Department of Economics and Finance

Chair of Financial Markets and Institutions

Herd behaviour and mass effects in finance:
Behavioural Finance through historical eras

SUPERVISOR:

Prof. Stefano Di Colli

CANDIDATE:

Filippo Florio 271671

Academic Year 2023/2024

ABSTRACT

What is finance? How do markets actually work? Financial markets are the figurative place in which trading of securities occur, they are characterized by the presence of many participants and regulative authorities that overall manage to balance the equilibrium needed to sustain the economy.

What happens, then, when this equilibrium breaks down? Sometimes markets can take disproportionate deviations, generated in most cases by some irrational mistakes made by market participants, causing mass effects that lead to economic crises. This seems not something that human beings can learn just thanks to experience, as many times in history markets have experienced very similar pitfalls due to very similar leading events.

At the beginning of the 20th century, but more seriously only by the 90s, a field of study concerned on investigating human behaviours within the finance field was born: behavioural finance.

The largest contributors to this cause have been surely Kahneman and Tversky, two psychologists that dedicated their research to the mental mechanisms that can trick even the smoothest investor, followed by professor Robert Shiller, who was more concerned on the sociological aspect of this matter, theorising that people on markets move as a crowd, discovering the high propensity of people to be influenced by the “herd”.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION ON FINANCIAL MARKETS

1.1 DEFINITION OF FINANCIAL MARKETS

A financial market is the figurative place where economic exchanges occur, a complex ecosystem where the aspirations of investors match with the needs of businesses. In essential terms, we can define the financial market as a vast network of institutions, participants, and instruments where the buying and selling of securities and other financial assets takes place. This market serves as a central point for the distribution of capital, facilitating the meeting between those seeking financing and those willing to invest. “Financial market” is a broad definition that encompasses a range of mechanisms where individuals, businesses and governments can engage in financial transactions. These various venues called markets permit the buying and selling of different financial instruments such as stocks, bonds, commodities, currencies, and derivatives.

A key element in this context, that we could consider the core substance of market’s activity, is the concept of financial instruments. These act as vehicles through which investors can participate in the economy, gaining profits or suffering losses based on market dynamics. So, having securities the role to respond to different investors’ needs thanks to their characteristics, they also function as a way to distinguish several types of markets.

Market structures within the financial domain include organized exchanges, like stock exchanges, where standardized instruments are traded in a centralized manner. On the other hand, over-the-counter (OTC) markets operate in a decentralized fashion, with direct transactions occurring between parties, often facilitated by brokers. Electronic trading platforms leverage technology to ensure fast and efficient trade execution. *(Pagano 1993)*

Markets can be classified according to their liquidity, a measure of how easily an asset can be bought or sold without affecting its price. For example, markets with high liquidity enable efficient trading and better price discovery.

In this perspective, functions of financial markets include price determination, liquidity provision, risk management and information discovery. Price for securities is set autonomously by “demand and supply forces”, so it is driven by interactors themselves, reflecting market participants' collective expectations and perceptions of value.

Functionally, financial markets serve as crucibles for price discovery; the interplay of buyers and sellers determines the fair value of instruments. The markets also act as hubs for risk management, providing tools for hedging against various financial risks.

This intricate network encompasses a wide array of instruments, participants and functions, collectively shaping the dynamics of capital flow and resource allocation. But why so many people, institutions and corporations have interest in competing in these “arenas”?

The scope of individual investors engages in personal investment pursuits, while institutional investors such as pension funds and hedge funds manage substantial capital pools. Banks and financial institutions play the role of intermediaries, providing services ranging from lending to asset management. Corporations access financial markets for fundraising through the issuance of stocks and bonds, while government agencies participate in bond markets and currency exchanges.

