($800 instead of $807). Options A and D have the same 25% probability of gaining money, but you earn a bit more ($250 instead of $248).

2. **Which axiom of traditional financial theory is not followed by people who choose financial offers A and D in task 1? Is it the axiom of dominance, independence, or consistency?**

ANSWER

It is the axiom of dominance. The axiom of dominance states that if one option always leads to better outcomes than another option in every situation, then we should rationally prefer it. The axiom of dominance is therefore not adhered to whenever we choose a combination that leads to the "dominated" (i.e., worse) outcome. When we choose options A and D, the resulting outcomes are worse in every case than the outcomes from the combination B and C. Therefore, combination B-C dominates combination A-D.

3. **Imagine Mr. James Wise, who lives in a nearby village, leading a calm life, occasionally going for a walk, enjoying time with his family, and sometimes taking ibuprofen if he has a headache. One day he learns that scientific studies suggest that daily use of ibuprofen doubles the risk of heart attack. His first reaction is naturally concern. *"Doubling the risk of heart attack?"* he thinks—*"That sounds serious."* Is he right?**

ANSWER

This is a common case of reasoning based on relative probabilities. To improve judgment, it is first reasonable (rational) to look at the change in absolute probability. Although doubling the risk is worrying, it may actually be a small increase in probability. Using calculated values, one can find out by how much the probability of heart attack increases for people who take ibuprofen daily.

ANALYSIS

First, we need to find the baseline probability of heart attack in the population to interpret the message more accurately. Let's assume the baseline probability of heart attack in the population (i.e., the probability that an average person not taking ibuprofen daily will have a heart attack in a given year) is approximately 0.3 %, which means about 3 people out of 1,000.

Doubling the risk means that the probability of heart attack for those taking ibuprofen daily would rise to 0.6 %, which in absolute numbers means 6 people out of 1,000 per year.

By calculating these values, we find that the probability increases by 0.3 % (0.6 %–0.3 %), representing a 100 % increase compared to the baseline 0.3 %. So, when looking at the change in absolute numbers, we realize that although the risk of heart attack doubles, it is still a relatively small absolute number. In absolute terms, this means 6 people out of 1,000 taking ibuprofen daily will have a heart attack in a year.

Deeper consideration might adjust this baseline based on specific factors concerning Mr. Wise, such as smoking, and revise the rate accordingly with similar risk adjustments.

REFLECTION

Prospect theory—unlike traditional financial theory—assumes that people tend to consider probabilities relatively rather than absolutely and are subject to base rate neglect bias.

This also explains why media prefer to report relative changes in risk (e.g., "twice as many people") rather than absolute changes (e.g., "3 more per 1,000 people"). This method attracts greater reader interest.

4. **Mrs. Linda Bright bought 1,000 shares of a company at a market price of $28 per share. The company was getting great media attention, especially thanks to a new accounting software expected to become the industry standard. Mrs. Bright, with significant knowledge of accounting and software, carefully studied all available product information and conducted her own research. About two weeks later, near the software launch, the stock price rose above $32 per share. However, speculation about a possible software bug started circulating, and the stock price became more volatile. Mrs. Linda decided not to sell.**

Due to spreading rumors, the price first dropped below $32 and then below $28. Despite occasional positive social media news causing slight increases, Mrs. Linda became increasingly worried about the company's future and product. Currently, the shares trade below $23. Although Mrs. Linda now believes the product will fail, she is determined to hold her shares, hoping that social media discussions and new news will push the price back above the original $28 so she can sell.

Which aspect of prospect theory best illustrates Mrs. Linda Bright's behavior during the period she held the shares?

ANSWER

Risk-seeking over losses.

ANALYSIS

Risk-seeking over losses means the tendency to hold a losing position, hoping the price will return to the original (purchase) price. The original price became the reference point against which all market prices were compared. This is exactly what motivated Mrs. Bright in this case.

REFLECTION

Prospect theory is based on tendencies to not adhere to the principles of rational behavior. Unlike classical financial theory, it does not have axioms that always hold. It describes a natural inclination to behave irrationally, meaning sometimes we behave rationally (concept of *bounded rationality*). Also, not everyone necessarily exhibits all elements of prospect theory, as these are tendencies. Some of us are more influenced

by emotions, subconscious patterns, and environmental factors than others.

5. **Mr. Wise owned shares in a certain company worth $21,000 for many years. One day he remembers them and considers whether to sell. He finds they maintained their value and decides to keep them. A few months later, the company unexpectedly goes bankrupt and his shares become worthless. Mr. Wise realizes he lost $21,000.**

   His friend Mr. Dumpling also owned shares worth $21,000 in a competing company and almost forgot about them. He decided to sell when he saw they maintained value. A few months later, the company unexpectedly launched a new product and its shares doubled in value. Mr. Dumpling realizes he has $21,000 less than he would have if he had kept the shares.

   Both ended up $21,000 poorer. Which part of prospect theory best explains why Mr. Dumpling is likely to feel stronger regret over time than Mr. Wise?

   a. Regret from omission
   b. Risk aversion
   c. Regret aversion
   d. Disposition effect

ANSWER

Regret from omission.

ANALYSIS

Regret from omission means the tendency to feel worse about negative outcomes resulting from doing nothing compared to taking acting, especially over time.

Mr. Dumpling took action (sold shares), while Mr. Wise did nothing.

Despite their financial loss being equal ($21,000), regret from omission bias suggests that in the long run, Mr. Wise will feel worse.

REFLECTION

Regret from commission implies that shortly after the financial loss, Mr. Dumpling experiences greater regret.

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AVAILABILITY HEURISTIC AND RELATED BIASES

Given that in practice people, including professionals, often rely on heuristics, they hold non-objective beliefs that expose them to the risk of making mistakes.

Hersh Shefrin

3.AVAILABILITY HEURISTIC AND RELATED BIASES

3.1. INTRODUCTION

Heuristics are subconscious mental patterns that can help us in everyday life but often lead to predictable and measurable errors (biases).[1] We will focus on the first of the key mental heuristics to which we naturally succumb in our financial decisions: the availability heuristic. It refers to our natural predisposition to rely on information that is easily accessible or readily recalled when making decisions. This heuristic plays a significant role in behavioral finance and has also been observed in other domains.[2]

The financial decisions we make are often influenced by how easily we can recall an experience with a similar choice based on available information and our own experiences. Typically, we remember and recall negative events more easily than positive ones. This is due to our predisposition to impulsively succumb to automatic negative thoughts (ANTs) and to persist in them, despite their link with chronic stress and fatigue. This is especially driven by an innate loss aversion tendency. Emotionally charged events or those that have received broad media coverage tend to remain especially vivid in our memory. Furthermore, we are limited by our memory capacity, so we tend to focus more on recent events than older ones, which can lead to biased decision-making that works against our financial goals.[3] [4] [5]

Imagine a headline on social media about a dramatic stock market crash, accompanied by photos of devastated investors and graphs showing a steep decline in stock prices. This news quickly spreads across social media and becomes the subject of discussions on various online platforms. As a result of this intense media coverage, many investors begin to fear for the future of the stock market. They are now convinced that investing in stocks is extremely risky and that a similar crash could happen again and affect them as well. This heightened level of concern is driven by their vivid recollection of emotionally charged images and stories they have read, leading them to perceive the stock market as much riskier than it may actually be.

As a result of this distorted perception, investors may be prone to making rash decisions, such as selling their stocks without a more rational analysis of market fundamentals or avoiding investments altogether in the future—thereby overestimating rare events.

The availability heuristic is associated with several key systematic errors, such as base rate neglect, salience bias, recency bias, endorsement bias, and frequency and timing bias, which we will explore in this chapter alongside the availability heuristic.[6]

REFLECTION

1. **On a scale of 1 to 5, how would you currently rate your tendency to make decisions based on information that quickly and vividly (colorfully) comes to mind?**

   1 = Yes, I rely on it
   3 = Maybe
   5 = No, I do not rely on it

2. **Do you think that becoming aware of the natural tendency to make decisions based on information that quickly and vividly comes to mind can contribute to more deliberate decision-making and better financial outcomes?**

   YES NO

3. **Do you agree with the statement that some events stand out more in our minds than others?**

   YES NO

Now reflect on whether, over time, it is ordinary or emotionally charged memories that resonate (feel more vivid) with you more strongly, and whether they tend to be more positively or negatively toned.

4. **Can you recall a situation when you (last) made a decision based on information that quickly and vividly came to mind? How would you rate the influence of this tendency on your decision? Do you now, in retrospect, believe the decision was well thought out?**

3.2. CORE CONCEPTS

Availability heuristic, first introduced by Amos Tversky and Daniel Kahneman in 1973[2], is a mental cognitive shortcut that influences our financial decision-making. This concept stems from our genetic predisposition to believe that the more often we hear about something, the more likely it is to occur. According to evolutionary theory, we inherited this tendency from our prehistoric ancestors, who lived on the savannah and learned to assess risks and probabilities of events based on how frequently they encountered them (repetition frequency).

When making decisions, we tend to give greater importance to information or events that are easily recalled. We subconsciously apply these experiences to current situations or decisions. If something comes to mind easily, we are inclined to consider it more significant and more probable—even though this may not reflect reality.[4]

It is crucial to realize that our memory favors recent events that are emotionally charged or widely covered by media. This can lead us to overestimate current information and ignore other relevant factors. The availability heuristic also affects our perception of risk—dramatic events that are frequently mentioned in the media or that we are emotionally involved in tend to seem more likely than ordinary events that

receive little or no media attention. This manifests in our tendency to overestimate low probabilities.[7] [8]

Research has confirmed that the availability heuristic plays a key role in investment decisions and can lead to impulsive investment behavior. It can influence how we subjectively perceive and assess risk before making an investment decision. The tendency to overestimate the probability of recent positive outcomes or investment news—or to underestimate older information and investment risks due to the recall of negative or positive cases—can lead to suboptimal investment decisions and ultimately impact the overall performance of investment portfolios.[9] [10]

When making investment decisions, we often prioritize information that is easily accessible in our memory. If we have recently heard or read positive news about a certain investment, we may overestimate its success, while negative events may trigger excessive fear of potential loss. This phenomenon results from a natural predisposition to use the availability heuristic, which affects our perception of risk and reward associated with an investment. Speculation in financial markets has been linked specifically to the availability heuristic, along with overconfidence and the desire for social recognition.[11]

Moreover, we tend to favor recent information when evaluating investment options. This may lead us to invest in well-promoted funds or to react to past financial crises even at times when the market shows no negative signs. Changes in analysts' investment recommendations can also trigger new associations in our minds and influence our decision-making. Studies further show that the availability heuristic shapes decisions not only in stock markets but also in specific markets such as real estate. When deciding to buy or sell real estate, we may overvalue easily accessible information about recent trends and overestimate our own subjective experiences, which can lead to distortions. It appears that the tendency to fall victim to the availability heuristic in real estate is more common among women, who also tend to be more price-sensitive than men. However, more empirical evidence is needed before generalizing across genders.[12] The availability heuristic—associated with flawed judgment based on easily accessible but potentially

misleading information, often recent and extreme—has also been studied in the context of emerging markets and cryptocurrency markets.[13]

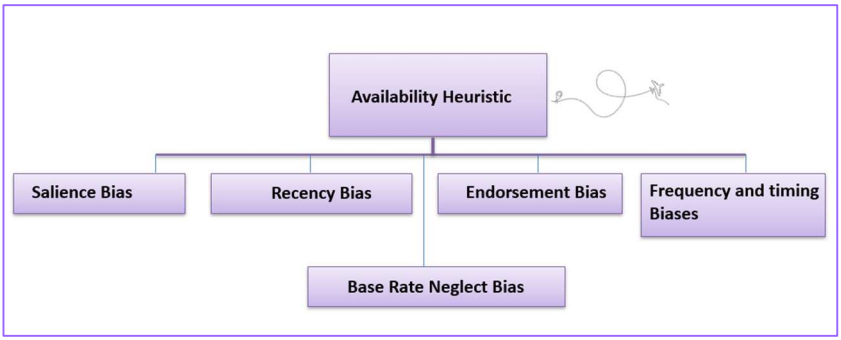
Biased judgment caused by the availability heuristic can ultimately lead to impulsive decisions that negatively affect the overall performance of investment portfolios.

KEY BIASES ASSOCIATED WITH THE AVAILABILITY HEURISTIC

Using the availability heuristic allows us to react quickly to situations based on the subconscious assessment of the likelihood of events by recalling similar scenarios that are easily accessible in our memory, experiences, and imagination.[2] However, this mechanism can lead to systematic errors (biases), as our subjective perception of probability often differs from objective reality, primarily due to the tendency to remember recent events more vividly than those further in the past.[2 12 14 15]

The availability heuristic is associated with many distortions, especially with recency bias and salience bias, which are often referred to as its "cousins", as they lead to the overestimation of the likelihood of events. The use of this heuristic often results in excessive emphasis on emotionally charged and dramatic events (salience effect), overestimation of low-probability events, and neglect of statistical foundations (base rate neglect) and historical developments in favor of newer and easily accessible information (recency effect), rather than objective assessment. This can lead to the misinterpretation of data, i.e., incorrect understanding of information. Other key biases associated with the availability heuristic include endorsement bias and frequency and timing bias.[6]

Key Biases Associated with the Availability Heuristic



Source: Own elaboration with the use of- [6 16]

SALIENCE BIAS

Salience bias (also the salience effect) represents errors we frequently repeat due to a natural predisposition to assign greater weight and direct attention to information and events that are striking and prominent—that is, to visually or emotionally vivid information. These distortions may be influenced by a person's emotions, beliefs, and past experiences and can lead to judgment and decision-making errors. To avoid these fallacies in the future, it is important to be aware of one's own biases and strive to consider all relevant information when making decisions.

Salience bias is closely related to the availability heuristic, as emotionally charged, shocking, and "vivid" events are easily accessible in our memory. This type of event is colorful and prominent, which subsequently leads to more frequent recall. Due to their emotional impact, we tend to consider these events more frequent and assign them greater importance. When an event is strongly emotional and easy to imagine, it becomes salient in our mind – that is, prominent. Such striking events and information often trigger strong emotional reactions.

