

Behavioural Corporate Finance

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By

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The truth is, we believe, that the real motives of human life, at least of those people who do big things, are idealistic in character. The business man has the same fundamental psychology as the artist, inventor, or statesman. He has set himself at a certain work and the work absorbs and becomes himself. It is the expression of his personality; he lives in its growth and perfection according to his plans.

Frank Knight (1886-1972), American economist,
in *Risk, Uncertainty and Profit*, 1921.

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PART I

THE DECISION OF THE MANAGER

CHAPTER ONE

TO ERR IS HUMAN

On 13 January 2012, the *Costa Concordia*—one of the biggest and most modern cruise ships in the world—was navigating in the Mediterranean with 4252 passengers on board. The weather was nice, the sea was calm and the ship was sailing along the coast of Italy. At 9:45 p.m., the *Costa Concordia* ran aground and one of the rocks tore a 50-metre gash in the hull, flooding the engine room and causing a complete power loss. The ship sailed adrift for an hour, and at about 22:45 p.m. capsized and stood near the coast partially sunk. The tragic loss of 32 lives stirred up compassion around the world.

The reaction to the accident was immediate. How could a relatively new ship, with the most sophisticated navigation systems available, have been involved in such an unlikely accident? Emerging as one of the leading characters was Captain Francesco Schettino. The captain himself later admitted to turning off the automated navigation systems because he was familiar with the seabed and wanted to get closer to the coast, something he had often done before. Answering a phone call during the manoeuvre was enough to distract him. When he realised he was too close to the shore it was too late: he was already in shallow waters and the accident was inevitable.

The human factor's role in the whole incident was highlighted in the following days. The accident reminded everyone that, no matter how advanced technology is, human-caused mistakes will continue to happen. Scholars and historians like Edward Tenner have drawn our attention to some of the unexpected effects of technology in human decision-making. For instance, it has been noticed that introducing safety procedures usually leads individuals to adapt to taking more risks because they feel more protected. This phenomenon, called the Peltzman effect, explains why people began to drive less safely after it became mandatory to wear seatbelts. In Tenner's view, it was overconfidence in his own skills and his 20 years of experience that led the captain of the *Costa Concordia* to risk so much. Such overconfidence stemmed from the trust on the ship's built-

in quality, on the navigation systems at his disposal, and on his spotless record.¹

The crew of a ship like the *Costa Concordia* have some similarities with the people that are part of an organisation such as, for instance, a firm. In both cases there is a chain of command with clearly defined tasks for each individual. Just like a business manager, a captain like Captain Schettino has to manage resources—including human resources—and aim to keep his customers satisfied. But there are important differences in both roles. In a business there are no satellite navigation devices, navigation systems nor accurate nautical charts. The manager can only rely on the diverse Economics and Management theories—some of which are contradictory—to guide him. The "seas" where the manager "navigates" are also much rougher and more unpredictable than the seas usually sailed by a ship's captain. While the main sea currents are chartered, the "seas" in which the manager has to sail on are not chartered by any means. In those "seas" one must include new competitors, new technologies and substitute products, changes in taxation and fiscal incentives, the evolution of macroeconomic conditions, changes in trends and consumer preferences, among many other factors. With the "guidance instruments" at his disposal and the conditions of the "seas" in which he navigates, it is no wonder that the manager's role is hard to carry out, which often leads to mistakes being committed.

The arguments presented by those who claim that there are no management mistakes are widely known. Mistakes are not really mistakes, they say. They are decisions that could have been right but, given the uncertainty faced by the manager, proved to be wrong thereafter. The manager is, in this sense, like an all-knowing explorer pushing forward by "trial and error" through unknown territory. Errors are only the price to pay for success. As mentioned before, it is true that conditions faced by management are, normally, not easy. But not everything can be explained by this argument. Managers have to make choices and different managers make different choices when faced with the same problem, and some make systematically more mistakes than others. Human errors can also happen in firms, just as in the command of a ship.

On the financial side, management errors may translate into capital budgeting projects that systematically go over the budget and the time limit, into mergers and acquisitions doomed to fail right from the start, in the brash entrance into new markets, or in developing new products that, in hindsight, should not have seen the light of day. These errors have huge costs: wealth destruction for society as a whole, a decrease in the citizens' well-being, slower economic growth and lost jobs.