We then realise that the scope of financial markets is not merely confined to the trading of assets; it extends to the intricate interplay of diverse instruments, participants, and functions. This dynamic ecosystem reflects the complex evolution of technology, the impact of globalization, and the influence of regulatory frameworks, all of which collectively contribute to the intricate and interconnected nature of financial markets on a global scale. *(Pagano, 1993)*

The geographical scope of financial markets extends across national borders. While domestic markets operate within a specific country's confine, international markets facilitate cross-border transactions and the global trading of financial instruments. Key global financial hubs, such as New York, London, Tokyo, and Hong Kong, serve as pivotal centres for financial activities, fostering international transactions.

It goes without saying that, for participants, it is crucial to have access to information regarding securities, risk, liquidity, other investors’ expectations but they also make decisions based on their analysis of corporate performance, geopolitical events and other factors. This continuous flow of information contributes to the efficiency of financial markets, stating that information is the most important drive-force of the whole market mechanism.

This is going to be a really considered concept through the development of this thesis, as we are soon going to analyse the historical events in which information flows have played a negative role in an economic growth perspective.

In conclusion, financial markets are multifaceted structures that play a pivotal role in the functioning of the global economy. The diversity of financial markets reflects the complex needs of market participants, offering a dynamic and interconnected system that contributes significantly to economic development and stability.

1.2 PARTICIPANTS

As mentioned above, financial markets are in the interests of plenty of different figures, which enter and trade in these markets to pursue their goals.

Firstly, we find the investors, who are subdivided into individual investors and institutional investors.

Individual investors are just private individuals who invest their personal money in financial instruments. They represent the vast majority of all participants and their financial investments derive from various wills, such as protecting their savings from inflation or, simply, wanting to increase their personal assets.

Differently, institutional investors represent the whole multitude of businesses and operators that invest money in the markets on behalf of clients: they can be pension funds, insurance companies and mutual funds. Anyway we can find similarities between the two types of investors, such as the tendency to make long-term and low risk investments.

Having a more detailed look, we encounter professional investors called traders: they too can be classified into two categories.

Retail traders are simply individuals who engage in short-term buying and selling of instruments for personal gain. Similarly, institutional traders are professionals employed by “trading companies”, which are financial institutions who execute trades on behalf of clients.

Among the most important financial institutions we find banks, whose business is the collection of savings from the public together with the granting of credit: they invest money lending it to households and businesses, he fundraising happens through deposits of money from the public and/or by issuing bonds. Banks are essentially of two different kinds: commercial banks and investment banks.

While the former provides various financial services including loans, deposits and currency exchange, the latter offers investment-related services and in particular the matching of companies in need of lenders and investors for the management of complex financial transactions, nevertheless they provide services for mergers and acquisitions.

Another important figure in the financial ecosystem is surely that of brokers, which are business intermediaries taking positions in markets on behalf of clients. Recently it has become popular the use of brokerage firms: companies providing a platform

for investors and traders to execute trades in various financial instruments and different markets.

Then we can mention investment funds, that employ various strategies to generate returns for their investors, and quite similarly, there are also insurance companies, that invest premiums collected from policyholders in various financial instruments and pension funds: management funds on behalf of employees for retirement benefits.

Besides Central Banks and Regulators, that will be treated separately later, we can also observe the presence of venues, to facilitate the trading; they can help investors in the trading of stock, but also futures and options.

Those above are the most significant participants in financial markets, next we're going to have a look into the deep functioning mechanism of financial markets, studying the "demand and supply" mechanism and the Central Banks' role in determining interest rates.

1.3 ROLE OF REGULATORY AUTHORITIES AND CENTRAL BANKS

Being information such an important factor and being financial markets a wide source of interest for many different players, regulations become strongly needed.

Also, we are going to notice the role in financial markets of the most important among these players, known as Central Bank.

Financial markets operate within a regulatory framework led by various regulatory bodies that play a crucial role in overseeing and enforcing compliance within these markets. It's important to fully understand the importance of such measures in order to avoid illegal manipulations and unfair actions and to ensure fairness, transparency, and stability during the trading. *(Ball, 2006)*

In the U.S.A. the Securities and Exchange Commission (SEC) is a key regulatory authority responsible for maintaining the integrity of securities markets. The SEC enforces securities laws, regulates the securities industry and protects investors by ensuring full and accurate disclosure of relevant information. It oversees a wide range of market participants, including securities exchanges, brokers, and investment advisors.