A typical example is a highly publicized financial crisis or a significant market crash, which may lead investors to overestimate the likelihood

that such events will recur in the near future.[17] [18] This may result in excessive risk aversion or avoidance of certain types of investments, even though they may be a reasonable choice. Similarly, a tragic event such as a plane crash that is widely covered and discussed in all news media may cause some people to at least temporarily overestimate the probability of a similar event occurring, and as a result, avoid flying. After rare but intensely publicized catastrophes, people often show a greater willingness to purchase insurance against similar events in the future.[6]

In the financial context, however, salience may also lead to much more "mundane" errors in financial decision-making. Errors in financial decisions are often influenced by the perception of visual elements. Studies have shown that our decisions are frequently affected by the visual presentation of information, including the use of colors. For example, we tend to prefer colorfully attractive presentations of financial data, even if they are not critical for investment decisions. Color schemes, especially the use of red, can influence our preferences in risk situations and expectations of future returns, which may result in emotionally driven investment decisions. Such an approach, however, is usually not the most reasonable strategy, as emotion-based decisions tend to be impulsive and may reduce the effectiveness of the investment strategy. This phenomenon is studied within the field of visual finance.[19]

Studies also show that people may fall for salience in social situations. For instance, diversity in a team or committee, including factors such as gender or skin color, results in the actions and decisions of that team being more memorable – whether positively or negatively. For example, in a team of six people with only one woman or a single Black member, people tend to better remember what that person did than in a group with two or more people of the same gender or skin color. Additionally, it has been found that assessments of individuals working alone are often more extreme, with a tendency to evaluate them as either very successful or very unsuccessful, rather than somewhere in between.[20]

RECENCY BIAS

Recency biases, also known as recency effects, are subconscious cognitive distortions that lead us to give greater attention and weight to recent events and information. We tend to overestimate their importance, underestimate events from the more distant past, and believe that current trends will continue into the future. We recall recent occurrences more easily than older ones, which leads us to base our decisions on recent experiences. Strong impressions from the recent past can significantly influence our judgment.[16]

In the field of behavioral finance, this phenomenon is common and has significant implications. It often causes us to overemphasize recent developments and neglect fundamental investment principles or the long-term value of financial opportunities. It is essential to recognize that past asset growth is not a guarantee of future performance. For example, if an event occurred five years ago, we tend to consider it less relevant in our decision-making; if it happened ten years ago, we regard it as even less important. This behavior aligns with the way human memory functions.[16]

Recency bias is closely linked to the availability heuristic, meaning that recent events are more easily accessible in our minds and are recalled more quickly. As a result, we assign greater weight to them in our judgments and decisions.[2 21]

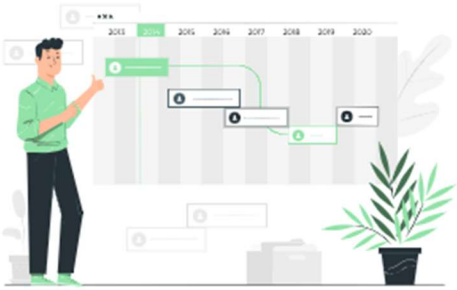
These misjudgments can create opportunities for financial professionals to gain an advantage and generate higher profits. For example, bettors often behave irrationally because they succumb to biased thinking when evaluating past events, interpreting them through the lens of recent outcomes, which puts them at a disadvantage.[16 21]

Fund managers frequently highlight their past successes to attract potential investors. However, this presentation is often incomplete and fails to reflect the full context. They may emphasize only the positive aspects of past performance while omitting key information, such as long-term fund development or comparisons with alternative investments. As a result, investors may make decisions based on distorted information, leading to suboptimal investment choices.[6 16]

Behavioral finance studies also show that shareholders often unconsciously place too much emphasis on recent trends in the stock market—whether bullish, bearish, or stable—and expect these patterns to continue. Investors influenced by recency bias are more likely to view investments with strong recent performance as especially attractive. Consequently, they may favor stocks that have recently delivered high returns (so-called "winners"), disregarding their long-term performance. This makes them susceptible to buying at historical peaks. Unless it is part of a short-term momentum strategy, such behavior is likely to result in financial losses over time. Moreover, it has been shown that investors tend to remember the order of information rather than its content, which may lead to impulsive and inconsistent decisions based on short-term market fluctuations instead of long-term fundamentals, causing painful financial losses.[16 22]

This bias also affects seasoned professionals in finance, including analysts, auditors, managers, and accountants. Research suggests that experts such as analysts and auditors may overvalue recent data. For instance, analysts' forecasts of long-term corporate growth tend to be overly optimistic during economic booms and overly pessimistic during recessions. Studies have also shown that even professional accountants are vulnerable to this bias, especially when handling large volumes of information.[21 23 24]

The recency effect is also observed in other contexts, such as in workplace performance evaluations or recruitment processes. Supervisors may tend to assess employees based on their recent performance rather than considering their entire work history. For example, during annual performance reviews, managers may give disproportionate weight to achievements in the last three months, overlooking accomplishments from the previous nine. This bias can also lead to significant hiring mistakes—recruiters might subconsciously remember the last few candidates best, leading them to overlook highly qualified applicants who were interviewed earlier in the process.[25] [26] [16]



BASE RATE NEGLECT

We humans often ignore the probability of an event when making decisions—a phenomenon known as base rate neglect (also referred to as the base rate fallacy). Instead of considering how frequently an event occurs in the general population, we tend to rely on newly acquired, specific information. This leads us to overlook the base rate (i.e., the statistical probability of the event).[20]

This natural tendency is closely linked to the availability heuristic, where we give more weight to information that is easily accessible in our memory rather than objectively analyzing the actual likelihood of an event. This bias often stems from our limited cognitive capacity and difficulty in understanding probabilistic reasoning or applying Bayes' theorem. As a result, overvaluing new information while neglecting

base rates can lead to poor judgment and misinterpretation of data.[6] [27]

For example, imagine an investor considering purchasing shares in a company that appears stable and successful based on a recent strategic analysis. Historically, however, only 60% of similar companies in the same sector have proven to be good investments. The investor now receives a new report highlighting strong fundamentals and promising growth potential. It is essential not to forget the historical success rate (the base rate) of similar firms in the industry, even when new information seems positive. Ignoring either of these factors can result in biased decisions—whether it's underestimating industry or company-specific risks, overestimating potential returns, or missing out on a good investment opportunity. A well-considered investment decision must account for both types of information, and neglecting the base rate can prove to be a costly mistake.

ENDORSEMENT BIAS

We also have a natural tendency to rely on information we perceive as trustworthy, even when it may be ambiguous or incomplete—a phenomenon known as endorsement bias. This cognitive bias can significantly influence decision-making, as we may blindly trust the opinions of those we admire without critically evaluating the content they support.[16] [28]

This tendency is related to the availability heuristic. We are more likely to recall information that we perceive as credible—whether it comes from a trusted source, is endorsed by someone we admire, view as an authority, or is supported by many people rather than a minority. As a result, we assign greater weight to such information, even when we should consider additional relevant evidence or critically examine it. This connection is particularly evident in marketing, where advertisements featuring respected public figures often achieve success. Such bias can lead to uncritical decision-making.[6] [29]

Therefore, we are prone to trusting information, products, and services endorsed by celebrities we admire or recommended by experts, family members, friends, or a large number of people. Even without personal knowledge of a given product, we may subconsciously favor it due to the endorsement effect.[30]

In a financial context, for example, we might have a more favorable opinion of a financial product or service simply because it is publicly endorsed by a celebrity we like, even if the product has nothing to do with the celebrity's financial expertise. This product may then gain an imaginary "stamp" of prestige, giving us the impression of a higher subjective value than it actually holds. Research suggests that age plays an important role here. In Generation Z (Gen Z), there is a tendency to place greater trust in financial advertising endorsed by social media influencers rather than traditional celebrities. This is because influencers often align with the ideal self-image Gen Z aspires to, making them appear more trustworthy and relatable.[31] [32]

The endorsement effect is also significant in other areas, such as the workplace. For instance, we often view employer recommendations as a safe choice and stick with default options provided by the employer without critically evaluating them. This can lead to status quo bias.[6] [33] [34]

FREQUENCY AND TIMING BIAS

The media coverage of events generally leads us to overestimate the likelihood of rare occurrences, which can cause us to act based on information we hear or see in the media, even when doing so may not be entirely rational. Moreover, news outlets tend to highlight threats selectively—a phenomenon known as the timing effect. For instance, seemingly frightening risks like shark attacks may appear more common than they actually are because they are sensational and attract audience attention. Financial studies have also confirmed that, as investors, we often react quickly to highly publicized and salient news.[35] [36]

The more intensely negative events are discussed, the more significant they seem, leading to even more frequent discussion. This process creates a self-reinforcing loop known as an availability cascade. Once an opinion is voiced, it can trigger a chain reaction, gradually gaining credibility due to its growing presence in public discourse. In other words, this phenomenon creates an availability cascade effect, where negative opinions and news become amplified through repeated discussion and exposure in the public space. This can lead to the formation of incorrect collective beliefs and decision-making based on distorted information.[37]

Errors in judgment resulting from frequency and timing biases are therefore natural. The more an event is talked about, the more we are inclined to believe it may recur and is not merely random. A salient situation such as a highly publicized plane crash might make us fear that such an event could happen to us.[6]

These errors are closely related to the availability heuristic, as we more easily recall events or information we frequently hear about. Events that receive strong media attention may be perceived as more frequent than they actually are. The more we hear about them, the more likely we are to believe they are common or probable. That is why the timing and frequency of media exposure are used by advertisers to convince us of their products' advantages. Even though repeated ads may seem annoying, studies suggest that such exposure makes us more likely to

remember and ultimately purchase these products. We also tend to better remember events we heard about recently—a known effect called recency.[6]

In the financial context, previous studies have provided evidence that media coverage of macroeconomic news influences investor sentiment and thereby affects returns across different asset classes. High trading volumes are often observed in financial assets that have been associated with extreme returns in the media. As investors, we may be inclined to buy "winning" stocks and funds (winners) heavily featured in the media and on social networks, which can lead to impulsive decisions, overestimating the probability of rare events while underestimating the risks of more typical occurrences.[16 38]

Conversely, we may have a natural tendency to underestimate the likelihood of risks if we are not personally aware of any recently publicized incidents. For example, the highly publicized bankruptcy of a small number of publicly traded companies may discourage us from investing in stocks altogether, even though the vast majority of companies may be in solid financial condition—thus causing us to overestimate the probability of a rare event.

The availability heuristic is also linked to other biases such as overconfidence and confirmation bias, which will be discussed in the following chapters.[16 20]

3.3. QUIZ

1. **Choose the false statement regarding the availability heuristic.**
   a. The availability heuristic is a cognitive shortcut that describes the tendency to rely on information that is easily accessible when making decisions.
   b. The availability heuristic is a cognitive shortcut that describes the natural predisposition to give greater weight in decision-making to information that is heavily publicized.
   c. The availability heuristic is an emotional shortcut that describes the tendency to rely on a value anchored in our subconscious when making decisions.

2. **In which year did Amos Tversky and Daniel Kahneman introduce the availability heuristic?**
   a. 1951
   b. 1971
   c. 1973

3. **The availability heuristic does NOT lead to the following phenomenon:**
   a. Overestimating the probabilities of current, especially dramatic, information.
   b. Estimating probabilities based on how easily similar cases come to mind.
   c. Considering common events, which rarely receive media attention, as more probable.

4. **Emotionally charged, shocking, and particularly vivid events tend to be more accessible in our minds is a characteristic of:**
   a. Salience bias
   b. Recency bias
   c. Endorsement bias

5. **We often mistakenly believe that unlikely and dramatic events are more probable than they really are because we are genetically predisposed to believe that the more we hear about something, the more likely it is. "If everyone is talking about it, it must be happening everywhere." What psychological pattern is this?**
   a. Affect heuristic
   b. Anchoring heuristic
   c. Availability heuristic

3.4. ADDRESSED PROBLEMS

1. **Many customers avoid buying either the most expensive or the cheapest product among similar items and prefer to choose an option "somewhere in between". Xerox Corp increased sales of high-capacity copiers for corporations by introducing an even more expensive model with several additional features. Does the availability heuristic explain this effect?**

ANSWER

The availability heuristic does not explain this effect.

ANALYSIS

The availability heuristic refers to the tendency of people to estimate the probability of events based on how easily they recall similar cases and extrapolate from them to the event being evaluated.

2. **Which of the following four types of investors is most likely least influenced by the availability heuristic according to the characteristics below?**

   Type A – Headline Reader: Prone to emotions and stories. When hearing about a popular new tech stock or innovative startup, they immediately try to buy shares without carefully assessing the situation.

Type B – "Talent": Believes they have discovered a miraculous product and wants to invest in the manufacturer's stock before the product becomes widely known.

Type C – Analyst: Believes in scientific and mathematical models for stock evaluation. Relies on complex formulas and algorithms.

Type D – Loyal Investor: Strongly connected to the company they work for and invests mainly in that company's stock, often at the expense of portfolio diversification.

ANSWER

Type C.

3. **You notice that on social media, there are shared reports about big profits on a new algorithmic platform. What are you more likely to feel when you read such news again, and your colleague at work and neighbor in the garden are also talking about it?**

ANSWER

We may tend to prematurely overestimate the actual probability of our gain and consequently increase our spending on trades.

ANALYSIS

This example illustrates the availability heuristic, where related events or situations immediately come to mind when making decisions. As a result, we may incorrectly assess the frequency and scope of these events because we give greater importance to this

information and tend to overestimate the likelihood that similar things will happen to us in the future.

4. **Mr. James Wise found out he is out of groceries and needs to go shopping. Which products will likely catch Mr. James's attention in the supermarket?**

ANSWER

Products displayed at eye level or just below it.

ANALYSIS

Research results show that as customers we tend to buy more goods displayed at eye level or just below it (they are more accessible) than goods placed more to the side or less noticeable (less accessible). The availability heuristic is convincing in this respect. Companies supplying "prime spots at eye level" in stores often have to pay a premium.

5. **Are we more likely to buy insurance against death or injury caused by a plane crash when purchasing a ticket, or at an insurance booth placed directly in front of the plane we see and will board?**

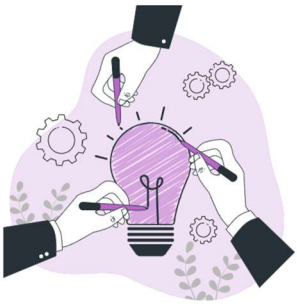
ANSWER

Due to our vivid imagination (salience), we are more likely to buy such insurance because of the vivid image of the stairs and the plane we will fly on, even though the event has a low probability—insurers rely on this vivid imagination when selling insurance.

ANALYSIS

If the insurance were offered before or while buying the ticket, we would probably not buy it. Why? Because we would likely realize that a plane crash is a very rare event and thus tend to ignore an event that seems very unlikely— and we probably would not purchase the insurance.

But insurers know how to influence us. They understand our psychological behavior and use it to their advantage. If they could place their booth right at the boarding gate, where fear starts to affect us, this could increase the likelihood that we buy the insurance. Many people would do so, especially if the insurance were cheap, because they would have all those stories about plane crashes in mind and start to get nervous that it might be their last day on Earth. But in reality, the probability of a fatal plane crash is very, very small—about 1 in 10 million.



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ANCHORING HEURISTIC AND RELATED BIASES

Because people confirm their hypotheses by attempting to verify them, they seek information based on subjectively predetermined anchors, thereby subsequently distorting their own judgment.

Klayman & Ha[1]

4.ANCHORING HEURISTIC AND RELATED BIASES

4.1. INTRODUCTION

The second cognitive pattern that we subconsciously use when making decisions is the anchoring heuristic (also known as the anchoring effect). This natural tendency leads us to rely too heavily on the first number or piece of information we receive when making a decision or evaluation — this information is called the anchor. Moreover, the problem with this heuristic is that we have difficulty changing our opinions even when new information emerges. In other words, we often remain too fixated on the first number we heard, for example, in connection with a widely publicized event or during negotiations. Subsequently, we misinterpret new information because we evaluate it through this original anchor (also called the reference point). Although we sometimes succeed in adjusting this incomplete anchor, our adjustments often remain biased.[2][3][4]

To better illustrate this innate cognitive pattern, let us briefly dive into a story. In a small town, Mr. Wise faces another important question. His neighbor asks him whether he estimates that the population of Los Angeles is greater or less than 5 million and then challenges him to estimate a specific number. Mr. Wise, who does not have a phone at hand to look up the information and has never been very interested in the current population of Los Angeles, however, he clearly remembers that New York City has almost 9 million inhabitants. Immediately, the image of New York City as a huge metropolis comes to his mind, and a mental comparison with Los Angeles as a smaller city. "Less populated than New York City," he whispers to himself. "But how many exactly? Less or more than 5 million?" He feels something pulling him to adjust the value of 5 million. In our story, it is not important what exact number he finally gave. The key point is that Mr. Wise would very likely have given a different number if his neighbor had asked whether he thinks the population of Los Angeles is greater or less than 7 million.[5]

This is because Mr. Wise was unconsciously influenced by the anchoring heuristic when making his decision. This mental shortcut led him to treat the value 5 million as a sort of reference point on which he

focused when estimating Los Angeles' population, and then adjusted it based on the comparison with another city. This story simplifies how the anchoring heuristic affects our decision-making and estimates by forcing us to rely on the first available piece of information as an anchor. In other words, our decisions and estimates are often rooted in the values we hear first and unconsciously tend to cling to – to anchor to. And when we try to adjust these anchors, we often fall victim to insufficient adjustment.