When there's an aviation or maritime accident, the first thing government agencies do is to investigate the incident that occurred. There are enquiries, responsibility is established, the craft's black boxes are retrieved and analysed. In short, they try to learn from the incident in order to improve both equipment and personnel training to prevent similar accidents from happening again.

It is equally important to understand what are the organisational conditions and characteristics that make an individual a good manager. It's useful to learn from one's mistakes. You would think financial theory would study managers and their decision-making process, considering the high social costs that result from their mistakes. Oddly enough, that is not the case.

1.1. Management Errors in Financial Theory

Mainstream financial theory has largely ignored the manager's individual role in the decision-making process. Traditional Finance models usually do not consider the manager himself and his personal traits. For decades, mainstream Finance has been dominated by the neoclassical approach and that explains why the human element has remained absent from explanatory models. The neoclassical framework for financial problems is based on a set of highly simplifying assumptions about available information, competition conditions and the aims pursued by each market agent. Simplifying assumptions lead financial problems to be analysed as Physics problems where it is assumed that individuals will behave as homogeneously and predictably as an Oxygen atom. Since that behaviour is assumed to be homogeneous and predictable, all human characteristics which make each individual unique and unlike any other are disregarded. Managers are seen as an undistinguished resource: any manager is a perfect substitute for another in the same way that a one euro coin can be substituted for another one euro coin.

But the human factor is the key to understanding organisations. The people that work there behave like human beings—they have psychological characteristics. They don't behave like molecules without any awareness of themselves, and which for some magical reason must obey the ruling of an unfathomable equation. Companies are not abstract concepts; they are, in fact, *deeply human institutions*.

Therefore the important decisions that have to be made within the firm, financial ones being an obvious case, depend on *intrinsically human factors*—limitations, past experiences and individual personality characteristics—not solely on strict technical, economical calculations.

Interestingly, even the implementation of the aforementioned calculations relies on the manager's knowledge, abilities and awareness of them.

This disregard of the manager's role isn't confined to theoretical Finance. In fact, the empirical studies that have been conducted explain a firm's financial decisions only with the firm's particular characteristics or its business area. The individual role of the manager in those decisions is usually ignored.

Such an incomplete perspective on the business problem has raised serious issues. How can we then understand that similar companies, operating in the same business industry, often have significantly different financial ratios?

The point is that *people* make decisions, not companies. And people's choices, including those in management positions, are influenced by a set of economical, institutional and social factors that are very particular to the context where individual decisions are made, but also by one's personal characteristics.

Individuals, even those in management roles, have heterogeneous psychological characteristics that can have a relevant impact on the decisions made in the firm and, ultimately, on the performance of an organisation.² Therefore, it is also important to try to link those psychological idiosyncrasies with the company's results.

For those that study firms, this analysis is particularly relevant. The inside of a firm has often been described as a "black box" because of the difficulty to study all its internal processes. The study of the impact of the manager's psychological profile in his decisions has contributed to shed some light onto that "black box".

But the interest in studying this issue is not, by far, strictly academic. After all, a firm's purpose is not to provide scholars with interesting questions. Businesses fulfil an infinitely more important role of creating wealth and well-being. In that sense, it is important to emphasise three of the main benefits this analysis may bring to the manager. First, the link between manager and business performance may allow for the identification of personality traits that benefit or hurt the quality of the decisions made by managers. This way, recruiters can adjust their selection and training processes to favour more desirable psychological characteristics when screening for potential managers.

Secondly, it may help to understand which institutional and corporate governance factors are better suited to help a manager achieve his goals based on his qualifications and experiences.

And last but not least, it can be useful for the manager himself because he will be able to anticipate the competition's decisions. That implies that

the psychological factors that define managers are useful to explain their decisions—in itself something already very important—and that disregarding those factors may curb managers' ability to predict the choices made by their competitors.

1.2. Behavioural Finance in the Firm

The aim of this book is to demonstrate how the personal traits of managers affect the decisions made in the firm, especially financial decisions. We will see that the psychological qualities of individuals holding management positions have a decisive effect on, for instance, their financing and capital budgeting decisions or their dividend policy. It will also become clear that the psychological profile of each manager will provide an explanation for the financial decisions made beyond the scope of the company and its business sector.