In the United Kingdom, the Financial Conduct Authority (FCA) is the primary regulatory body overseeing financial markets. The FCA regulates conduct across the financial industry, covering areas such as market abuse, consumer protection, and integrity of financial markets. It works to ensure that financial markets operate in a fair and transparent manner.

For the European Union, the European Securities and Markets Authority (ESMA) serves as a regulatory entity. ESMA works to enhance investor protection and promote stable and orderly financial markets across EU member states. It provides a centralized approach to regulation, coordinating with national authorities (such as Commission C.O.B. in France, BAFIN in Germany, CONSOB in Italy, exc.) to ensure consistent standards. *(Buiter, 2014)*

A correlated role to these "overview duties" is brought forward by world's Central Banks. In fact, Central banks can act as regulatory authorities, overseeing and supervising financial institutions to ensure compliance with prudential regulations. By setting and enforcing standards, central banks contribute to the stability and integrity of the financial system, protecting depositors and investors. Many central banks operate independently from the political sphere to avoid short-term political pressures. This independence allows them to focus on long-term economic

objectives. However, central banks also prioritize transparency, regularly communicating their policies and decisions to the public and financial markets.

Despite these “minor” duties, one of the primary functions of central banks is the formulation and execution of monetary policies. Through tools such as interest rates and open market operations, central banks aim to control inflation, stabilize prices, and foster sustainable economic growth. By adjusting the money supply, central banks influence interest rates, impacting borrowing costs and, consequently, spending and investment levels.

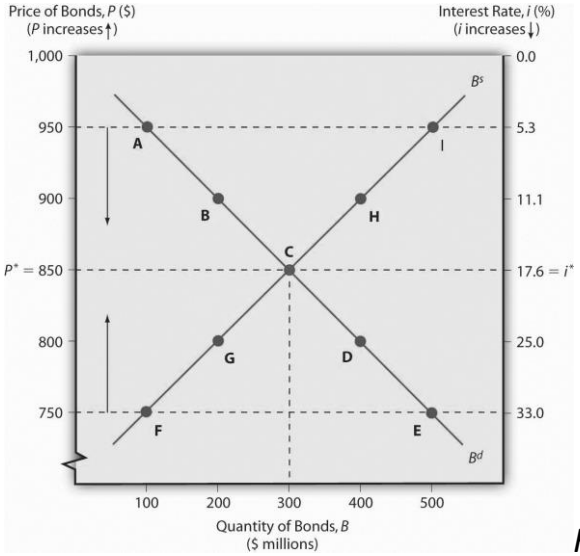

Figure 1

Monetary policy is a tool implemented to control and regulate the money supply and interest rates in an economy with the overarching goal of achieving economic stability and sustainable growth. The primary instruments of monetary policy include open market operations, discount rates, and reserve requirements.

1. Open Market Operations: Central banks engage in open market operations by buying or selling government securities in the open market. When a central bank buys securities, it injects money into the financial system, lowering short-term interest rates. Conversely, selling securities removes money from the system, raising interest rates.
2. Discount Rates: The discount rate is the interest rate at which commercial banks can borrow funds directly from the central bank. By adjusting this rate, central banks influence the cost of borrowing for financial institutions. Lowering the discount rate encourages banks to borrow more, promoting lending and economic activity, while raising it has the opposite effect.
3. Reserve Requirements: Central banks set reserve requirements, specifying the proportion of deposits that banks must hold as reserves.

4. Interest Rate Targets: Central banks often set short-term interest rate targets. By influencing these rates through tools, central banks seek to achieve price stability, full employment, and economic growth.
5. Inflation Targeting**:** Many central banks employ inflation targeting as a key component of their monetary policy framework. Controlling inflation is crucial for preserving the purchasing power of a currency and promoting economic stability.