In the field of finance, the anchoring heuristic is a key factor. It often happens that our financial decisions are influenced by how strongly we are attached to the first number or information we receive, and how difficult it is for us to change our opinions when confronted with new information. These anchors can be so strong that they prevent us from accepting new perspectives even when relevant information emerges.[6]

Research shows that subconscious reliance on the anchoring heuristic often leads to everyday errors in our judgments and decisions. Among the key systematic errors related to the anchoring heuristic are framing bias, loss aversion, mental accounting, endowment, primacy, recency, halo, and status quo biases. In this chapter, we will become familiar with these biases in connection with the cognitive pattern of anchoring.[7]

REFLECTION

1. **On a scale of 1 to 5, how would you rate your tendency to cling—anchor—to the first number proposed during a negotiation, or to make adjustments based on that number?**

   1 = Yes, I rely on it
   3 = I do not know
   5 = No, I do not rely on it

2. **Do you think that being aware of the tendency to anchor on the first information presented to us can contribute to more responsible decisions and better financial outcomes?**

   YES NO

3. **Do you agree with the statement that some events stand out more in our minds than others?**

   YES NO

Reflect further whether: after some time, do you realize that when answering questions or making decisions, you were influenced by a specific number mentioned in the question. For example, if someone asked you whether a regular payment to a building savings account should be higher or lower than $75, would you

answer the same if the question was asked without the "reference" number?

4. **Can you recall a situation in which you most recently decided based on the first piece of information or number, and any mental adjustments you made from it during the decision? How much do you think the information influenced your decision? Looking back now, do you think the decision was well-considered?**

4.2. CORE CONCEPTS

The anchoring heuristic, originally defined by Amos Tversky and Daniel Kahneman in 1974 as anchoring-and-adjustment, is a key psychological effect influencing our decision-making. The anchoring heuristic is a psychological phenomenon that reveals our tendency to rely on the first piece of information or obtained figure—an anchor—even if it may be random, unintended, or deliberate. We use it as a reference point for our considerations and therefore hold on to our beliefs longer than is appropriate. In other words, it is an estimation method where we start with available information and gradually adjust it. The initial anchor can influence our adjustments, causing our final estimates to remain too close to it.[7 8 6 3]

An anchor can be any value or piece of information that is presented to us or that we latch onto at the beginning of the decision-making process. Although this initial value may be irrelevant, inappropriate, outdated, or fabricated, we often allow it to influence our subsequent judgments and decisions and prefer adjusting it rather than making a more demanding judgment and evaluation.[9 10]

The anchoring heuristic has been a well-documented cognitive thinking pattern for over 40 years. Studies suggest that the influence of anchoring is exceptionally strong and pervasive, and that people react to anchored values. They provide insights into how their responses differ from actual values. It has been found that people tend to adjust their estimates toward given anchors, but this adjustment can be insufficient, especially if people feel satisfied with a minimally acceptable estimate.[4 5 6 11 12]

Research has shown that people often adjust their estimates or decisions toward a predetermined anchor value, which is often an insufficient adjustment, and that we stop adjusting once we reach a minimally satisfactory estimate. Furthermore, it has been found that motivation and the ability to dedicate additional cognitive resources (intelligence) and attention to the task determine whether we accept the anchoring value or seek a more accurate estimate—that is, whether we are inclined to think harder and arrive at a more accurate estimate, thus providing estimates farther from the anchors we often create ourselves.[4 5 6 11 12]

A key point in understanding the anchoring heuristic is how the anchor influences human behavior and decision-making and how it can be potentially used or effectively resisted in various contexts such as pricing strategies, marketing campaigns, and strategic sales. For example, when introducing a new product to the market, an initial price can be strategically set to serve as an anchor point for future customer perception of the product's value. Similarly, in negotiations, understanding the anchoring heuristic can lead to better negotiation tactics and achieving more favorable agreements.[6 12]

This phenomenon is important when studying human behavior and decision-making processes across many domains, including financial decision-making. In finance, an anchor might be, for example, a financial advisor's recommendation, a stock price in the past, or a price we were willing to pay for a certain investment previously. Even though these pieces of information may not be relevant to the current situation, they have a strong influence on our decisions and can lead us to overestimate or underestimate the value of the investment.[2]

An important aspect of the anchoring heuristic is also its ability to affect our perception of risk. If we are anchored, for example, on a low past stock price, we might underestimate the real risk of the investment and overestimate its potential return. Conversely, if anchored on a high past stock price, we might overestimate the risk of the investment and underestimate its potential return.[2]

Problems especially arise when the anchor value is inappropriate, because any adjustment of the estimate is often insufficient and completely wrong. This can lead to incorrect decisions and inaccurate estimates, especially if we tend to be satisfied with minimally satisfactory results. We then tend to feel content that we have made a good decision, even though we could have achieved a better outcome. We may fall victim to the anchoring heuristic—meaning we are "anchored" to our original decision and fail to change it even when we should.[6 13]

Studies suggest that the anchoring heuristic plays a key role in our financial decisions and often leads, due to insufficient adjustment from anchored initial information, to impulsive investments and other financial mistakes, which can result in financial loss. Therefore, it is important to be aware of this phenomenon and try to consider a wider range of information and conduct rational reasoning when making decisions. If we realize that we are prone to rely too much on the first piece of information we receive, we should actively pursue critical thinking and consider other factors and options to reach better-thought-out and more successful financial decisions.[4 14]

The anchoring heuristic not only explains how our judgments are influenced by initial impressions and values, which can lead to related errors, but can also explain other phenomena such as preference shifts, hindsight bias, subadditivity[2] in probability judgment, and egocentric bias.[6 10 15]

Furthermore, studies suggest that even financial professionals, such as auditors, who possess expert judgment gained through experience and knowledge, are not immune to the anchoring heuristic, although they are less sensitive to it. By acknowledging these tendencies and increasing awareness of cognitive errors, professional skepticism can be enhanced, thereby reducing the risk of erroneous decisions.[4]

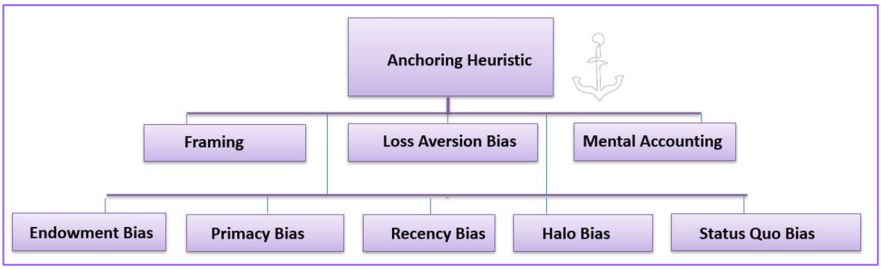
KEY BIASES ASSOCIATED WITH ANCHORING HEURISTIC

The anchoring heuristic allows us to respond quickly to situations based on the first information or numbers we received and to use them as reference points for our decision-making. However, this approach can lead to systematic errors because we tend to remain fixated on these initial numbers or information, which can distort our evaluations. Although we try to adjust these anchors, we can still be subject to bias. Moreover, we tend to cling to these anchored values even when accepting new information.[2 3]

The anchoring heuristic is associated with many biases, especially framing bias, loss aversion, and mental accounting. Other key biases linked to the anchoring heuristic include the endowment bias, primacy bias, recency bias, halo bias, and status quo bias.[7]

[2] Subadditivity is a concept that refers to the principle in which the combination of multiple components has a smaller effect than the sum of their individual effects.

Key Biases Associated with the Anchoring Heuristic



Source: Own elaboration with the use of- [2,7]

FRAMING BIAS

Decision-making errors arising from our natural tendency to prefer certain options based on how information is presented to us are known as framing biases.

Even a slight change in problem formulation through word choice, such as emphasizing one aspect while downplaying another without altering the actual facts, can predictably lead to a change in our decision between options—in our own preferences. The way information is presented, i.e., the frame, can lead to biased judgment because our perception and memory are subconsciously influenced by the context or frame.[16 17]

This natural susceptibility to the framing effect is related to the anchoring heuristic, where, due to the influence of framing, we create frames and contexts that become our anchors (reference points) for subsequent decisions. This influence is especially noticeable in financial decisions, where risk and investment are key elements.[17 18]

Similarly to a doctor who presents us with the risks and benefits of treatment, a financial advisor can influence our decisions by the way they present information—whether they emphasize risks (loss frame) or returns (gain frame) of different options. This can significantly impact whether we ultimately decide in favor of the recommended treatment or investment strategy.[2]

Framing is a tool in negotiation, used to influence motivation and achieve desired outcomes. To better understand, imagine a situation where two programs to reduce traffic accident fatalities are presented. The first achieves a smaller reduction in fatalities with lower costs, while the second achieves a larger reduction but requires a higher financial investment. How these programs are presented to the public can be crucial—whether focusing on the absolute number of lives saved, for example 30 people saved, or on the cost per life saved.[17]

Studies suggest that the way information is framed has a fundamental impact on our behavior, where even a slight change in wording can predictably alter our choice between options. This choice is often influenced by risk preferences, where risk-averse individuals prefer certainty, while those with higher risk tolerance may opt for higher risk in exchange for higher potential reward.[7 16 17]

Framing (also called decision frames) is one of the key assumptions of behavioral finance with influence on our judgments and decisions, which we introduced in more detail in Chapter 2. Framing is also associated with other psychological effects, such as the primacy effect, recency effect, and halo effect.[7]

LOSS AVERSION BIAS

Errors associated with the natural tendency to prefer avoiding losses over acquiring equivalent gains are known as loss aversion biases. In other words, we may assign greater importance to reducing losses than to increasing gains. This natural inclination motivates minimizing losses and often leads to attempts to avoid possible losses at all costs, which can result in imprudent decisions.

These errors are closely related to the anchoring heuristic, as the anchors we create based on the anchoring heuristic can amplify our loss aversion.

For example, if we are anchored to a certain price or value, we may tend to avoid actions that could result in potential losses relative to this anchor. Anchoring on past losses can also intensify loss aversion by prompting us to minimize the risk of future losses, even though this may not always be the most optimal choice in the long run.

The behavioral bias of loss aversion, as part of prospect theory developed by Daniel Kahneman and Amos Tversky and one of the key assumptions of behavioral finance, was introduced together with the disposition effect in Chapter 2.[19]

MENTAL ACCOUNTING BIAS

Errors associated with the natural tendency to organize, evaluate, and track one's financial matters by assigning different "mental accounts" to money based on its source or purpose, which are tracked and evaluated separately, are called mental accounting biases. Richard Thaler (1999) defines mental accounting as a set of cognitive operations that individuals and households use to manage their finances. Key components of the concept include decision frames, account assignment, account closure, and the frequency of account evaluation.[20] [21]

We often subconsciously or deliberately divide money into various "drawers" according to different criteria such as income, expenses, various goals, income source, purpose of funds, or time frame for spending. These "accounts" are more mental than actual. For example, an account for daily expenses, an account for vacation, a mortgage account, a savings account, a bonus savings account, pension savings, and others. Furthermore, research shows that we are willing to pay significantly different amounts for a bottle of beer depending on whether we plan to buy it in a small pub or a five-star hotel. In other words, monetary transactions are framed by alternative accounting schemes that can be flexible and confusing, where value may be highly subjective. For example, this is evident when deciding what price to assign to a painting by an unknown artist that we find beautiful.[2 21 22]

To better illustrate the concept of mental accounting, let us again dive into a short story. Mr. Wise came home one evening from a behavioral finance course, where he was intrigued by the concept of mental accounting along with the advice to mentally merge his assets. When reviewing his savings and debts, he realized he was financially in the red due to unpaid debts. He was aware of one-third of an unpaid mortgage and credit card debt, but mentally, he took comfort from the savings in his savings account and pension plan. Until then, it had not occurred to him to subtract the negative balances from the positive ones. This unpleasant truth—that he was overall financially negative—hit him, so he decided to change his approach. This was also driven by a tendency toward loss aversion. He began to perceive his finances as a whole and focused on achieving financial stability. He no longer perceived isolated successes in individual areas but monitored his finances comprehensively to achieve more balanced financial behavior and to effectively seek ways to reduce his liabilities.

Errors related to mental accounting are closely linked to the anchoring effect. When we divide our money into various imaginary drawers based on where the money comes from or what it is for, we often subsequently rely on instinctive judgments. Research shows that mental accounting can lead to suboptimal financial decisions.

For example, we may be inclined to take more risks with money from certain mental accounts than with money from others, which can encourage impulsive financial decisions or, conversely, missed opportunities for savings or investments. This is often due to subjective perceptions and the notion of an anchor as a reference point—what is considered normal or safe in a given mental account.[23] [24]

Mental accounting can have its benefits, such as encouraging saving, but it can also lead to avoidance of closing these accounts even when doing so would be wise in the given situation. This approach to finances can differ from the traditional idea of fungibility of financial resources. Understanding the psychological concept of mental accounting—that "accounts" are more mental categorizations—can help us make more informed financial decisions and improve financial attitudes and our financial situation in daily decisions. It is important to realize that this mental categorization can influence decision-making and financial behavior.

Research shows that mental accounting has broad implications across various financial areas, including business and personal finance. It is part of the behavioral life cycle hypothesis, which extends the traditional life cycle saving theory by factors such as self-control, mental accounting, and framing.[25] In business, mental accounting influences the formation of financial attitudes and behaviors of young entrepreneurs. Studies also confirm that due to a lack of rationality, we tend to think in nominal prices and disregard inflation, a phenomenon known as "money illusion".[26] [27]

Also interesting are study results clarifying how mental accounting affects our perception of value. For example, when someone has a wine collection, they might feel they enjoy an old, expensive bottle "for free" because they perceive it as already invested value. Conversely, someone who would look at the matter rationally and include current costs like the price and gas spent on the original purchase might not have such a sense of joy from consumption. Thus, while it may be rational to think about things in terms of objective costs and benefits, the irrational approach can sometimes allow us to enjoy the

experience more with a feeling of it being “free.” In other words, we often tend to perceive already owned items as “free” or less costly than new items, even though they were originally purchased at a high price.[21]

This is due to consumer hedonism, where we tend to feel immediate pain when paying, which can diminish the joy of instant consumption, but over time, this fades with thoughts of benefits until the consumption can be felt as free. This phenomenon is known in behavioral finance as the theory of dual mental accounting, the theory of the mutual interaction between the joy of consumption and the pain of payment, where the central assumption is prospective accounting. In other words, from a hedonic perspective, the ideal situation is when payments are tightly linked to consumption (so the payment triggers thoughts of financed benefits), but consumption is detached from payments (so consumption does not trigger thoughts of payment). From an efficiency perspective, however, it is important for consumers to be aware of how much they pay for consumption.[28] [27]

The theory of dual mental accounting, published in 1998 by Prelec and Loewenstein, can explain a number of financial situations. For example, why the ticking of a taxi meter reduces immediate pleasure of the ride, or how our our attitudes toward paying with cash or by credit card are influenced, especially combined with discounts and other anchors. Producers are often aware of the theory and conflicting goals and try to develop strategies that reduce this tension. Similarly, various institutional measures, such as financing public parks through taxes or user fees, should consider these trade-offs in this context.[28] [29]

ENDOWMENT BIAS

Errors caused by the natural tendency to overestimate the value of owned items compared to those not owned are called endowment biases, also known as the endowment effect, which was introduced by Thaler in 1980.[30] This psychological phenomenon is often observed in economic and financial situations and is consistent with prospect theory, which states that losses—giving up—are felt more strongly than gains—gaining. Therefore, we tend to attach greater value to things we own than to things we do not own.[2 31 32]

A similar psychological concept is the house money effect, closely related to the concept of mental accounting and framing, which is associated with a greater willingness to take risks with money that we perceive as a bonus or a win, i.e., "not our own". While "earned money" has greater emotional value for us, leading to greater caution and less willingness to gamble with it, unlike bonus money. This effect of understanding and categorizing money can lead to financially careless behavior, such as a tendency to risk and spend it more carelessly, when we would otherwise consider it important to protect it and behave more cautiously in our investment decisions.[8]

The predisposition to endowment bias is closely related to the anchoring effect. How firmly we hold on to the value of the things we own can significantly influence our decision-making through this heuristic. The value we attach to our possessions can serve as a strong anchor when assessing the value of similar items. For example, when deciding on a new piece of furniture, our initial reaction may be influenced by the value of the furniture we already own, which we then adjust based on additional information.[7]

In the financial world, we can better understand endowment bias with the example of an inherited painting. Due to the tendency to succumb to the endowment effect, we are likely to demand a much higher price for this painting than we would be willing to pay ourselves if we were buying it.