There is already a significant number of theoretical and empirical works that show the clear effect of psychological variables on investors' decisions in financial markets. This book proposes to expand the scope of that analysis to include the study of those effects on business managers. Introducing psychological factors in the study of organisations and in the theory of the firm is a current challenge that must be met. We ought to focus more on the way managers think and behave in order to improve how businesses are run.

For some time, the business component of behavioural studies didn't progress at the same pace as studies that dealt with investors' decisions. The main obstacle was obtaining the necessary data to support empirical studies. However, new techniques developed in the last few years have allowed us to overcome that standstill and today behavioural studies on managers' decisions have grown immensely. We intend to give account of that set of studies.

The perspective chosen for this book can be encompassed in the *Behavioural Finance* framework. Behavioural Finance differs from Traditional Finance in the sense that the former considers the impact of an individual agent's qualities—particularly their psychological characteristics—on decisions. For instance, Behavioural Finance proposes to determine if managers suffer from overconfidence when making financial decisions and if that overconfidence has any significant impact on their choices.

While the interest in the relationship between managers' characteristics and financial decisions is recent, the idea that managers can be influential in the life of a company is not new. Our approach draws its inspiration from the behavioural theory of the firm, a study branch that came to light

in the 1950s. Among the founding fathers of the *behavioural theory of the firm* are Nobel Economics Prize Laureate Herbert Simon, and also James G. March and Richard Cyert.³ For these authors, firm decision makers are not capable of making decisions through optimisation processes because their rationality has boundaries (*bounded rationality*). Optimisation would require individuals to know all the alternatives available to choose from, the consequences of choosing each alternative and the corresponding probabilities. Only then would it be possible to create the distribution of expected results for each decision alternative. However, maximisation solutions are not attainable due to the enormous gap between the complexity of the problems addressed by managers and the limits of their capabilities (attention, calculation, memory). For that reason, rational decisions under uncertainty demand managers to adopt a satisfying behaviour instead of a maximising/optimising one. Choices are made based on simplified models that only capture the essentials of the problem without grasping its full complexity. In addition to that, business managers make decisions founded on a set of assumptions that reflect their particular cognitive base, their idiosyncrasies, and their psychological profile. These assumptions, which evolve over time, limit and distort the manager's perception of the information. Consequently, due to managers' cognitive limits, their view of the problems being faced is narrow, which in turn ends up influencing the choices that are made.

Despite the mentioned author's proposition that the managers' individual psychological factors are the key to understanding their decisions, the empirical study of the effects attributable to each psychological characteristic had to wait for further developments in the field of cognitive Psychology. That took place in particular from the 1980s onward with the contributions of psychologists Daniel Kahneman and Amos Tversky.

This book's approach also touches on the *upper echelons* literature initiated by Hambrick and Mason (1984) and followed up by numerous authors.⁴ That contribution, in the field of strategic management and organisational theory, stresses the importance of the manager in the firm's strategic choices and his performance. An executive officer passes on to his decisions and leadership behaviour much of his personality, experience, frame of mind and preferences. Institutional restraints that limit the decision maker's scope, while important, cannot eliminate that effect. Therefore, managers' characteristics allow us to partially envision what happens within organisations.

Although there is common ground between the approach chosen in this book and the contributions of the mentioned authors, it is important to clarify that the former differs from the latter in four major points:

- 1) Behaviour-based organisational theory tries to establish a link between managers and the firms' strategic decisions, that is, the more complex and far-reaching decisions. In this book, the focus of our analysis is narrower: we will only try to establish a connection between managers' psychological profiles and financial decisions;
- 2) The object of analysis in upper echelons theory is not the manager but the management team. Unlike that theory, our interest lies in the impact of each person's psychological characteristics and therefore we will make the manager our object of analysis. In spite of that, we will give the issue some thought (see chapter 3) given that some of the firm's most important financial decisions can be group decisions;
- 3) In studies conducted within the upper echelons theory framework, managers are characterised by a few observable factors that are reflected mainly in sociodemographic variables associated with managers' personal and professional backgrounds. Our perspective is different in the sense that we will favour the study of people's *psychological* characteristics. Those characteristics are hard to assess, something that will, obviously, raise analytical difficulties. Nonetheless, new approaches have emerged that will allow us, as we'll see in the next chapter, to overcome those obstacles;
- 4) Empirical studies, in the upper echelons theory, are usually sectional. They try to relate observable variables that characterise managers with the strategic decisions made within a given set of firms. The study methods adopted in the works referred to in this book are considerably more diverse. Note that some of those methods are typically used in Psychology, such as surveys and experimental studies, and that stems from the focus on managers' psychological profiles.