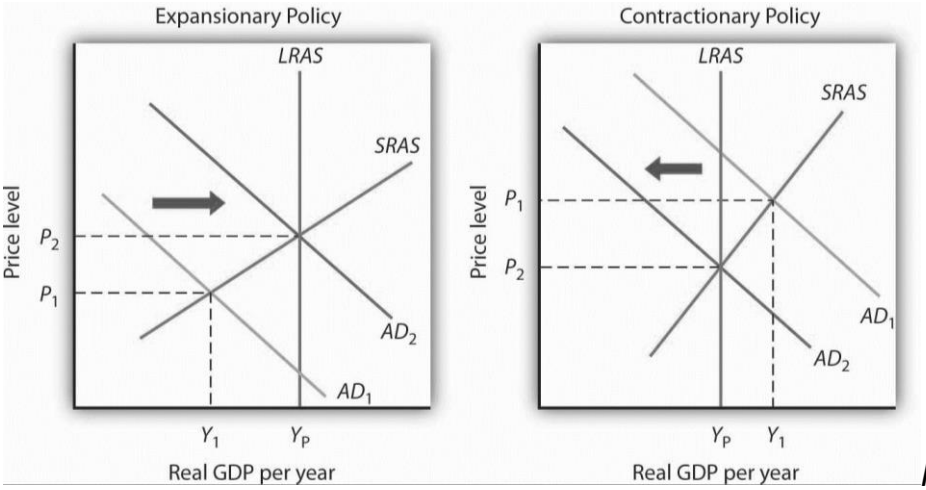

Figure 2

Fiscal policy involves the use of government spending, taxation, and public debt to influence the overall health of the economy. Unlike monetary policy, fiscal policy is primarily the domain of governments, but central banks may indirectly influence it through their monetary policy actions.

1. Government Spending: Governments can stimulate economic activity by increasing spending on infrastructure, education, healthcare, and other public services. This injection of funds into the economy creates jobs, boosts consumer and business confidence, and fosters overall economic growth.
2. Taxation: Altering tax policies can impact consumer and business behaviour. Cutting taxes puts more money into the hands of consumers and corporations, potentially boosting spending and investment. Conversely, raising taxes can cool an overheated economy by reducing disposable income.
3. Public Debt Management: Governments may use fiscal policy to manage public debt levels. During economic downturns, governments may engage in deficit spending to stimulate the economy.

Those policies confer a wide power to the institutions which make use of them, being it able to affect interest rates fluctuations and, consequently also to partially control investors' behaviour. *(Joyce, Lasaosa, Stevens and Tong, 2010)*

In conclusion, the combination of monetary and fiscal policies forms a comprehensive strategy for achieving macroeconomic objectives. Central banks use monetary policy tools to control the money supply and interest rates, while governments implement fiscal policies to manage spending, taxation, and public debt. The effectiveness of these policies often depends on their careful coordination and alignment with prevailing economic conditions.

1.4 FINANCIAL MARKETS' FUNCTIONING

Financial markets are driven by the intrinsic forces of demand and supply, which are parameters set by the proper flow of information derived from the necessities of buyers and sellers themselves. More specifically, demand is meant as "the total quantity of goods and services needed to cover the wealth requirement for consumers on the market"; differently, we define supply as "the total quantity of goods and services available on the market", so the quantity of wealth that producers can put on the market managing to meet demand by consumers.

Supply curve: as with any market, the higher the price, the greater the quantity of assets that suppliers are typically willing to provide. This relationship is often illustrated by an upward-sloping supply curve.

Demand curve: on the other hand, there is an inverse relationship between price and quantity demanded, meaning that as prices decrease, the quantity demanded tends to increase. This relationship is typically depicted by a downward-sloping demand curve.

The interplay between these two forces is the mechanism through which a financial market carries out one of its primary functions, such as determining assets' prices.

In this light, the equilibrium quantities and price are illustrated by the meeting point between supply and demand curve, which means the level of price that satisfies both demanders and suppliers requirements at the same time.