That is why sellers often offer the option to purchase goods "on trial" or return them for a full refund, because they rely on this psychological effect. When we bring something home, it becomes "our property" in our minds and we attribute a higher value to it. This makes it more difficult to return the goods than if we had to make a purchase decision right there in the store. This type of bias can significantly influence financial decisions and investment strategies, as it can prevent us from managing our assets wisely.

Endowment bias is also associated with other biases that influence our behavior, such as status quo bias and loss aversion, and as a result, it can lead to systematically irrational financial decisions. For example, in conjunction with the status quo bias, unreasonable decisions may be made as a result of a preference for things as they are, i.e., for what we own to remain in our possession. This is a natural psychological human tendency to prefer the current state of things to introducing changes in one's life or taking new actions. Therefore, as we will read later in this book, many people, for example, do not change their supplementary pension plan by switching to another financial institution and leave this service at its default setting, even though it would be more advantageous. The endowment effect can also subconsciously reinforce our aversion to loss, because when we own something, we feel the loss more intensely. This can lead to even greater resistance to selling assets, or, conversely, greater motivation to retain ownership, even though it may no longer be financially advantageous. In other words, we perceive such a sale as a loss.[7 33 34 35]

PRIMACY BIAS

Errors caused by the psychological tendency to give greater weight to information or events that occur at the beginning of a list or sequence are called primacy biases, also referred to as the primary effect. This psychological effect subsequently influences how we remember and interpret information, with the first information having a greater influence than later information. In particular, it influences the formation of first impressions, with the primacy effect emphasizing the importance of the order in which information is presented to us.[7]

The primacy bias is closely related to the anchoring effect. When information is presented in sequence, people may give more weight to the information that comes first, even if information that could be more important or relevant is presented later. The anchoring heuristic can amplify this effect by fixing one's estimates or decisions on the first piece of information and then slightly adjusting them based on subsequent information. Together, these can result in people becoming overly fixated on the first piece of information they receive and not giving sufficient consideration to other relevant factors. In addition, the anchoring heuristic is often associated with the concept of semantic priming, where certain information accelerates the activation of related words in the mind. This can further reinforce our tendency to respond to the first piece of information and ignore later information, which can lead to inaccurate or biased decisions.[6 9 10 13 36]

To better understand the primacy effect, let's imagine a situation where a new CFO is described by gossip as envious, stubborn, critical, impulsive, hard-working, and intelligent. When someone is introduced to us in this way, we tend to evaluate that person based on the first characteristics we hear, in this case envious and stubborn. However, if we were first told that he is intelligent and hard-working, our first impression might subconsciously be different. This is because we tend to give more weight to what we hear first and assume that the first piece of information is more important. Although we are often unaware of it, we subconsciously prioritize or offer what we consider important or easier for us, in other words, what we would like the other party to choose or infer from the offer.

Research on the primacy effect confirms that first impressions tend to have a longer-lasting impact, even with repeated presentations. This phenomenon significantly influences how first impressions affect us and what we remember.[3 7 38]

RECENCY BIAS

Similar to the primacy effect, the recency bias (recency effect) is a psychological phenomenon that influences how we remember information we receive. While the primacy effect is about the tendency

to remember information that was presented at the beginning of a list, the recency effect manifests itself in the easier memorization of information that was presented at the end of an imaginary list.[2 39]

We discussed the recency effect in more detail in Chapter 3. Let us recall that errors that occur due to the subconscious overestimation of recent events and underestimation of past events are called recency biases.

The tendency toward recency biases is related to the anchoring heuristic. Subconscious reliance on this heuristic, together with the recency bias, can lead to errors in decision-making when we anchor ourselves too much on recent information without sufficiently considering its relevance or accuracy.[40]

Studies suggest that when we observe two events that follow each other immediately, such as two political speeches, the primacy effect often manifests itself. In other words, the first one tends to leave a stronger impression on us than the second one. However, if a certain amount of time elapses between events, such as a week or a year, the recency effect often attracts more attention and significance in our memory.[7]

HALO BIAS

Errors caused by the subconscious predisposition to judge the overall impression of a person or thing based on the perception of their specific characteristics and appearance are referred to as halo biases.[7] In other words, it is a subconscious tendency to base evaluations on previous impressions or salient characteristics.[8]

The halo effect was first described in a scientific study by Nisbett and Wilson (1977), which showed that humans unconsciously tend to change their own judgments about a person based on the impression that person makes on us. This impact is known as the halo effect and is studied in various fields, such as psychology and social psychology.[41] The halo effect occurs, for example, when a job applicant is intuitively taken more seriously if they are physically attractive and elegant.[42]

There is a connection between the halo effect and the anchoring heuristic, whereby our decisions can be biased by the first impression we receive (the anchor).[7]

For example, if we have a positive impression of a financial advisor because of their professional appearance, we may use this positive impression as an anchor when evaluating their answers to questions. Even if we find this candidate's answers not very strong, we may subconsciously evaluate their abilities and skills more positively. Similarly, for example, reports may be considered of higher quality if they are prepared by a financial manager who is rated as physically attractive or has an attractive voice, for example.[7]

Research on the halo effect has yielded mixed results. Some studies, on the other hand, suggest that the halo effect may be more of a "crown of thorns".[43]

STATUS QUO BIAS

Errors in decision-making resulting from our natural tendency to prefer the current state of things over change are called status quo bias. The term status quo bias was first published in 1988 in a paper by Samuelson and Zeckhauser,[44] who pointed out the subconscious preference for maintaining the status quo, even when more advantageous alternatives exist and change would be a rational step. In other words, it is the tendency to choose the alternative we have chosen before or that is preselected for us, even though it may not be the optimal choice.[45] [33]

The status quo bias is a prominent concept in behavioral finance with evolutionary roots that take us back to the time of our ancestors living on the savannah. They had to make careful decisions when choosing food. Red berries were known to be safe, so they preferred them over other colors. In other words, they stuck to the default status, i.e., safe, familiar options, to avoid the potential danger associated with berries of other colors. [7]

There is a connection between the status quo bias and anchoring heuristics, whereby our decisions can be distorted by our subconscious tendency to prefer maintaining the status quo, to which we subconsciously anchor ourselves.[7] [46]

In the financial world, we encounter the status quo bias, which is the tendency to invest inertially and not change our financial decisions, even though market conditions are changing or new information is coming in. This bias toward maintaining the status quo can have harmful consequences for us, such as missing opportunities to rebalance our financial portfolio. As investors, we often lack the courage to make changes, even though it could be to our advantage. We naturally tend to stick with the default investment options offered, for example, by our employer in the form of a pension plan, because it does not require any active decision-making. In the retail sector, this effect manifests itself in a fear of buying new items and a desire to return to familiar stores. Bias toward the status quo can also influence brand selection, where we subconsciously prefer familiar brands, even if it means higher costs for us.[7] [8] [47] [48]

The tendency to stick with the default setting is also associated with the concept of loss aversion. Studies show that the way gains and losses are presented directly influences individuals' decisions to stick with the default setting, i.e., their current positions, even though selling might be a rational step to minimize potential losses.[7]

4.3. QUIZ

1. **Which psychological factor best explains the tendency of traders to quote an initial price significantly higher than the final transaction price?**
   a. Money illusion
   b. Endowment effect
   c. Anchoring heuristic

2. **What is an "anchor" in the context of the anchoring heuristic?**
   a. Initial information that influences subsequent judgments.
   b. The average value that serves as a reference point.
   c. Final information that influences subsequent judgments.

3. **Which of the following cognitive biases best explains why we are more willing to gamble with money that we have obtained easily, for example through a gift, inheritance, gambling, or winning, than with money that we have earned?**
   a. Mental accounting
   b. Disposition effect
   c. Loss aversion

4. **How does status quo bias affect investment decisions?**
   a. It promotes portfolio diversification.
   b. It leads to investment inertia, i.e., holding investments without changing the original settings.
   c. It promotes active trading and short-term speculation.

5. **What is the endowment effect?**
   a. The tendency to attribute greater value to things that do not belong to us.

b. The tendency to prefer holding on to things that do not belong to us.
c. The tendency to attribute greater value to things that belong to us.

6. **Is the endowment effect associated with status quo bias?**
   a. Yes
   b. No

4.4. ADDRESSED PROBLEMS

1. **Imagine a bustling oriental market full of merchants who attract passers-by to their stalls with their colorful carpets. When you stop at one of them and express interest in a beautiful carpet, the merchant turns to you with a smile and says in an enticing tone, "*This carpet is truly unique, but did you know that it is worth much more than any other item on the market?*" His first offer will, of course, seem exorbitantly high to you. Similarly, when viewing real estate, we encounter real estate agents who show us potential future homes. When we ask about the price, their initial asking price often seems out of this world. Why do oriental traders in markets often start negotiations by mentioning an absurdly high price for goods we show interest in, and why do real estate agents start negotiations on the price of a property by quoting an excessively high initial price?**
   Is this phenomenon related to the psychological heuristic of anchoring?

ANSWER

This phenomenon is explained by the anchoring effect. In negotiations, the initial offer can serve as an anchor leading to the adoption of the final offer during the negotiation process.

ANALYSIS

Why do they do this? They often do so selfishly because they rely on a psychological heuristic called "anchoring". This heuristic tempts us to automatically consider the first number we receive as a subjective reference point for our further considerations about price and decisions. Even if a salesperson or

broker starts with an absurdly high price, it still subconsciously roots the idea of a starting point for negotiation in our minds, even though the final agreed price may be completely different. This anchoring heuristic can then influence the buyer's perception of the value of the goods or services and help salespeople achieve a more favorable deal.

Due to our natural tendency to see the world in black and white rather than shades of gray and to seek simple solutions, we resort to anchor values, which we may adjust, especially in uncertain situations. The effect can even occur in cases where the anchor value is completely irrelevant. Relying on anchoring heuristics leads to inaccuracies in everyday judgments.

2. **James, Linda, and Thomas are three investors who live in the same town, and each has their own approach to investing. A few years ago, James bought shares in a certain company at a price of $60 per share. Since then, he has stuck to this price as an anchor and refuses to sell, even though the share price has fallen to $30, hoping that the price will return to its original level. Linda, on the other hand, is a risky investor. Although she saw that the share prices of some companies had fallen, she decided to take advantage of this situation as a "discount." Unfortunately, she ignored the deteriorating fundamental indicators of these companies and ultimately suffered losses. Thomas, a conservative investor, expected further declines after the market bubble burst and kept his money in cash instead of investing it. As a result, he missed out on opportunities he could have taken advantage of. Despite their different investment strategies, all three investors have a common problem. What is it?**

ANSWER

Investors like James, Linda, and Thomas share a common problem: a tendency to hold on to the subjective anchor of the original purchase price of the shares. When the price falls, they tend to hold on to the shares until they return to their original level, without taking into account changing fundamentals. This increases their risk and prevents them from making rational decisions, such as buying an undervalued investment or selling an overpriced investment.

ANALYSIS

As investors, we often fall into the trap of subjective anchoring to the original purchase price of shares. When the price falls, we tend to hold on to the shares until they return to their original level, instead of objectively considering the fundamentals behind the decline. In this way, we take on higher risk and prevent ourselves from making rational decisions, as illustrated by the example of James, who bought shares for $60 each.

Similarly, we may be subconsciously tempted to anchor ourselves to recent high stock prices and view price declines as an opportunity to buy at a discount. However, we often overlook fundamental factors, which expose us to higher risk. This story clearly illustrates Linda's situation.

After a market bubble bursts, we may tend to negative anchoring and expect further declines in the market, especially if we label ourselves as conservative investors. Relying on simple labels such as "conservative" or "aggressive" when evaluating investments can be misleading, as the actual risk and performance characteristics can vary significantly. As a result, we may overlook opportunities to buy undervalued assets or fail to notice when it is time to sell overpriced investments. It is therefore crucial to conduct a detailed analysis and consider all factors when making investment decisions.

3. **Some banks attract their clients to new financial services and products by offering a trial period with no fees or favorable terms. Even if clients are initially unsure about a given product, after the trial period expires, they often decide to keep the financial service and products. What psychological effect explains this phenomenon, where clients, despite their initial hesitation, ultimately decide to stick with the product after trying it out?**

ANSWER

Endowment bias.

ANALYSIS

This bias can best be explained by the endowment effect, which describes the tendency of people to assign a higher value to things they own than to those they do not own. When we begin to perceive a product as our own property, we become more attached to it and are more likely to keep it, even though we were initially unsure.

There may also be a parallel here with the opt-out framework—a factor that is more likely to cause us to seamlessly transition to the paid version after the trial period expires, simply because we don't know or don't feel like dealing with how to change the default option and cancel the service (such as Apple TV and other similar applications).

4. **Can the concept of anchoring in relation to car purchases influence consumer decision-making, especially among those who are loyal to a brand?**

ANSWER

Yes, in this case, the anchoring heuristic can play an important role as well.

5. **Mr. James Wise, a native of a nearby village, was known in the village for his thriftiness and efforts to secure his financial future. He systematically saved for retirement using a pension fund and a savings account. With every dollar he put aside, his savings grew until they reached a significant amount. He believed that the key to financial independence was investing in the stock market, so he decided to put all his assets into stocks. However, after the Great Recession, Mr. James suffered a painful 40% loss. Even though the value of his investments exceeded what he would have achieved by continuing to save in a more conservative manner, he felt disappointed. What psychological factors may have played a role in this disappointment?**
   a. Loss aversion
   b. Mental accounting
   c. Anchoring heuristic

ANSWER

All of the psychological effects mentioned played a role in the disappointment.

ANALYSIS

Even though Mr. James still had more money than before the investment, the 40% loss could have been emotionally difficult for him and led to feelings of disappointment due to loss aversion. This feeling could have been exacerbated by the mental accounting effect, which could have given him the impression that the loss on the shares was separate from the other parts of his assets.