Despite those significant differences, some latter developments in upper echelons theory have bridged the gap between methods and between objects of analysis in Behavioural Finance models.⁵

1.3. Book Layout

The book is comprised of 15 chapters divided into two parts.

The first part of the book is comprised of seven chapters where we will present the manager's personality and personal traits that can influence his choices. In the remaining chapters that constitute the second part of the book, we will discuss the effects of behavioural factors in a particular kind of choice: financial ones. Throughout this book we will also present a few aspects in text boxes that broaden our understanding of the issues addressed in the main text. For instance, on pages 24 and 25 we emphasise the conclusions reached by a few authors on the effect of managers' overconfidence.

But let us summarise the content of each chapter.

The next chapter is vital because in it we will lay the foundations to understand what makes managers decide in a distinctively different way, not only from one another, but also from what is predicted by neoclassical Finance. We will explain the psychological foundations of human decision and present the main biases that affect managers' choices: overconfidence, confirmation, anchoring and availability biases, cognitive dissonance and illusion of control. Because of its importance we will pay special attention to the study of managerial overconfidence. Scenario analysis and the mistakes made by executives in their planning (hence the name *planning fallacy*) will also be broached.

The firm's management decisions are often made by a group. It is, therefore, important to understand how decisions made collectively are influenced by the group's particular members. From the business management perspective, it is useful to identify the characteristics displayed by groups that are capable of making the best choices. These are the objectives for the third chapter of the book.

In chapter 4 we will tackle three distinct subjects—managers' learning, competition between managers, and management incentives—that are usually resorted to in the argument against the prevalence of psychological effects in management decisions. In that chapter we will see how, in spite of the managers' learning, competition and incentives, psychological effects are indeed relevant in their choices.

The fifth chapter deals with decisions made by entrepreneurs. Entrepreneurs, as business founders, face specific problems. Because of that, decision biases also have specific effects when we consider this class of agents.

In the sixth chapter we will ponder the impact of the manager on the firm's performance. To do that, we will have to consider not only the

manager's characteristics but also the institutional environment where the decisions are made.

In the following chapter, the seventh, we will draw on the relationship between managers' life experiences and the choices made in firms. We will see that some life experiences—for instance, experience in the military or having gone through an economic recession—leave lasting marks on professionals and in all their future decisions.

Having established the behavioural principles and their effects on decisions made by managers, we will then proceed to analyse how those professionals make financial decisions. That will be the objective of the following chapters.

In chapter 8 we will present the effects of the manager's psychology on capital budgeting decisions. That insight will allow us to understand why business investments are often overdue and over budget. The reluctance shown by managers to drop projects that are bound to fail is another subject that will be addressed in this chapter.

Chapter 9 will be about financing decisions. Traditional models cannot explain the equity structure displayed by many firms. As we will see, behavioural effects like overconfidence are useful to understanding managers' choices.

Dividend policy is the subject of chapter 10. We will approach the shareholders' demand for dividends and the managers' reaction to that demand. Manager surveys constitute an invaluable source of information to understanding how this group decides how much companies should pay in dividends.

Chapter 11 will elaborate on one of the most important financial decisions: the decisions to merge or to acquire. As we will be able to see, behavioural effects are the key to understanding managers' choices on the number of mergers and acquisitions made, the amounts paid by the acquiring company to the shareholders of the target company, and also on the consequences for shareholders wealth.

But managers are not the only ones affected by decision biases. Financial market investors are also influenced by behavioural factors in such a way as to drive prices too high or too low. That is why we will, in chapter 12, address the reactions of unbiased managers to inefficient financial markets to conclude that corporate executive officers can opportunistically exploit market under- and overvaluations.

Having debated the consequences of managers' psychological traits in firms' decisions, in chapter 13 we will be ready to understand whether those consequences are beneficial or damaging.

Chapter 14 undertakes the study of the relation between the organisation's culture and the personality characteristics of those that are a part of it. As will become clear, certain competitive environments heighten or lessen managers' personal characteristics with relevant effects in their behaviour. The impact of corporate culture and individuals' behavioural factors in frauds and in the tampering of corporate results is another issue that will be brought to the fore.