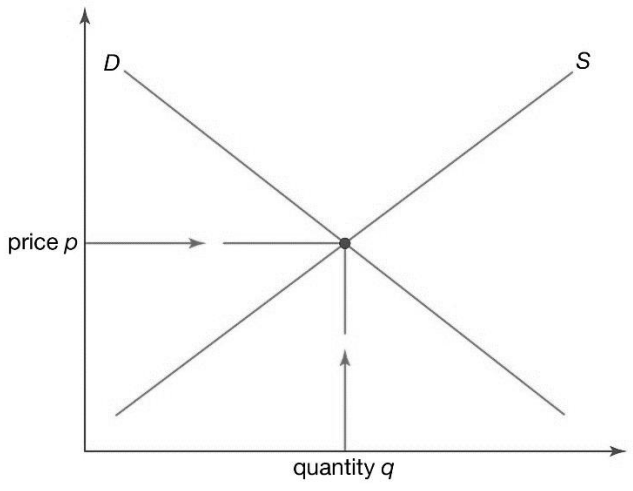

Figure 3

Such a mechanical functioning would suggest a wide interplay between the various participants and, in fact, relations can become very numerous.

In this light, the aim with which this work is concerned, is to explore the various causes and situations that may lead markets to function in an irrational way: too many times in the history of economics and financial trading humanity have witnessed bubbles, crises and drifting events led by irrationality on markets.

Almost as a contradiction, financial education is poor even to the present days, suggesting the extreme need of divulgation of these topics, not very widely treated.

Unfortunately, studies provide an accessible survey of the state of empirical research on social interactions, and the difficulty of drawing inferences about the nature of an interaction process from observations, arguing that structural analysis of markets remains a subtle inferential problem, do not resolve the problem. *(Manski, 2000)*

This process of study is still open nowadays and, to stay on the subject, the next chapter is presenting actual events in history that have marked the fallacy of human rationality in markets (and in trades in general), denoting the necessity to continue studying these subjects with the aim to avoid future global problems like mass financial crises.

Specifically, the focus is going to be put on the herd mentality of crowds which seems to be unchanged from the earliest centuries of modern history to the present days; for this very reason, several opinions will be presented as the debate is still open. Therefore, starting from the Tulip Mania, through the South Sea Bubble, to conclude with the more recent Dotcom Bubble, the objective will be to get an idea about what drives human crowds to fall in the same patterns even when the external conditions are totally different.

CHAPTER 2

HISTORICAL EXAMPLES

2.1 TULIP MANIA

If we talk about financial bubbles what comes to our mind will probably be a more or less recent happening; however, there are many examples of actual economic crises caused by people's greed and eagerness for enrichment happened in the past.

In particular, one of these historical events (also considered to be the first of the kind) results to be an incredible story that can teach a lot about herd behaviour in finance and highlight what proportion that a kind of domino effect can reach when investors try to build "castles of cards". *(Malkiel, 1973)*

What happened is that, at the end of the XVI century, a botany professor of the University of Leiden brought some exotic plants from Turkey, causing the astonishment of the Dutch, who had never seen such flowers.

Among those species there were tulips, by whose beauty the Dutch were enchanted; the legend then continues with some thieves that stole the tulips from the professor, selling them for a considerable price: a new trend was born in the Netherlands, making tulips one of the most desired goods just some years later.

However, to fully understand the escalation that will lead to the crisis, small hints of taxonomy are necessary: tulips are bulbous flowers that bloom for only a brief period in the spring months of April and May. Tulips reproduce asexually and propagate through the planting of either buds formed on the mother bulb or mere seeds. This peculiarities, along with the turban-like shape of the flower which made it appear even more exotic, contributed to the perception of a very rare good, which in turn made the price of bulbs levitate year after year. *(Garber, 2000)*

The story is not over as, due to the increasing popularity of the flower and striving to keep pace with the climbing demand for tulips, sellers developed a new method of trading the precious plants by utilizing futures contracts. These futures were based on the trade of the excrescences, or buds, still attached to the mother bulb. *(Moore, Artz, Ehlen, 2017)*