Such a separation can lead to an emotional reaction to the loss that is not consistent with a rational assessment of the overall financial situation. The anchoring heuristic may also have intensified James's disappointment, as he may have continued to hold on to the initial expected value of his portfolio or other reference value to which he was and is anchored, which may have increased his feelings of disappointment and negative emotions.

6. How does the anchoring heuristic differ from the availability heuristic?

ANSWER

The availability heuristic means that the more we are exposed to information, the easier it is for us to recall that information, especially if it is recent or dramatic. This leads us to perceive these events as common, important, and more likely than they actually are.

The anchoring heuristic influences our decision-making by emphasizing the importance of the first piece of information we receive, which we then use as a reference point for our considerations and decisions. Even when new information emerges, we remain anchored to this original value and change it only very slowly, often even in cases where these anchors may be completely irrelevant. In conjunction with status quo bias, they become key to customer loyalty—especially in industries such as the automotive industry, the luxury goods segment, or financial services, where it is often a matter of creating the impression that a given brand and company is our first choice, which can lead to more lasting brand loyalty even when the market changes.

7. How is anchoring heuristic related to framing effect?

ANSWER

Framing serves as an anchor that influences subsequent judgments.

ANALYSIS

Framing defines the context and perspective through which we perceive the information presented.

In the decision-making process, the anchor acts as a reference point that influences our subsequent judgments and decisions by providing a point of reference to which we naturally tend to cling when processing information and making decisions.

8. Which psychological effect, well known to salespeople, explains the distorted perception of actual costs and impulsive decisions?

ANSWER

This is bias caused by mental accounting.

ANALYSIS

When we buy high-value items, such as a car or a house, we are often willing to purchase various accessories or insurance that we would not normally buy. Salespeople are well aware of how this psychological phenomenon works. For example, when buying a car for $48,000, the additional costs of $766 seem like a relatively low marginal[3] expense compared to the total price of the car. This can lead us to pay extra for various accessories or insurance without much hesitation.

[3] Marginal – a universal term, most commonly used in economics, where it refers to an additional cost, benefit, or effect.

4.5. REFERENCES

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REPRESENTATIVENESS HEURISTIC AND RELATED BIASES

Recognizing the representativeness heuristic is easier than defining it precisely.

Baker & Nofsinger[1]

5. REPRESENTATIVENESS HEURISTIC AND RELATED BIASES

5.1. INTRODUCTION

The third and final key thought pattern in this book—which we tend to rely on in our judgments and decisions—is the representativeness heuristic, based on stereotypical thinking. This heuristic subconsciously encourages us to judge whether people and objects belong to a certain category based on how typical they seem to us. However, we often overlook objective probabilities and neglect logical reasoning. In other words, we often make mistakes when we assume that two similar things or events are closely related even without a strong likelihood of such a connection.[2] [3] [4]

The representativeness heuristic can significantly influence our judgment and perception of reality, so it is crucial that we are cautious when generalizing and making quick judgments. Relying on this rule of thumb can be useful in some situations, as it allows us to draw conclusions based on already known patterns. However, if we do not take sufficient time to consider the matter thoroughly, it can lead to inaccurate conclusions as a result of biased deduction.[2] [3] [4]

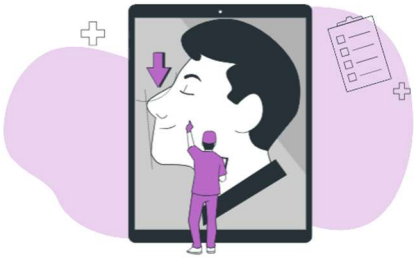
To better understand the representativeness heuristic, let's consider the following story. Imagine a group of college students. One of them is Radovan♡. Radovan is highly intellectual, enjoys philosophical debates, and regularly reads books on art and culture. He wears glasses and often has messy hair. Which of the following fields is he more likely to be studying—philosophy, engineering, medicine, acting, or sports management?

Given the stereotypical ideas about these fields, some of us might assume, as a result of the representativeness heuristic, that Radovan is most likely studying philosophy. This is because his intellectual interests, appearance, and preferences for art and cultural activities may seem to us to be representative characteristics of philosophy students. However, Radovan may in fact be studying a completely different field, such as medicine, which would be less expected given the stereotypes.

If we were to assess the characteristics objectively with regard to objective probability, we might come to a completely different conclusion.[5]

In finance, the representativeness heuristic is a key factor. It is not uncommon for our financial decisions to be influenced by how we subjectively make probabilistic judgments based on similarities to stereotypes. When making financial decisions, we may therefore prefer investments that seem "representative" of successful investments in the past, without considering the objective probability of future returns or risks. This can lead us to overestimate or underestimate investment opportunities.[6]

Research suggests that our intuitive reliance on representativeness heuristics often leads to errors in our judgments and decisions. Key systematic errors associated with this heuristic include extrapolation bias, base rate neglect, the recency effect, conservative bias, hot hand fallacy, gambler's fallacy, mean reversion fallacy, conjunction fallacy, and overestimation of predictability. We will take a closer look at these errors and mistakes in the context of the representativeness heuristic in this chapter.[7]



REFLECTION

1. **On a scale of 1 to 5, how would you rate your tendency to make assumptions based on stereotypical similarities?**

   1 = Yes, I make assumptions based on stereotypes
   3 = I do not know
   5 = No, I do not make assumptions based on stereotypes

2. **Do you think that being aware of our natural tendency to subconsciously judge based on stereotypes can contribute to more responsible decisions and better financial results?**

   YES NO

3. **Do you agree with the statement that some events stand out more than others in our minds, especially if they seem to be representative of a certain stereotype?**

   YES NO

4. **Can you remember a situation when you (most recently) judged or estimated based on stereotypes? Thinking about this situation now, do you think your decision was reasonable?**

5.2. CORE CONCEPTS

The representativeness heuristic is a mental shortcut that humans commonly use unconsciously to make judgments and estimates based on similarities to our own stereotypical and prototypical ideas. This concept explains how many of us make decisions based on the similarity of available data to our preconceived notions, rather than considering objective probabilities—base rates. Decisions based on similarity to a prototype can cause us to neglect objective probability, which can contribute to misjudgment.[7]

Relying on the representativeness heuristic leads us to the mistaken belief that individuals or events falling into a certain category share all the characteristics of other members of that group. This mental shortcut often forces us to identify patterns where none exist, which can lead us to ignore alternative possibilities and make incorrect predictions about the future based on misinterpreted past data. This effect reinforces our stereotypes and focuses our attention only on possibilities that come easily to mind thanks to the availability heuristic. The result is often incorrect decisions and biased conclusions.[7]

The representativeness heuristic is one of the most common but still under-researched mental shortcuts in behavioral finance. Scientific studies show that this heuristic consists of three main parts: the search rule, the stopping rule, and the decision rule.[8 9 10]

The search rule means that we tend to search for information based on similarities to our previous experiences. The stopping rule leads us to stop searching for information when we find a sufficiently stable and representative similarity. The decision rule then guides us to choose the option that best matches these similarities and exceeds our expectations.[10]

In this process, intuition can help the decision-maker compare different options. On the other hand, excessive overconfidence can prolong the search for information and increase costs, which will affect both the decision to stop searching and the decision itself.[10]

The representativeness heuristic was first described by Tversky and Kahneman in 1971 as a way of simplifying complex decisions. They explained that this mental shortcut influences our evaluation and selection of alternatives by assessing the probability of an event based on its similarity to our ideas about a typical case in a given category. Tversky and Kahneman identified it as one of three key heuristics, along with the availability and anchoring heuristic. The representativeness heuristic is often referred to as a close relative of the availability heuristic and is one of the most important and best-documented heuristics in behavioral finance.[3 11 12]

We tend to use the representativeness heuristic—when assessing the probabilities of events, we often base our judgment on how much a given sample or event resembles our idea of a "typical" or "representative" pattern, based on the information available. This intuitive way of thinking, unlike the more accurate Bayesian method, leads us to neglect important factors such as sample size and can therefore lead to incorrect verdicts. For example, if we see a small sample that exactly matches our expectations, we may mistakenly imagine that it is representative of the entire population, even though this may not be the case.[3 13]

The hypothesis of the use of representativeness heuristics has been confirmed in a number of studies with different participants, from naive to experienced individuals. Studies have shown that people rank results according to their probability as well as their representativeness. This means that we often incorrectly predict rare events and extreme values if they seem representative to us.[13]

Representativeness therefore presupposes the possibility of generalizing learning, i.e., applying knowledge gained *from experience* outside the context specific to the situation.[10] Previous research has shown that more experienced decision-makers tend to use this heuristic more often. However, the influence of experience on the effectiveness of using the representativeness heuristic has not been clearly identified as positive or negative by previous research. It has been found that in decision-making tasks with a consistent context and clear feedback, experience can positively influence decision-making. Conversely, in dynamic and changing environments where feedback is ambiguous, experience can contribute to rigid thinking and poor decisions. The key to effective decision-making is the ability to adaptively use experience and be open to new solutions.[14 15 16 17 18 19]

Previous research also shows that *intuition* is a key element in representativeness heuristics. It arises through rapid, unconscious associations based on a deep understanding of the situation and past experiences, which distinguishes it from emotions. In dynamic environments with unclear feedback, intuition enables the effective synthesis of available information, contributing to faster and less costly decisions. It helps identify key stimuli and supports the adaptive use of experience, which is crucial for rational decision-making in volatile and uncertain conditions.[20 21 22 23]

Previous research suggests that overconfidence can significantly influence the representativeness heuristic, but the results of studies are not consistent. Overconfidence, observed across various professions, causes individuals to overestimate their abilities and knowledge. This can result in underestimating the costs and overestimating the benefits of decisions, leading to dysfunctional behavior. Some studies suggest that in environments with a high degree of uncertainty and

ambiguity, overconfidence can accelerate the information search process and terminate it prematurely, thereby reducing search time and associated decision-making costs. Overconfidence can also change the way decision-makers stop the information search process. Overconfidence can therefore cause them to negate feedback and inconsistencies, which negatively affects the quality of decisions. Instead of focusing on the accuracy and stability of the situation, they focus on maintaining their positive image and make decisions based on superficial analogies. On the other hand, some studies show that overconfidence can also have positive effects, such as a greater willingness to take advantage of new opportunities and improved strategic agility of organizations. Managerial confidence may be associated with an organization's ability to respond quickly to new opportunities, allocate resources effectively, and create a collective commitment to those opportunities.[10 24]

Many financial decisions depend on probability estimates, such as the probability that a company will continue to report profit growth. However, stereotypical thinking can be misleading, as past profits are not always a reliable indicator of future performance, especially when the history is short. Research shows that the subconscious use of representativeness heuristics can significantly influence financial planning and decision-making, which usually leads to errors. In this chapter, we will take a closer look at these cognitive errors. To avoid them, it is important to be aware of the influence of representativeness heuristics and to actively try to base investment and financial decisions on facts and data.[5 6]

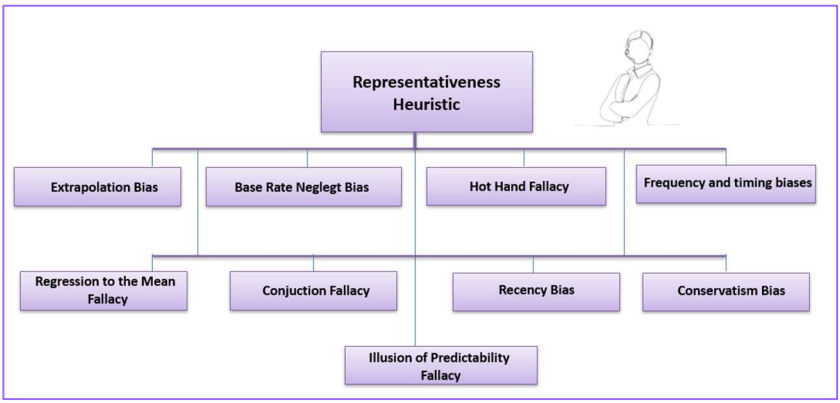
KEY BIASES ASSOCIATED WITH REPRESENTATIVENESS HEURISTIC

The representativeness heuristic, as a natural human desire to see patterns even where they do not exist, allows us to make decisions more quickly. However, it can cause us to make a number of mistakes and hasty erroneous conclusions when assessing and deciding. These

include extrapolation bias, base rate neglect, the recency effect, and conservatism bias.[7]

Other key errors associated with the representativeness heuristics include the hot-hand fallacy, the gambler's fallacy, the mean reversion fallacy, the incorrect weighting of probabilities (overestimation of predictability), and the conjunction fallacy.[7]

Key Biases Associated with the Representativeness Heuristic



Source: Own elaboration with the use of- [5,7]

EXTRAPOLATION BIAS

Extrapolation is a process in which we assume, based on known data, that current patterns and trends will continue into the future. This way of thinking can lead to errors known as extrapolation bias. We often project recent trends into the future without taking objective probabilities into account. This tendency stems from the representativeness heuristic, which leads us to intuitively evaluate the future based on stereotypes and similarities to previous experiences. In other words, we tend to extrapolate past experiences into the future and rely on intuition rather than objective data. This approach often overlooks the reliability of evidence and the probability of outcomes, which contradicts the logic of statistical forecasting and can lead to

poor decisions by often overlooking truly important factors and overestimating what appears to us to be “representative”.[5 13]

In a financial context, extrapolation bias can have serious consequences. For example, we may overestimate the future performance of stocks that have recently achieved high returns and assume that this trend will continue. This short-sighted approach may encourage us to invest in stocks that have recently increased in price without considering other key factors, such as the company's financial stability or its competition. This makes us even more likely to neglect the objective probabilities and risks associated with investing.[5 7 25]

Another example of extrapolation bias in a financial context is the tendency to overestimate a company's positive attributes (e.g., producing high-quality goods) and consider them a guarantee of investment success without taking into account the long-term outlook and other factors. These biases can result in insufficient portfolio diversification and risky behavior, which can cause capital loss or lower returns in the long term. It is therefore crucial to be aware of these biases and to carefully consider all relevant aspects when making investment decisions.[5 7 25]

BASE RATE NEGLECT

Base rate neglect, also known as the base rate fallacy, is the natural tendency of people to draw conclusions based on a small amount of information. We often rely on a few specific pieces of information or too short a period of time and do not pay enough attention to long-term statistical probabilities—that is, how often a given event usually occurs. As a result, we tend to draw conclusions that do not apply to most cases. This is particularly problematic in the investment environment, where decisions are made based on limited data, which can lead to erroneous opinions about the performance of investments or the market as a whole.[26 27]

As mentioned in Chapter 3, the base rate neglect is related to our natural predisposition to rely on the mental model of availability heuristic, but it also appears when applying representativeness heuristics. When we use representativeness heuristics, we focus on stereotypical thinking and make decisions based on typical and familiar patterns. In doing so, we subconsciously overlook the actual probabilities of how often a given event actually occurs. In the context of representativeness heuristics, the base rate fallacy lies in the widespread misconception that a small sample is representative of a much larger population. For example, we may mistakenly assume that a mutual fund manager is experienced because he has successfully implemented a business strategy several times. By attaching too much importance to a few successes (a small sample), one commits the base rate fallacy.[26 7 28]

Neglecting the base rate, caused by subconsciously relying on the representativeness heuristic, manifests itself in thinking errors such as the hot hand fallacy, the gambler's fallacy, and the regression to the mean fallacy. These errors can result in poor financial decisions by overestimating potential returns and underestimating risks because we do not carefully evaluate the underlying probabilities.[5 7]