The last chapter has a different nature. Behavioural principles and one's psychological traits reflect on choices that go far beyond the corporate universe. Therefore, in chapter 15 we will present a set of examples that illustrate the importance of behavioural factors on choices as diverse as the ones made by politicians, military leaders at war, or scientists in pursuit of knowledge.

Notes

¹ Janssen (1994); Tenner (2012a, 2012b).

² On that very subject, Peter Drucker, one of the fathers of Management Studies, noted: «Some of the best business and non-profit CEOs I've worked with over a 65-year consulting career were not stereotypical leaders. They were all over the map in terms of their personalities, attitudes, values, strengths, and weaknesses. They ranged from extroverted to nearly reclusive, from easygoing to controlling, from generous to parsimonious» (Drucker, 2004, p. 58). On the heterogeneity of people's choices, see also Heckman (2000).

³ Simon (1947, 1982); March and Simon (1958); Cyert and March (1963).

⁴ For instance, see the revision made by Hambrick (2007) and the literature review by Carpenter *et al.* (2004).

⁵ For instance, Hambrick (2007) suggests resorting to experimental methods to study the effect of management teams in firms' strategic decisions. On the same article, the author also states that upper echelons theory only adopts the management team as object of analysis (and not the top manager as an individual) because, purportedly, the empirical studies will yield better results.

CHAPTER TWO

HUMAN DECISION IN THE FIRM (AND OUTSIDE)

2.1. A Biased Mind

In the last few decades, a large set of studies on social and cognitive Psychology have shown that people don't see the world as it is. In that sense, we can say that our perspective of the world is imperfect. To understand that "imperfection"—let's call it this for now—we must understand its source, its *raison d'être*. To do so, we will approach the topic in two distinct stages. In the first stage we are going to explain the cause of that 'imperfection'. In the second, we will define what led some of the environment's characteristics to become 'invisible' to human beings—all of us—and what made others so self-evident.

Let us begin the first stage: why don't we see the world as it is? The 'imperfection' we refer to is a result of the mismatch between the massive volume of available information in our environment and the limited cognitive resources available to process it. Our memory capacity and attention is limited when compared to the existing information and that makes us able to process only subsets of that information. In addition, the amount of time available to perceive the relevant data is also an important constraint. We often have deadlines to decide—imagine the case of a business manager—and what we can understand of those problems, the information we have to process to do so, is usually curtailed by those deadlines. Because of those reasons it is said that human rationality is limited and that those limits translate into a 'skewed' perspective of reality.

But why do we find some characteristics of reality more important than others? Let us move on to the second stage of our analysis of the problem. To understand rationality, i.e., the way by which we perceive problems in reality and how we try to solve them, we must consider another factor: evolution. How we apprehend the world around us, and also the economic problems that are comprised in that world, rely on mankind's evolution as a species throughout millions of years. In fact, it was that evolution and

the species selection process that made us what we are today: more sensitive to some characteristics of reality and less to others. Therefore, the fact that we have a certain vision of reality, that is, a skewed vision, need not be understood as an imperfection but as our way to respond to the environmental conditions in which the human species has evolved over time. To elaborate more on this issue is well beyond the scope of this book but, still, for the more curious reader, we would like to quote from Felix Goodson's *The Evolution and the Function of Cognition* (2002):

«Let me emphasize again that all living things are functional analogues, reflections of the selection pressures that defined the particular ecological niches in which they evolved. This is also true of human beings. (...) Our cognitive world is a functional not a literal analogue; colours, sounds, and odours exist only in our heads, but they are functional translations of energy shifts in the external environment. The three-dimensional character of our cognitive world is not a literal reflection of the external world; selection pressures (...) insured that certain vital features are emphasized, while less important ones are diminished or missing altogether» (pp. 78-9).

Now we understand why we don't perceive the world as it is. Our perception is not neutral: we are sensitive to the characteristics of the outside world that are more important for our survival and less sensitive to all others. But that raises a difficult problem for social scientists who want to study financial decisions made in an economy. If we cannot really see the existing world as it is, how can we study what makes people decide in one way or the other? Goodson (2002) continues:

«This analysis suggests that the only reality is our subjective experience, that we can never compare your red with my red (...), etc. This is true, but this does not mean that each of us is isolated in solipsistic loneliness. As members of the same species with a shared evolutionary history, we may assume that our information-processing machinery works in similar ways. Insofar as our cognitive world is a functional duplicate, we can know about and interact with the external world, and, insofar as we are functionally alike, we can communicate» (p. 79).