Unfortunately, there was no guarantee that the outgrowths would bloom once planted, thus adding a new risk to the tulip trade *(Emmett, 2000)*

In 1630s, literally everyone had entered in the market of bulbs: noblemen, merchants, middle-class workers, farmers and also servants became greed-driven buyers, resulting in bulbs prices reaching price increments up to 2000%. Aware of the inherent risks of short sales, the Dutch government "ruled that trading commodities that were not in the possession of either the buyer or the seller was fundamentally immoral". *(Dash, 1999)*

Unfortunately, this was not enough to stop the escalations in bulb prices for various species of tulips, including increases from 15 guilders to 75 guilders for an Admirael de Man, 45 guilders to 550 guilders for a Gheel en Root van Leyde, and 95 guilders to 900 guilders for a Generalissimo: in order to better understand the proportion of such prices, just assume that the price of a premium house on Amsterdam's upscale canal with an eighty-foot garden was around 10000 guilders. *(Dash, 1999)*

In February 1637, the tulip market crashed. The crash occurred as tulip detainers, realising to have some really high priced assets, became more prudent in buying and selling new ones and so, when a bid of flowers for 1250 guilders was made in the great market of Haarlem, it surprisingly obtained no offers.

With tens of millions of guilders invested in deals in the tulip market (the equivalent of several hundred million dollars today), the diminishing worth of the tulip was felt all over across Europe. *(Emmett, 2000)*

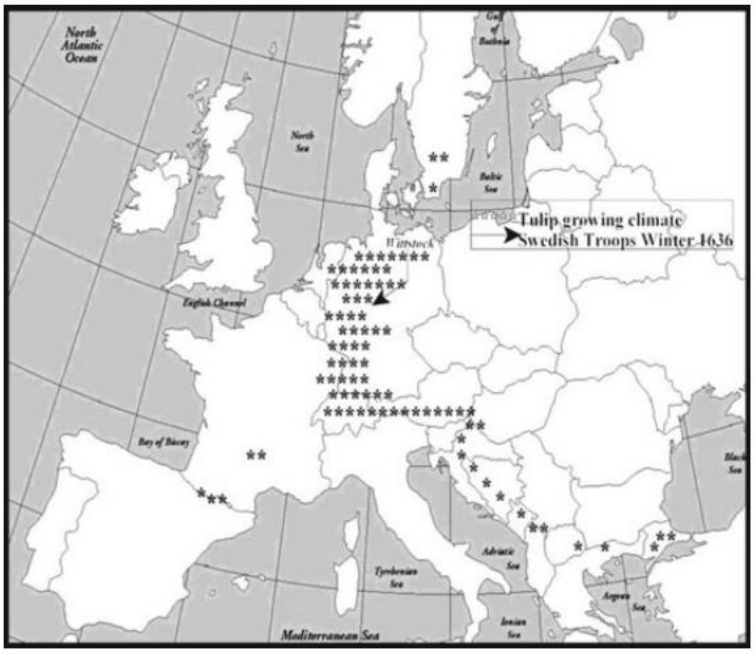

Figure 4

The causes for the market's dramatic downfall are attributed to the absence of both money and actual bulbs in the winter of 1637, so that bulb dealers were attempting to seize their profits by "selling up," which again restricted capital in the tulip market. In turn, also the nature of the good was considered useless and devoid of intrinsic value, making demand fall. *(Dash, 1999)*

Naturally, sellers wished to receive full payment for the agreed upon tulips, which the buyers no longer desired. In an attempt to contain the madness, Haarlem's government ruled that tulip sales taking place on or before November 30th, 1636, were enforceable by law. Luckily for society, those measures lightened the severe

consequences of the crises; anyway both the rich and the poor suffered losses from the fall of the flower trade, and additionally bulb growers, who scarcely received payment for bulbs grown and sold, suffered even more. Even though data on prices are scarce, some information reveal that tulip prices fell by about 90% in five years. *(Moore, Artz, Ehlen, 2017)*

So, Tulip Mania was one of the first actual economic bubbles in history, arisen from eager traders motivated to make fast profits. This event provides an accurate example of the investors' FOMO (fear of messing out) when deciding whether to take part or not to the collective "fever".