HOT HAND FALLACY

The hot hand fallacy is the belief that a recent series of successes—for example, when a basketball player scores several baskets in a row—increases the likelihood of further success. The hot hand fallacy is the opposite of the gambler's fallacy in terms of how chance is perceived. While the gambler's fallacy focuses on negative events and assumes that a series of failures must inevitably be followed by success, the hot hand fallacy focuses on positive events and leads to the belief that a series of successes will continue.[26 29 30]

The hot hand fallacy was first examined in detail in a 1985 study by Gilovich, Vallone, and Tversky, which showed that although basketball players and spectators believe that a series of successful shots means that a player has a "hot hand" and will continue to be successful, the reality is quite different. The study showed that success in such situations is more random and that past success does not influence future results.[31]

We humans often subconsciously underestimate the actual probability and instead allow ourselves to be guided by the impression that if something has been going well, it will continue to do so. This feeling, known as the hot hand fallacy, is the result of overlooking basic probability and chance. We thus tend to think idealistically rather than pragmatically. This approach can contribute to poor decisions because it makes it difficult to correctly take into account the randomness and independence of events and often encourages us to make rash decisions.[7 29]

Recent research has pointed to a link between the hot hand fallacy and the representativeness heuristic—the hot hand fallacy may be driven by the representativeness heuristic. It often arises because of a natural tendency to trust the representativeness heuristic, where we believe that success creates a pattern that will continue. In reality, successes and failures in random events are independent. Therefore, past success does not mean (or rather, does not guarantee) that the same success will be repeated.[7 32 33 34]

In finance, the hot hand fallacy can influence our decisions as investors. For example, we may mistakenly assume that good management and a series of profit growths guarantee future success. Although these factors appear to be clear signs of success, by ignoring the broader context and real probabilities, we may end up making unwise decisions. Research has shown that as investors, we tend to fall victim to the hot hand fallacy more in the presence of a strong trend than in the case of moderate stock price fluctuations.[35]

Research by Shefrin and Statman in 1995 revealed that investors largely neglect smaller stock companies, even though these "neglected stocks" can generate higher risk-adjusted returns than large and popular companies. This phenomenon is also related to the hot hand fallacy, where investors tend to mistakenly believe that the past success of large companies will automatically continue. The representativeness heuristic encourages investors (especially so-called "noise traders") to automatically consider large companies as safe and profitable investments, while neglecting key factors such as systematic risk. The hot hand fallacy then leads to poor investment decisions, with investors overlooking smaller but potentially profitable stocks because they expect large companies to keep doing well. The research points out that traditional notions of success may not always lead to the best investment results, and therefore it is crucial to consider the broader context and objective data when making decisions.[36] [37]

GAMBLER'S FALLACY

The gambler's fallacy is the faulty belief that after a series of certain results, the opposite result must inevitably follow. This phenomenon greatly influences financial choices. It represents the belief that after several consecutive losses (for example, in roulette), a win "must" come, or that after a series of increases in the financial markets, a decline must necessarily follow, simply because a decline has not occurred for a certain period of time. In other words, that the coin must now flip. This extrapolation bias error arises from the mistaken assumption that random events influence each other, even though they are in fact independent.[7 33 35]

The gambler's fallacy is a consequence of representativeness heuristics, which contribute to erroneous conclusions. We tend to subconsciously overlook the fact that random events can deviate from the average in the short term without affecting future results.[29 33]

In the world of finance, this fallacy usually manifests itself in investment decisions, where we believe that a series of declines in the markets must be followed by growth, or vice versa. For example, an investor may incorrectly assume that after nine days of growth in the S&P 500 index, a decline must follow. This view is based on a misapplication of the law of small numbers, whereby when evaluating short-term trends or small amounts of data, we may tend to mistakenly assume that the results will correspond to the long-term average. In other words, with a small sample of data, we often incorrectly assume that the results will correspond to the long-term average.[5 29 34]

This mistake also explains why we repeatedly and irrationally persist in losing financial situations or take unnecessary risks. We often mistakenly believe that after a series of failures, a turnaround for the better must necessarily follow. This leads us to take further risks or maintain disadvantageous positions, instead of considering the real probability of success and taking into account the broader context. This misconception often contributes to people with gambling disorder continuing to gamble despite their losses.

They believe that after a series of losses, a win must inevitably follow, which motivates them to take further risks. This flawed way of thinking can deepen gambling addiction and make it more difficult to manage the disorder. As investors in financial markets, we tend to fall for the gambler's fallacy when there is moderate price volatility rather than when there is a strong trend.[35]

To avoid the false expectation that short-term sequences can represent a long-term average, it is important to consider the broader statistical context and not rely solely on short-term trends as reliable indicators of future developments. Research also shows that the gambler's fallacy is influenced by the way information is obtained. When people follow results sequentially, they tend to fall for this fallacy more often. However, when the same information is presented all at once, this illusion is weakened. This has practical implications, for example in investing, where people should be aware of how the way information is presented influences their decision-making.[38] [39]

MEAN REVERSION FALLACY

The mean reversion fallacy, also known as "non-regressive forecasting", is one of the key cognitive errors in behavioral finance. This fallacy consists in our subconscious disposition to ignore the statistical tendency of extreme values to return to the mean over time. In other words, the trend of reversion to the mean, which means that after significant fluctuations (positive or negative), a return to more normal values is more likely.[29]

The mean reversion fallacy is strongly linked to the representativeness heuristic, which is a cognitive shortcut that we tend to rely on when assessing probability based on the similarity of events. We assume that if a situation exhibits certain characteristics, it will continue in a similar trend in the future. This leads to the neglect of basic statistical principles and a misperception of long-term developments. People who fall for the mean reversion fallacy expect an exceptional event to continue, even though it is more likely that values will return to the mean after a certain period of time.

This fallacy is common in finance, especially among investors. For example, many of them get carried away by the recent performance of stocks, mutual funds, or other investments and expect them to continue to perform exceptionally well. They do not take into account the possibility that results will tend to return to the average over time. If stocks have performed above average in recent years, many investors believe that this trend will continue, even though historical data suggest that performance usually normalizes in the long run. This can lead to overvaluation of risky assets and subsequent disappointment when performance returns to average.[37]

Conversely, in the case of poor performance, the mean reversion fallacy can have the opposite effect—investors may underestimate the potential for recovery. Investors may react inappropriately to a series of failures and decide to sell securities at a time when the expected return to average values could bring positive results.

In the financial world, the mean reversion fallacy is particularly dangerous because it can influence our investment decisions. Mutual funds are a classic example. Funds that have performed above average in the recent past may attract investors who believe that their success will continue. However, this is not guaranteed. Even high-performing funds are often prone to a gradual return to average market performance. The same principle applies to funds that have recently performed poorly—they may recover if their performance returns to average values.

A common manifestation of this fallacy is also the tendency of investors to estimate the true "long-term average return" of the market. Historical averages can provide some insight into past performance—for example, the long-term historical average return on stock markets is approximately 7% per annum above the return on bank deposits. However, any extrapolation of this trend into the future is fraught with uncertainty. Investors should be aware that historical averages do not necessarily imply that such performance will continue in the coming years, decades, or even centuries.[7]

The mean reversion fallacy teaches us how important it is not to succumb to short-term extremes and trends in our decision-making.

Whether in finance, sports statistics, or other areas of life, neglecting the natural reversion to the mean can lead to exaggerated expectations and poor decisions. Awareness of this tendency is essential for creating better, more prudent (rational) decision-making processes. In the world of finance, it is particularly important to keep in mind that extraordinary events are the exception rather than the rule, and long-term performance trends are prone to oscillate around the mean.

CONJUNCTION FALLACY

The conjunction fallacy is one of the most common cognitive biases. It is a natural tendency to overestimate the probability that two events will occur together, i.e., in "conjunction". We may therefore mistakenly believe that the probability of two events occurring simultaneously is higher than the probability of one of these events occurring independently, even though this contradicts the law of probability. In reality, the probability of a joint occurrence is always lower than the probability of each event occurring independently. The probability of conjunction P(A&B) cannot exceed the probabilities of its components P(A) and P(B).[26 30 40 41]

If someone asked you whether it is more likely that Mr. Radovan wears glasses or that he wears glasses and reads a lot of books, many people would intuitively choose the second option. This is because we usually automatically associate glasses wearers with intellectual activities such as reading rather than, for example, extreme sports. However, from a purely statistical point of view, it is more likely that Radovan only wears glasses than that he wears glasses and reads a lot at the same time. Adding another condition reduces the overall probability.[1 26 42]

This error in judgment occurs as a result of a natural predisposition to rely on the mental shortcut of representativeness, which leads us to irrational judgments based on stereotypes. The conjunction fallacy is a manifestation of the representativeness heuristic. We often find it easy to imagine that two events, such as Mr. Radovan wearing glasses and reading a lot, are more likely because they are intuitively related. The

better these events correspond to our ideas, such as the idea of Mr. Radovan's high intellect, the more we tend to believe that their occurrence is more likely, even though this may not be true from a probability perspective.[1 26 34 40 42]

This fallacy has significant implications in the world of finance and investment decision-making. Investors often succumb to the conjunction fallacy when assuming that the occurrence of several specific conditions together is more likely than one of these conditions alone. For example, option 1 – stock markets will achieve double-digit growth over the next five years; and option 2 – stock markets will achieve double-digit growth over the next five years, supported by strong double-digit growth in corporate earnings.[7]

Intuitively, the second scenario may sound more convincing because it appears consistent: double-digit earnings growth should naturally result in double-digit stock market returns. However, statistically speaking, the probability of double-digit growth alone (scenario 1) is higher than the probability that this growth will also be conditioned by another factor, such as earnings growth (scenario 2). Stock markets can achieve strong returns even without earnings growth, for example, due to asset price growth, interest rate changes, or the influence of monetary policy.[7]

Research confirms that the conjunction fallacy is a real problem in our thinking, and better theories need to be developed to explain the cause of these errors. In an investment context, the conjunction fallacy can often lead to poor investment decisions, as investors tend to favor scenarios that seem logical and representative to them, even if they are statistically less likely. Imaginable scenarios that involve multiple factors at once are more appealing to us than simple options, leading to an overvaluation of complicated but less likely outcomes.[7]

For example, an investor may believe that stock markets will rise only if corporate profits increase and interest rates fall at the same time.[43] Yet again, our thinking deceives us—we are prone to believing in consistent and logical stories without realizing that adding additional conditions reduces the probability. In practice, this means being cautious about complex predictions involving many factors and not getting

carried away by complex scenarios that seem credible because they are conceivable but statistically less likely. Understanding this deception is also key to improving our decision-making processes in an uncertain financial world.[7]

RECENCY BIAS

Recency bias is a cognitive distortion involving the tendency to give greater importance to recent events or information, while older or more relevant data are overlooked. This susceptibility causes fresh impressions or experiences to dominate our decision-making, even when they should be assessed in the broader context of long-term trends. As discussed in Chapters 3 and 4, recency bias can lead to incorrect conclusions and decisions in many areas of life, from performance evaluation to financial investments.[7] [44]

In everyday life, recency bias can affect various situations. For example, when evaluating an employee's performance, supervisors may place disproportionate emphasis on recent success or failure, without considering overall performance throughout the year. Similarly, students may overestimate their exam readiness based on a recent successful exercise attempt, even though their overall knowledge of the subject remains weak.[7] [45] [46] [47]

Recency bias is closely related to the representativeness heuristic. This cognitive shortcut leads to judgments based on how much a new piece of information is "representative" of a given situation. In the case of recency bias, recent developments are often considered representative of the overall trend, even though this may not be the case. As investors, for example, we might assume that stocks that have recently risen will continue to follow the same trend, because this development fits our existing mental model of a successful market. However, this approach ignores the importance of long-term data analysis and broader fundamental factors.[7]

Trend and momentum following has long been a favored strategy in technical analysis, which focuses on identifying turning points and is based on the assumption that recent developments are indicators of

what is to come. A study by the *American Association of Individual Investors (AAII)* found that investor optimism increases with recent market growth—for instance, strong past performance of mutual funds often attracts new capital. Due to the recency bias, investors believe that recent results foreshadow future ones. This approach, however, overlooks the fact that long-term returns may not reflect recent performance. Sentiment surveys, such as the one by *AAII,* reveal a fascinating dynamic in which investors heavily base their market outlook on recent experiences. That means that if the market has recently risen, investors tend to form optimistic expectations for future performance, which may result in overestimating future returns.[7 48]

In investing, recency bias manifests in the tendency of investors to assign more weight to the recent performance of stocks or funds and base decisions on this. This phenomenon is commonly referred to as "chasing winners", where investors allocate funds to assets that have recently outperformed, believing this trend will continue. However, research shows that such a strategy is not typically successful. While it is possible that investing in "winners" may pay off in the short term for *momentum seekers* betting on market dynamics, over the long run, asset performance tends to revert to the mean, which may lead to disappointment among investors who blindly follow recent trends.[26]

A recent study exploring the impact of gradually released information on investor decision-making found that investors are often influenced by the recency effect, assigning more weight to recent information. The experiment further showed that even when investors had all information upfront, discussions among them intensified the bias and led to an overestimation of positive news and underestimation of negative news—with negative news having a greater impact. The study concluded that companies may benefit from gradually disclosing good news, while releasing bad news all at once. Investors were advised to consider limiting participation in investment forums, which may exacerbate recency bias.[49]

While recency bias emphasizes the importance of recent events, the primacy effect operates in the opposite manner—giving more weight to the first information a person receives. This effect often appears

when two events occur close together, such as when watching two political speeches in succession. When there is a longer time gap between events, recency bias tends to be stronger, as recent information has a greater chance of influencing our decision-making than earlier impressions.[47] [46]

To defend against this distortion, it is essential to focus on long-term trends and facts and avoid overemphasizing short-term fluctuations. One useful method is self-review, a simple technique proven effective even in auditing practice. This technique can help us reassess our decisions, prevent recent information from overly distorting our judgment, and guide us toward more consistent and deliberate choices.[46] [47]

CONSERVATISM BIAS

Conservatism bias is a cognitive inertia bias (similar to default bias and endowment effect), in which we have a natural tendency to cling to our original beliefs for too long, even after receiving new relevant information that should influence our convictions. As a result, we update our beliefs and predictions slowly, despite the availability of new relevant data. Conservatism bias thus means a slow adjustment of beliefs in light of new evidence. This tendency often unconsciously prevents us from reassessing our views and can lead to inaccurate decisions, as we may underestimate or even completely ignore important information that could challenge our existing beliefs.[1] [13] [34] [50] [51]

We often tend to prioritize information that is easy to process. When confronted with complex data or information that is difficult to verify,

we hesitate to change our beliefs, reinforcing our conservatism. This frequently leads to underestimation of key facts and persistence in existing views, even when the odds are in our favor. In addition, we subconsciously tend to seek confirming information (confirmation bias), which further deepens our conservatism as we rely on past experiences. Research shows that people with higher cognitive reflection scores are less susceptible to this bias.[7 52 53]

Conservatism bias arises from the representativeness heuristic, whereby new information that does not fit established patterns or stereotypes tends to be ignored or undervalued. While representativeness can cause overreaction to pattern-consistent data, conservatism bias works in the opposite direction. If new events do not align with our prior expectations, we underreact, hesitate to respond, and adapt slowly due to preference for old information.[1 13 54 55 56]

This slowed adaptation process, anchoring investors in previous beliefs, is a typical manifestation of conservatism bias triggered by representativeness.[1 13 54 55 56]