From this we can draw two major conclusions. The first is that our perception of the world does not correspond to the actual world, meaning we have a biased perception of reality. We may think we decide in a completely rational and objective way but no matter how hard we try that simply is not true. It is important to realise that the source of those biases makes them even more dangerous because we're not aware of them when we decide: it is our very own perception of the world—and the only one we have—that is skewed. Some authors compare those cognitive biases to an

optical illusion. Optical illusions occur regardless of our will and knowing that what we are looking at is an optical illusion does not prevent us from experiencing its effect.

The second major conclusion is that biases that affect a population tend to be similar because we all experienced the same evolutionary process. That means that biases are not random but rather follow a certain pattern.

The role of the social scientist that sets out to study any problem—in our case, to understand the way people make financial decisions—is to strive to know the pattern of biases that characterise individuals' choices. To that purpose, in the last decades several psychologists have empirically identified a set of biases that, from a practical standpoint, lead individuals to make decisions that are contrary to conventional Finance theories.¹

We will then present some of the effects that result from the biases faced by individuals when making decisions of an economic or financial nature. We will allude to the framing effects, to the violation of the dominance principle, and to loss aversion. From point 2.2 onwards we will focus on characterising the biases themselves.

a) Framing Effects

Financial and economic decisions often involve what we call risk. It is important to understand whether the decisions that are made depend solely on the substance of the problem or also on the way they are presented. To approach the subject we will start by describing the problems faced by the test subjects of an experiment run by a few psychologists in 1981.²

The subjects were given the following problem:

Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of each programme's consequences are as follows:

If Programme A is adopted, 200 people will be saved.

If Programme B is adopted, there is $\frac{1}{3}$ probability that 600 people will be saved, and $\frac{2}{3}$ probability that no one will be saved.

Which of the two programmes would you favour?

From the 152 people that were asked to answer, the majority (72%) chose Programme A. 28% chose Programme B.

It should be noted that the choices are expressed in terms of lives saved (it is the survival framing) and that the majority of the choices reflects risk aversion. That happened because most people prefer a programme that saves 200 lives with certainty rather than a risky alternative with an equal expected value of lives saved:

$$(\frac{1}{3} * 600 + \frac{2}{3} * 0 = 200)$$

The same problem was proposed to a group of 115 people but the alternatives were presented in a different fashion:

If Programme C is adopted 400 people will die.

If Programme D is adopted there is $\frac{1}{3}$ probability that nobody will die, and $\frac{2}{3}$ probability that 600 people will die.

Which of the two programmes would you favour?

Note that the choices are presented in terms of fatalities, but the alternatives are essentially the same that were presented to the first test group. Programme A is similar to Programme C and Programme B is similar to Programme D.

However, the choices made are significantly different: most people (78%) chose Programme D and only 22% preferred Programme C.

This choice shows that most individuals are *risk prone*. The certain death of 400 people is less acceptable than a probability of $\frac{2}{3}$ that 600 people will die.

On a number of occasions the same people answered both versions of the problem with their inconsistency being pointed out to them. Even so, many people kept their intention of remaining risk averse in the survival framing and risk prone in the mortality framing, although they expressed that they wished both answers were consistent.

Changing the framing leads the subjects to change their choice. Similar results to this form a pattern: the same results were attained with individuals of different academic levels and interests—university students, university professors or people that, in principle, would be more used to make choices like the ones from the problem, such as physicians or nurses. In this case, the choices were expressed in terms of lives saved/deaths, but similar results are found when the proposed choices are of a monetary or financial nature.

The reasons for that attitude towards risk can be found in the boundaries of human rationality and in the theory of evolution. As stated by Kahneman (2003, p. 1459):

«The basic principle of framing is the passive acceptance of the formulation given. Because of this passivity, people fail to construct a canonical representation for all extensionally equivalent descriptions of a state of affairs. (...) Invariance cannot be achieved by a finite mind».