In financial contexts, conservatism bias is most visible in investors' short-term decision-making. When faced with new information, they commonly hesitate to incorporate it due to cognitive and time costs. This contributes to market anomalies such as the post-earnings announcement drift, where stock prices continue to move upward or downward even after earnings are released and differ from expectations.[7 54]

Investors often fail to react immediately, believing that profits and firm values are more stable than they actually are. This leads to underestimation of critical data and slow market adjustment, misrepresenting the true value of companies. Such conservatism results in clinging to outdated beliefs and inefficient responses to changing market conditions.[7 54]

Recent studies suggest that combining the representativeness heuristic and conservatism bias can explain market dynamics through investor reactions to new information. According to a unified theory, the market oscillates between two states – *mean reversion* and *trending movements*, either upward or downward. Two types of investors play crucial roles in this dynamic. *News watchers*, who rely on fundamental analysis, react slowly to new information and often stick to previous beliefs, delaying their adaptation to current market conditions.[1 50 57 58 59 60]

The second type, *momentum traders*, use technical analysis, focus on price trends, and tend to overreact, pushing market prices away from intrinsic values. The slow diffusion of information among news watchers can lead to stock prices lagging behind fundamental changes, creating new market trends and increasing volatility. The interaction between these investor types and their psychological tendencies has a significant impact on price development.[1 50 57 58 59 60]

Conservatism bias plays a key role in experimental economics, especially in the formation of economic bubbles. This bias causes investors to hesitate in adjusting decisions based on new data, often relying on stereotyped patterns. Such behavior can result in aggressive investing based on insufficient information and the formation of speculative bubbles. During a rising stock market, investors often assume the trend will continue despite warning signs. The bubble echo phenomenon occurs when a short-term recovery creates a false sense of stability due to investors' attachment to prior beliefs. Psychological studies indicate that belief revision requires a higher burden of proof, increasing the risk of bubbles. When bubbles burst, the loss of the illusion of market stability is painful, forcing investors to revise their strategies. This behavior, driven by conservatism bias, contributes to persistent market myths and exaggerated reactions. Overall, these psychological tendencies significantly influence economic cycles and suggest that *losing the illusion* is a necessary step toward revising investment strategies. The key factor is the very nature of human psychology.[46 47]

OVERESTIMATING PREDICTABILITY FALLACY

The overestimating predictability fallacy is an error in forecasting caused by the predisposition to believe that events are more predictable than they truly are, and by the unwillingness to admit that some things are inherently unpredictable or only barely predictable. It manifests in unrealistic expectations in situations where we overlook or underestimate randomness and the difficulty of predicting many events. Similar to the planning fallacy, which involves underestimating the time and costs associated with a project, the fallacy of overestimating predictability reflects a tendency to downplay uncertainty and unpredictability, which may result in poor decisions and ineffective risk management.[7 62 63]

The overestimation of predictability in forecasting often stems from the subconscious reliance on the representativeness heuristic, which leads to judgments based on similarity to known patterns or stereotypes. This phenomenon has been demonstrated in various studies.[7]

For instance, we might be convinced that there is a strong positive correlation between a sense of humor and average academic performance. This assumption may arise from a predisposition to associate a good sense of humor with successful personalities—a common stereotype. Although such a correlation may not exist in reality, people have the ability to percieve patterns in data that are in fact non-informative and may be random.[7]

The overestimating predictability fallacy, when combined with cognitive biases that affect financial decision-making, encourages investors and policymakers to believe that it is possible to predict market movements and economic outcomes more accurately than is realistically feasible. This fallacy can have serious consequences, including systemic risks in financial markets.[64 65]

Overconfidence bias is one of the key cognitive distortions that contribute to the fallacy of overestimating predictability and thus to unrealistic forecasts. Research findings show that overconfidence can lead to significant financial losses, as it causes us to take on excessive risk

without adequately considering the uncertainty inherent in our predictions.[64] [65]

The bias toward overestimating predictability has important implications in finance, as it is closely linked to investors' tendency toward excessive confidence, which it often reinforces. Believing in their ability to reliably forecast future market developments, investors tend to take on greater risk and drive up asset prices beyond their intrinsic value—thereby creating market bubbles. When the market then behaves differently than investors expected, sharp declines and crises can follow, threatening the stability of the financial system.[37] [66]

To conclude this book, let us briefly touch upon the bias known as overconfidence (also called excessive confidence), one of the most significant and common emotional biases, which intuitively leads us to *belief perseverance*—the tendency to cling to our beliefs.

It is often related to a natural, subconscious desire to impress others and to create a positive self-image. In everyday life, a typical example is the tendency of most people to rate their driving skills as above average, even though this is statistically impossible.[1] [5]

Similarly, in financial choices and investing, overconfidence leads to an overestimation of one's intuitive and cognitive abilities. As investors, we often fall into the so-called "superiority trap", succumbing to selective memory and inflated *ego*, which reinforces our belief that we have exceptional skills in stock picking and market timing. In reality, however, most individual investors make decisions at the wrong time and in the wrong direction, overestimating their ability to predict future

market developments. Overconfidence is commonly associated with self-attribution bias—the tendency to take credit for successes while blaming external factors for failures—and with hindsight bias, which leads us to recall our successes while ignoring our failures. The illusion of knowledge—the belief that we know more than we actually do—further increases the risk of poor decisions such as excessive trading, poor market timing, or unnecessarily high risk-taking. Overconfidence also increases vulnerability to financial fraud, as it weakens rational judgment—affecting not only individual investors but also professionals, who, despite their tools and experience, often fail to outperform the market.[5 37 66]

The tendency to persist in our beliefs is closely linked to the sunk cost fallacy—the inclination to remain in disadvantageous decisions or projects simply because we have already invested time, money, or energy in them. This distorted perspective often prevents us from rationally reassessing a situation and choosing better alternatives. In investing, it may manifest as continuing with loss-making projects or unnecessary trading. When this is compounded by the status quo bias and fear of regret, it can lead to even deeper entrenchment in poor decisions and unprofitable situations. As Seth Godin aptly put it: *"Winners quit fast, quit often, and quit without guilt."*[7]

True winners are not those who never make mistakes but those who have the courage to admit errors in their thinking and to change course with a clear mind and an open heart. That is the key to overcoming bias, making free choices, and arriving at wiser (not only) financial decisions.

5.3. QUIZ

1. **What do people often ignore when using the representativeness heuristic?**
   a. Base rates
   b. Personal experiences
   c. Emotional factors

2. **Who first described the representativeness heuristic and in what year?**
   a. Shefrin and Statman in 1976
   b. Tversky and Kahneman in 1971
   c. Thaler and Shiller in 1975

3. **What are the main components of the representativeness heuristic according to scientific research?**
   a. Search rule, stopping rule, decision rule
   b. Similarity rule, availability rule, consistency rule
   c. Intuition rule, experience rule, reflection rule

4. **Which of the following statements is NOT correct?**
   a. Experience can positively influence decision-making in a consistent context, but in dynamic environments, it may contribute to rigid thinking.
   b. The representativeness heuristic leads us to judge the likelihood of events based on how much they resemble our existing stereotypical ideas.
   c. Intuition has no effect on decision-making in dynamic environment.

What causes extrapolation bias and how can it affect our decision-making in a financial context?

a. Extrapolation bias is an emotional shortcut that arises from ignoring all statistical data and relying solely on intuitive judgments, leading to biased conclusions. It may cause investors to overlook important factors and overestimate opportunities regardless of objective probabilities.
b. Extrapolation bias is an emotional shortcut in which people ignore new information and rely only on historical data. This approach may lead investors to disregard current market changes and focus solely on long-term trends.
c. Extrapolation bias is a cognitive shortcut rooted in the representativeness heuristic, which leads us to extrapolate recent patterns into the future without considering objective probabilities. In a financial context, it may lead to the false belief that the past will always repeat itself.

5.4. ADDRESSED PROBLEMS

1. Is extrapolation bias related to base rate neglect?

ANSWER

Yes, there is a connection between extrapolation bias and base rate neglect. Their influence can be illustrated within a financial context.

ANALYSIS

Extrapolation bias refers to the tendency to assume that current patterns and trends will continue into the future. In other words, we tend to project recent events or trends forward, without considering the possibility that conditions might change or the trend may be unsustainable.

Base rate neglect refers to the tendency to ignore base statistical information or prior probabilities (i.e., the base rate) when evaluating the likelihood of an outcome. For example, if we know that a certain event is rare in the general population but overlook this fact when assessing its probability, base rate neglect is at play.

Both biases can lead to flawed decision-making, as they either disregard essential statistical information or overemphasize recent or salient patterns—albeit in different ways.

Extrapolation bias may lead us to focus only on recent trends while ignoring base statistics such as long-term average performance. For instance, if an investment has recently posted high short-term returns, we may neglect its historical average (base rate) and assume the trend will continue.

Base rate neglect may arise when we rely on the representativeness of a specific case within a broader population and disregard base rates that suggest the case may not be typical.

Extrapolation bias can exacerbate this tendency by reinforcing assumptions about the continuation of current trends regardless of statistical grounding.

In a financial context, investors may observe a recent rise in stock prices (extrapolation bias) but ignore the fact that most stocks historically do not sustain such performance (base rate neglect). This may result in overestimating the likelihood of continued growth.

2. Consider the following scenario:

Is it more likely that a university student in an economics or finance program, tasked with estimating the expected returns from investments in two companies, would estimate higher future returns for a well-known computer manufacturer (e.g., Dell) with a strong market reputation than for a company with an unclear reputation (e.g., Unisys) that evokes neutral or negative feelings? Can individuals with financial knowledge also fall for the representativeness heuristic, and can it affect their financial decisions and investment recommendations?

ANSWER

Research shows that even individuals with financial expertise, such as university students in economic programs, are subconsciously prone to the representativeness heuristic.

As a result, they may make subjective estimates that lead to flawed investment decisions.

As Hersh Shefrin notes, even top Wall Street investors and financial professionals make errors when unknowingly influenced by biases, such as overconfidence, emotional decision-making, and heuristic-driven thinking.[35 67 68 69]

Using financial models is therefore essential to obtain a more objective view of expected returns and investment risks, reduce personal biases, and better account for actual market risks.

ANALYSIS

In a 1995 experiment on the influence of the representativeness heuristic in investment decisions, Shefrin and Statman studied investors and students with expertise in technology and investing. It was expected that their knowledge and experience would lead to informed expectations of stock returns for companies such as Dell and Unisys.[70]

However, the results revealed that business students typically predicted higher returns for well-known companies with a strong reputation like Dell. Meanwhile, less familiar firms like Unisys were perceived as less profitable investments. This behavior was influenced by superficial attributes and company image rather than objective data.

The CAPM model, which uses objective data and accounts for investment risk, predicted expected returns of 19.1% for Dell and 21.7% for Unisys—indicating that the lesser-known company could offer higher returns. This contradicted the students' intuitive estimates. Students tended to overestimate the returns of "good" companies and underestimate those of less familiar or negatively perceived firms—an example of the representativeness heuristic.

This gap between subjective estimates and objective calculations highlights the importance of using financial models like CAPM in investment decision-making. These models help eliminate personal biases and offer more accurate estimates based on real market conditions and risks—crucial for making informed and rational investment choices.

3. What is the name of the reasoning error that leads us to believe a win must follow a series of losses? Provide concrete examples of this bias and explain how it differs from a related fallacy, in which we believe a trend will continue.

ANSWER

The gambler's fallacy is the faulty belief that after a series of outcomes, the opposite result is due.

This fallacy stems from the belief that randomness "balances out" over the short term.

In gambling, players often fall for the gambler's fallacy when they believe that after several red numbers in roulette, a black number is due. In investing, it manifests when investors expect a market downturn after a series of positive returns. Misjudging short-term fluctuations as long-term trends or overestimating the likelihood of a reversal after a streak is a key feature of this bias and has been linked to financial crises.

The opposite of the gambler's fallacy is the hot hand fallacy—the faulty belief that recent success increases the likelihood of further success.

Both fallacies stem from the representativeness heuristic, which leads us to overestimate the influence of past events on future outcomes—even when those events are actually independent (e.g., each spin of the roulette is independent of the previous one).

As a result, we may wrongly believe that short-term outcomes will necessarily revert to the mean or continue in trend, despite this not applying to random events.

REFLECTION

Can the influence of cognitive errors such as the gambler's fallacy and the hot hand fallacy be minimized by focusing on objective data and rational analysis rather than subjective feelings and intuitive beliefs?

4. **Imagine that, as an investment analyst, you have access to a *Fortune* magazine survey that reveals peculiar investor behavior when evaluating stocks. You discover that respondents tend to assess stocks by perceiving large companies with low book-to-market ratios as "good companies" and simultaneously believe that "good stocks" are automatically those of these "good companies". You note that this perception contrasts with empirical evidence showing that stocks of smaller companies with higher book-to-market ratios often generate higher returns.**

   Which thinking pattern could help explain why survey respondents were inclined to automatically consider large companies as "good" investments compared to smaller firms, even though smaller-cap stocks with higher book-to-market ratios historically provided better returns?

ANSWER

The hot hand fallacy is the mistaken belief that past success will continue into the future. This leads investors to favor large, well-known firms based on historical performance, even though data suggest that smaller firms may deliver higher

returns. Research by Shefrin and Statman[36] demonstrated how investors tend to overlook the risks and returns of smaller stocks due to biases associated with the past success of large companies.

ANALYSIS

The representativeness heuristic and the associated hot hand fallacy help explain why investors often rely on stereotypes when evaluating and selecting stocks. Investors, much like the students in the previous example, tend to depend on the representativeness heuristic and fall prey to the hot hand fallacy. This leads to a natural predisposition to prefer companies that appear successful (e.g., simply because they are large and well-managed), while overlooking potentially profitable investments in lesser-known firms. As a result, investors may avoid investing in value stocks of small-cap companies that have historically outperformed.

Instead of considering a broader set of factors and data—such as the level of systematic risk measured by beta (also known as stock volatility)—the Fortune survey respondents relied on the belief that "good stocks" are linked to "good companies", which for most investors means large, familiar firms.

This connects to the hot hand fallacy, which is rooted in the false belief that past success will continue. It encourages investors to prefer large, well-known firms based on previous performance, even though evidence indicates that smaller firms may yield higher returns.

Shefrin and Statman's research illustrates how investors ignore the risks and returns of smaller stocks because of their bias toward the past successes of big firms.

Many survey respondents favored their mental image of successful large firms due to stereotypical thinking and unconscious reliance on the representativeness heuristic. Naturally, they considered large firms (even with low book-to-market ratios) as "good companies" and their stocks as "good

investments", while ignoring data showing that smaller companies with higher book-to-market ratios could deliver better returns.

Understanding investors' (especially noise investors') tendency to succumb to biases related to the representativeness heuristic (driven by stereotypical thinking) helps explain why mathematical models developed for asset pricing—such as the CAPM, which assumes that higher risk should result in higher returns—often fail in practice. Many investors do not make decisions in a purely rational manner. Instead, they are influenced by biases and stereotypical thinking. For example, they prefer investing in large, well-known companies simply because they view them as "good" investments, even if that is not supported by data. This intuitive tendency overlooks key factors like risk and contributes to the weak empirical relationship between risk and return that contradicts the CAPM.

REFLECTION

Choose two companies—one with high analyst ratings and another with low ratings.

Based on these ratings and other available information about the companies, estimate which one will have better investment performance. Then compare your estimate with the companies' historical performance.

Record whether your estimate aligns or diverges from actual performance and reflect on the influence of the representativeness heuristic in your decision-making.

A POINT TO PONDER

High ratings for management quality and other attributes—such as innovation or social responsibility—can lead to the conclusion that a highly rated company will have superior investment performance. Conversely, a company with lower ratings may be perceived as riskier and less profitable.

However, historical data may show that companies with low ratings (e.g., small cap value firms) can outperform those with high ratings (e.g., large growth firms). This result contradicts intuitive expectations that tend to favor companies with a positive image.

5. You are part of a research team at a financial institution studying clients' investment decisions. What is more likely?

A) More investors will invest in the stock market.

B) More investors will invest in the stock market and be interested in ecological projects.

ANALYSIS

The goal of this task is to recognize the concept of the conjunction fallacy and to reflect on one's own probability judgments in an investment context. This fallacy occurs when people intuitively judge the probability of two events (e.g., investing in stocks and being interested in ecological projects) as higher than the probability of one event (e.g., investing in the stock market). By estimating probabilities and reflecting on our thinking, we become more aware of how biases affect our judgments.

REFLECTION

You may have cautiously assigned a higher probability to statement A than to statement B. If so, then you avoided the conjunction fallacy. The fallacy arises from the belief that the probability of a conjunction (two events occurring together) is higher than the probability of a single event. In this case, it would mean mistakenly assuming that it is more likely that an investor invests in stocks and is interested in ecological projects, than that they simply invest in stocks. In certain

situations, this kind of reasoning can lead to inefficient decision-making. Accurately assessing risk and return can make the difference between a successful investment and a loss—and that's where understanding the conjunction fallacy can be especially useful.

A POINT TO PONDER

This example is an adaptation of the famous experiment by Tversky and Kahneman (1982)[12], which illustrates the conjunction fallacy. In their experiment, participants were presented with a description of a woman named Linda - she is 31, single, very intelligent, and active in social issues. Participants were then asked to rank the likelihood of statements about Linda. Many (85%) assigned a higher probability to the statement that Linda is a bank teller and active in the feminist movement than to the statement that she is simply a bank teller. This judgment was incorrect because a compound statement (a feminist bank teller) can only be as probable as its simpler component (bank teller). This type of thinking is known as the conjunction fallacy, and in financial contexts, understanding it is important for improving investment strategies.[51]

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CONCLUSION

CONCLUSION

As this book draws to a close, it invites us to reflect on one of the key messages that behavioral finance brings to the table: financial choices are not just about numbers, trends, and strategies—they are, above all, about ourselves. *Price and value are not the same*; value reflects a level of satisfaction, and that can vary significantly depending on each person's current situation. Subconscious thought patterns, emotions, social ties, and the surrounding environment are inseparable parts of almost every financial decision.

"The investor's chief problem—and even his worst enemy—is likely to be himself," as Benjamin Graham once noted. These words encourage us to look deeper and realize that success in financial markets is not just about understanding market mechanisms or being financially literate. Behavioral finance helps us understand ourselves and teaches us the art of self-reflection. If we learn to master our fears, think without bias, resist impulsive behavior, and act with deliberation, we hold the *key* to a safer financial future and deeper personal contentment.

I have come to believe that what happens to us in life is not merely a matter of chance, but a reflection of our past decisions and our ability to learn from them. True freedom of choice lies in the ability to think consciously and without prejudice, to act with calm consideration—a skill that remains rare and precious even today. The power to choose freely, to break old patterns of thinking, to work with our emotions, and to move forward with courage and clarity—this power lies within us. May your financial decisions be thoughtful and fulfilling.

The key to contentment lies within ourselves 🍀.

ANSWER KEY

CHAPTER 1

Answer key: 1 c., 2 a., 3 a., 4 a., 5 a., 6 b.

CHAPTER 2

Answer key: 1 a., 2 c., 3 a., 4 c., 5 b.

CHAPTER 3

Answer key: 1 c., 2 b., 3 a., 4 a., 5 c.

CHAPTER 4

Answer key: 1 c., 2 a., 3 a., 4 b., 5 c., 6 a.

CHAPTER 5

Answer key: 1 a., 2 b., 3 a., 4 c., 5 c.

INDEX

LIST OF ABBREVIATIONS

AAII	American Association of Individual Investors
ANT	Automatic negative thoughts
CAPM	Capital asset pricing model
CPT	Cumulative prospect theory
EMH	Efficient market hypothesis
IQ	Intelligence quotient
PFC	Prefrontal cortex

LIST OF FIGURES

IMAGE SOURCES

Only royalty-free images from https://www.freepik.com/free-vector were used in this book.

METHODOLOGY

This monograph is dedicated to the scientific discipline of behavioral finance, with a particular focus on micro-behavioral finance. Its central theme is the impact of reliance on subconscious cognitive thought patterns and related cognitive and emotional biases on the formation of attitudes and individual financial decision-making. The monograph analyzes how these factors contribute to repeated errors and missed opportunities in monetary and investment choices, placing them in a broader interdisciplinary context of economics, psychology, and the social sciences. It presents current theoretical and practical knowledge in this field for both academic and broader professional audiences.

Scientific methods and procedures were applied to ensure a systematic and comprehensive approach to the research topic. The foundation of the research was a content analysis of academic literature in behavioral finance, psychological theories, and related fields. Sources included peer-reviewed scientific articles published in renowned international journals and scholarly monographs. Selection criteria for sources included scientific quality, timeliness, relevance to the topic, and contextual significance.

A deductive approach was used to frame the research, ensuring a connection to existing theoretical concepts such as dual-process theory, heuristics, and cognitive biases. This approach enabled the identification of key research gaps and alignment with the current academic discourse.

An inductive approach was applied in the thematic analysis, allowing for the discovery of insights not explicitly captured by established theories. Given the multidimensional nature of the issue, an interdisciplinary approach was adopted, incorporating literature from relevant disciplines to integrate diverse perspectives and provide a broader context for analyzing financial decision-making.

A qualitative thematic analysis was conducted to identify key themes and categorize insights. The methodology also included interviews with experts in behavioral topics, whose perspectives enriched the interpretation of data and contributed to a deeper understanding of the

subject matter. The results were subsequently synthesized into a unified theoretical framework connecting behavioral finance theories with practical implications. This reflection enabled the formulation of an innovative perspective on mitigating cognitive and emotional errors in financial decision-making.

The author's goal was to create a scholarly monograph that, despite its academic focus, remains accessible and comprehensible to readers, encouraging broader engagement through an interactive approach.

CONTRIBUTIVE VALUE OF THE MONOGRAPH

This monograph addresses the topic of behavioral finance from a micro-behavioral perspective. It offers a comprehensive overview of both theoretical and practical insights. A key contribution of the work is a new, coherent categorization of behavioral factors influencing financial decision-making. This categorization connects cognitive biases, emotional distortions, and sociocultural influences with subconscious thought patterns. It provides a framework for analyzing errors and opportunities in decision-making processes and contributes to the expansion of the theoretical foundation of behavioral finance.

The practical applications of this work may be useful in the field of financial advisory services to help mitigate behavioral biases, as well as in educational programs aimed at improving financial literacy, critical thinking, and logical reasoning.

This monograph can also serve as a study resource for university courses on behavioral finance or decision-making processes. It provides a basis for further research and practical applications in the context of financial decision-making.

REVIEWERS' STATEMENTS

Opponent reviews are arranged alphabetically by the reviewers' surnames.

REVIEW 1

Jana Přílučíková wrote an excellent introduction to behavioral finance. The book offers a very thorough overview of the topic while remaining admirably concise. Dr. Přílučíková traces the application of psychological insights to the understanding of financial behavior from its very beginnings. In addition to introducing the field's key pioneers—including thinkers such as Herbert Simon, Daniel Kahneman, and Amos Tversky—she also familiarizes readers with the latest research from the growing and diverse body of academic literature.

The text is written in a style that is accessible and which will appeal to people learning about behavioral finance for the first time as well as seasoned experts. Dr. Přílučíková gives examples that will be relevant and easily understandable for a broad range of readers and the text is punctuated with numerous quizzes and exercises. This book is ideal for use as a textbook for students as well as a primer for people who simply want to learn more about money and finance. I would recommend BEHAVIORAL FINANCE to anyone who is curious about how finance works.

Tanweer Ali, M.A., Ph.D., CFA

REVIEW 2

This monograph systematically presents a comprehensive picture of the current evolution of thinking in the field of finance, particularly concerning the causes and consequences of the natural imperfection of human decision-making and behavior. It is fascinating to observe how financial theory has advanced over recent decades by testing its own boundaries, confronting its conclusions with empirical research findings and insights from related social sciences. This process has naturally led to a shift from previously postulated dogmas about the infallibility of markets and market information toward the recognition that, as human beings, we are inherently fallible—and this inevitably affects our financial behavior and financial markets themselves. Some of our natural errors or tendencies to make mistakes have deep, perhaps even biological, origins.

Drawing on a wide range of scholarly sources, the author presents these human imperfections in the context of investment decision-making in a highly systematic yet engaging manner—illustrated with many everyday-life examples. Her book clearly highlights how a large portion of our daily financial decisions is significantly biased by subconscious or involuntary influences. I believe that, ultimately, the book names what many global authorities in the field of investing have long intuitively practiced: investing is a possible path to self-awareness and overcoming one's own imperfections. Tireless curiosity and self-discipline is (hopefully) the way to investment success, but this journey never truly ends. I therefore thank the author for the opportunity to become familiar with the latest insights of financial theory in such a structured yet readable form.

Ing. Lukáš Brych, CFA

REVIEW 3

The reviewed monograph addresses the highly topical issue of behavioral finance and represents a significant contribution to the ongoing debate on behavioral aspects of economics and finance—areas that remain considerably underestimated in the Czech academic context. The monograph adopts a systematic approach to the subject; in individual chapters, the author progresses from the basic definition of behavioral finance and its principles to specific subtopics. The text effectively combines an educational function—offering theoretical overviews alongside presentations of partial issues and quiz sections—with a scientific function, as the author conducts a critical literature review in the field of behavioral finance, drawing on relevant and up-to-date sources. Thus, the monograph does not present comprehensive original research by the author but rather focuses on a literature review and the synthesis of findings in the field, which is appropriately enriched with sections designed to engage the reader actively. The author also provides her own critical perspective on the presented issues and formulates conclusive insights.

The individual chapters of the monograph are well-designed and logically structured. The formal and graphic layout of the monograph is of very high quality, and the structure of the text reflects the author's effort to present a well-organized and readable work that appeals not only to the academic and professional audience but also to the general public.

Based on the above, it is evident that the submitted monograph is highly relevant, represents an independent and original work by the author, and combines multiple functions and groups of readers. I have no objections to the monograph and recommend it for publication.

Prof. Ing. Boris Popesko, Ph.D.

REVIEW 4

The book *Behavioral Finance – Why We Make Financial Decisions the Way We Do* presents a systematic, accessible, and at the same time highly engaging narrative of behavioral biases—innate human cognitive tendencies that prevent economic actors in general, and investors in particular, from making purely rational decisions under real-world conditions of risk, as assumed by classical economic theory based primarily on the normative expected utility theory. What I value most about this monograph are three key attributes. First, the text is organized in a clear, practical, and logically structured manner. Second, each chapter includes practical quizzes, examples, and questions that actively encourage the reader to reflect and adopt the presented concepts. And third, the author provides references to a substantial number of original English-language sources, allowing readers who are interested to further expand and deepen their understanding of behavioral finance through the work of key international scholars. I sincerely wish the author much success with the book—not only among students of economics faculties across the Czech Republic, but also among the broader professional public.

Ing. Michal Stupavský, CFA

ABSTRACT

This first comprehensive monograph on behavioral finance in the Czech market opens the door to a deeper understanding of how our minds and emotions shape financial decisions. It demonstrates that the key to a successful financial future lies not only in understanding markets but, most importantly, in understanding ourselves. The book uncovers the hidden forces of thought patterns, biases, and emotional reactions that lead us to both mistakes and opportunities. It inspires readers to become aware of subconscious habits and overcome them, helping to build a solid foundation for more conscious financial choices, while fostering a sense of security and satisfaction on the path to wiser decision-making.

The book systematically introduces the fundamental principles of behavioral finance, including the concept of dual thinking and our innate tendency to rely on subconscious behavioral patterns and succumb to related cognitive and emotional biases. It bridges financial and psychological theory with contemporary findings from epigenetics, revealing how these fields are closely interlinked. It examines tendencies such as reframing, subjective valuation, and biased probability assessments related to financial situations, emphasizing how social and cultural influences shape real monetary and investment decisions—decisions that often diverge significantly from our financial aspirations.

The book delves into three critical cognitive thought patterns and their associated errors, aiming to promote better financial choices. Using specific examples, it inspires readers to identify and correct erroneous subconscious habits that frequently lead to repeated financial mistakes.

Step into the world of behavioral finance and discover how insights from this field can transform your relationship with money and financial decision-making. This fascinating discipline addresses numerous questions, particularly those arising during moments of financial uncertainty, making it an essential component of financial education.

ACKNOWLEDGEMENTS

I would like to thank Professor of Economics Emma Raisel and John A. Forlines of the Department of Economics at Duke University in North Carolina for preparing and delivering the intensive course Behavioral Finance, which I successfully completed with certification in 2024. This course played a crucial role in shaping the content of my book.
I would also like to express my gratitude to clinical psychologist Mgr. et Mgr. Blanka Kuželová, based in Zlín, and psychologist PaedDr. et Mgr. Hana Pašteková Rupertová, based in Kroměříž, for their inspiration and the valuable insights they provided during the writing of my book.
Further thanks go to Mgr. Jaroslava Bajgarová in memoriam for her proofreading of the text, and for her endless willingness and kind patience, which gave me strength to continue writing many times.
My sincere appreciation also goes to the book's reviewers for their thoughtful evaluations—I truly value the time and attention they devoted to my book. I also thank the team at UTB University Press for their support when it was most needed.
Last but not least, I thank my dear colleagues and students of behavioral finance at my home university for motivating me to complete this book.

With all my ❤️, I thank my family and friends.

PROJECT SUPPORT

This book was created with the support of the projects **Horizon Europe** (HORIZON) 101071300 - Sustainable Horizons – European Universities designing the horizons of sustainability,
IGA/FaME/2024/005 - Irrationality in financial decision-making and techniques to mitigate biases and heuristics for better investment and money choices, and **FSR FORD** 5-6/2022-23/FaME/005 - Experimental verification of theoretical concepts from behavioral public policy: "Cognitive biases and anchoring", carried out in the years 2022–2024 at the Faculty of Management and Economics, Tomas Bata University in Zlín.

Behavioral Finance:
Why We Make Financial Decisions the Way We Do

Author's contribution: Assoc. Prof. Ing. Jana Přílučíková, Ph.D. 100 %

Typesetting: Jana Přílučíková

The author is responsible for the accuracy of the language.

This publication was financially supported by the IGA/FaME/2024/005 grant.

Published by Tomas Bata University in Zlín, nám. T. G. Masarykova 5555, 760 01 Zlín.

Printed by KODIAK print s.r.o.

First English edition

Year of publication:
2025

DOI: 10.7441/978-80-7678-379-9
ISBN 978-80-7678-378-2 [print version]
ISBN 978-80-7678-379-9 [electronic version]

Notes

Notes

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Founding president of the Czech CFA Society

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Ing. BRYCH LUKÁŠ, CFA

Director level investment professional of the KAPRAIN GROUP

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Prof. Ing. POPESKO BORIS, Ph.D.

Full professor at Tomas Bata University in Zlín

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Ing. STUPAVSKÝ MICHAL, CFA

Investment Strategist of the Conseq Investment Management

Tomas Bata University in Zlín
Faculty of Management and Economics