The theory of evolution also allows us to understand why normally risk averse individuals exhibit risk prone choices when faced with the possibility of a loss. Those reasons can be found in natural selection processes: it is harder to reverse the consequences of an attack (a wrong choice in case of loss) than of a squandered opportunity (a wrong choice in case of success).³

Individuals that are risk averse in choices that involve gains are the same individuals that are risk prone in choices that involve losses. This pattern raises a serious question. The theories that we have in Finance do not take into account the way problems are framed. If individuals' choices alter significantly depending on how a problem is presented, how can we create theories that allow us to predict their choices? The same people facing the same problem have systematically different answers depending on how the problem is framed.

How can we then build models on choice theory? There are two possible options. The first is the path walked by Finance in the last 50 years. Traditional Finance models assume that individuals' choices are consistent, that is, an individual will make the same choices regardless of how the problem is presented. This is the invariance principle. Ignoring the framing effect allows for normative models, meaning models that describe how an individual should act according to criteria of logical consistency.

But the framing effect shows that individuals' choices are, in fact, not consistent. And so we have another path, another approach to choice theories in Finance. We can then build models that describe the choices that are *indeed* made, thus enabling us to predict their decisions. In this second path models lose normativity (individuals' choices are inconsistent) but gain realism and effective predictive ability.

Tversky and Kahneman (1986, p. 251) wrote on the subject: «...no theory of choice can be both normatively adequate and descriptively accurate».

We now understand that individuals may choose differently even when faced with the same problem and that reveals inconsistent choices. The same individual may stop being risk averse and become risk prone if the way the problem is presented changes. What are the implications of that fact? The following example will help us to answer that question.

b) Violation of the Dominance Principle

Again, we have an experimental study. Each of the 150 test subjects were called upon to make two choices. The problem was as follows:⁴

Imagine that you face the following pair of concurrent decisions. First examine both decisions and then indicate the options you prefer.

Decision 1: Choose between:

- A. a sure gain of \$240 [84 per cent]
- B. 25% chance of gaining \$1,000, and 75% chance of gaining nothing [16 per cent]

Decision 2: Choose between:

- C. a sure loss of \$750 [13 per cent]
- D. 75% chance of losing \$1000, and 25% chance of losing nothing [87 per cent]

The percentage of choice for each option is between brackets. On Decision 1 it is hard to refuse the alternative of a sure gain of 240 dollars when the alternative is a 75% possibility of not winning anything. Most subjects (85%) chose option A. With Decision 2 it is hard to accept the certain loss of 750 dollars. The majority of subjects (87%) decide to risk in order of getting a 25% probability of losing nothing even if they have to accept a 75% chance of losing 1000 dollars to secure that.

Note that the choice of the majority on Decision 1 suggests that people are risk averse while the majority's choice on Decision 2 is consistent with risk propensity. As we have seen in the previous point, this is a common pattern: in choices involving gains (like Decision 1) people are usually risk averse and in choices involving losses (as in Decision 2) they tend to be risk prone.

Since the subjects analysed the pairs of choices simultaneously, they have in fact expressed a preference for alternatives A and D to alternatives B and C.

To confirm that, we will group those two pairs of alternatives together. Therefore, we have:

- A+D: 25% probability of winning 240 dollars and 75% probability of losing 760 dollars
- B+C: 25% probability of winning 250 dollars and 75% probability of losing 750 dollars

In theory, B+C is clearly better than A+D. But note what is happening here: the fact that individuals make inconsistent choices—some risk averse, some risk prone—can have major repercussions *even when making financial decisions*. Most people end up making suboptimal choices because of this inconsistent preference pattern, as we have demonstrated in the example.

When the alternatives are presented in an aggregate way, the choice is clear and people choose easily the combination B+C. But when the alternatives are not aggregated, choices are very different: 73% of the test subjects chose A and D and only 3% chose B and C. The contrast between choices in the two formats is another example of a violation of the invariance principle. Results like these are systematic. They have been repeated several times in different contexts and with different test groups. We conclude then that the inconsistency of preferences may violate a fundamental tenet of normative theories which is the dominance principle, meaning the principle that says that individuals choose the best alternatives. In practice, not only our choices are inconsistent—they vary according to the way problems are presented—but that inconsistency leads us to make the worst choices.

We are confronted yet again with the evident dilemma faced by Finance and, for that matter, all other areas of Science where decision theory is fundamental. If one presumes individuals make the best choices, i.e., that they follow the dominance principle, we can create theories that can describe how individuals should decide. Those normative models, however, cannot predict how people will decide. When it comes time to decide, most individuals violate the principle of dominance when the way the alternatives are presented induces inconsistent preferences.

Inconsistency in choice is also at the root of another effect with clear implications in financial choices: loss aversion.

c) Loss Aversion

Suppose you're asked to play a game:

"I'm going to toss a coin. If the outcome is heads you win 150 euros, if it is tails you lose 100 euros".

Would you accept to play this game? If you are like the majority of people you will not accept to play. This sort of behaviour is somewhat

surprising since it involves a game with a positive expected value (assuming the coin isn't rigged, of course).

This result illustrates the so-called *loss aversion* effect.⁵ Loss aversion occurs because the dissatisfaction caused by a loss is greater than the satisfaction one draws from an equivalent gain. Evidence suggests that loss aversion makes most individuals reject a game if the odds of winning or losing are the same unless the potential gain is, at least, twice the amount of the potential loss. This means that, again, people do exactly the opposite of what one would expect according to conventional financial theory. In general, people will only accept to lose 100 euros with a 50% probability if, on the other hand, the possible winnings with a 50% probability equals, at the very least, 200 euros.⁶

These simple examples illustrate the effects that decision biases may have in choices—including financial choices. Experimental studies show that bias effects are frequent, significant and systematic. They are frequent because they affect most decision makers when confronted with choices that imply some risk. They are significant because the deviations to the expected are often very pronounced. And they are systematic because the errors found in experimental studies do not seem to be random; in fact, the same kind of mistake occurs when the decision is made in a similar context. These results confirm what one would have expected to observe in individuals that share the same evolutionary history.

The effects we have just described apply to most people. Logically it is plausible to think that they will also affect managers and their financial decisions.

But what is the effect of behavioural biases in the multitude of financial decisions made by a manager? To answer that question we have to examine the biases, searching in them the implications for the business financial decisions.

Therefore, we will now present some of the main behavioural biases susceptible to influencing the choices made by managers. This analysis is the first step to understanding in which circumstances and in what sense can management decisions diverge from the premises put forward by conventional Finance.

2.2. Overconfidence

a) Introduction

Overconfidence may be defined as the belief that one's decision-making, thinking and other abilities are greater than what they actually are.

This exaggerated belief in one's abilities affects most people in such a way that De Bondt and Thaler (1995, p. 389) find that overconfidence is «[p]erhaps the most robust finding in the psychology of judgment (...)». Other authors like, for instance, Taylor and Brown (1988, p. 198) go as far as saying that overconfidence is a trait of *healthy human thought*: «Yet considerable research evidence suggests that overly positive self-evaluations, exaggerated perceptions of control or mastery, and unrealistic optimism are characteristic of normal human thought». Just so we know the prevalence of this bias, research conducted with over 2,000 managers suggests that less than 1% did not display signs of overconfidence.⁷

Overconfidence may manifest itself in two clearly different moments: when deciding, and after the decision is made. In the first case, individuals show an *excess of confidence in their predictions* which means they think they can predict the future better than what they really can. This effect is observed before knowing if the prediction is correct or not and is what makes individuals place their estimates in confidence intervals that are too narrow. It stems from this that, when overconfident managers are asked to give an estimate of the value of a potential investment and its confidence interval, the answers translate into too narrow confidence intervals when the past suggests that the prediction's standard deviation should be greater.⁸ This effect occurs because overconfident people overvalue the importance of the information they have, undervalue the inherent risk of their choices, and are too slow to incorporate any additional piece of information that may help them assess the situation more accurately.⁹

After the decision is made, individuals affected by this bias may manifest an *excess of confidence in the assessment of the problems* they are faced with. That may happen because individuals overvalue their skills. For instance, after executing an investment, overconfident managers are usually little prepared for the possibility of taking losses. Consequently, they are exaggeratedly surprised or disappointed if the investment does not perform as expected.

The overestimation of one's own skills that is at the base of overconfidence manifests itself in the so-called "*better than average*" effect where the majority of people believe they are more skilled than the rest. Simple surveys show that most people (usually between 70% and 80%) believe to be better than average drivers. Similar results were found in health and management skills surveys, and on one's business success prospects.¹⁰

This exaggerated feeling of certainty and control which is typical of overconfidence makes individuals have an optimistic feeling towards the future. In other words, individuals will often manifest a systematic