In summary, tulip mania was not purely a period of market lunacy but an economic bubble that arose from traders anticipating fast profits. Much like the economic crises of today's stock market, the contracts of the tulip trade escalated to unsustainable amounts, and, consequently, the market crashed. *(Moore, Artz, Ehlen, 2017)*

Despite what one might think, those kind of conducts can easily be seen also in nowadays markets, making it clear that individuals' behaviour on markets is a matter of internal nature, and that when external outputs involve also social factors and multitudes of other people's influences, markets became the perfect grassland for herds of sheep. However, the Tulip Mania has been examined by today's historians and economists, and new views have been introduced on this historical-economic event. *(Açıkgöz, 2022)*

Scholar Thompson argues that the century-old literature misrepresents the Tulip Mania, because this incident is not an example of "extraordinary popular delusions and the madness of crowds" as critics thought. On the contrary, he claims that the tulip contract prices in the Tulip Mania are an example of the efficient market mechanism of what happened before, during and after the tulip mania. *(Thompson, 2007)*

On a different line, French argues that the Tulip Mania story is not only about the tulip bulbs and the price movements of these tulip bulbs and examining the basics of the tulip market will not explain the formation of the speculative bubble. According to French, tulip prices increased because of a government policy that increased the money supply and thus created an environment for speculation and bad investment. *(French, 2006)*

In conclusion, Tulip Mania offers valuable lessons for contemporary financial markets, where speculative bubbles continue to emerge periodically. By studying the dynamics of Tulip Mania, as well as the other bubbles, policymakers, investors,

and market participants can gain insights into the psychological biases and behavioural patterns that underlie speculative frenzies. Ultimately, understanding the lessons of history can help mitigate the risks of future bubbles and promote greater stability and awareness in financial markets.

2.2 SOUTH SEA BUBBLE

The South Sea Bubble is the speculative phenomenon that actually gave rise to the term “bubble”, as it became clear for everybody that such mass movements were destined to explode just like a bubble.

The “South Sea Company” was established in 1711, taking over a government promissory note of about 10 million pounds at a yearly rate of 6%, receiving in exchange the monopoly of all the trades in South America’s sea (the British had, in fact, just signed a truce with the Spanish, which had the control of such places).

It’s important to underline how, before the official announcement of the expedition was made, privileged people like Lords and officials had acquired the kingdom’s debt granted by the S.S. Company for the nominal value of 55 pounds, exchanging them with Company’s stock when it finally was created. *(Painter, 2006)*

Indeed, the South Sea Company’s major intent was not the actual trade in the South Sea, not least because none of the directors of the project had any experience in overseas trading, but instead a greatly expanded program of meeting the Government’s debt restructuring needs when interest rates declined after the Peace of 1713. Unsurprisingly, the Company obtained almost nothing by way of trade concessions, but, by engaging in self-dealing at the expense of shareholders by dispatching Company ships and crew on private “off the books” trading missions, directors managed to maintain the Company’s reputation high and to convince investors. *(Painter, 2006)*

Meanwhile, in 1717, a Scotsman (banished from the United Kingdom) acquired a society in the French America called the “Mississippi Company”, which the French government had given control over trade in the Louisiana Territory and elsewhere.

The Company’s pursue was to substitute metal coins with paper currency, creating more liquidity. The Banque General persuaded investors to exchange outstanding government debt for shares in the Company, making their value levitate from 100 to 2000 pounds per share in two years, reaching the record capitalization value of eight times the value of all the gold of French treasury reserve. *(Malkiel, 1973)*

It’s easy to understand that, having the Mississippi Company reached such high levels, in England a light nationalist reaction was born. Taking advantage of the wave of optimism, in 1720, the South Sea Company directors proposed to assume all of the British government debt of about 30 million pounds; just few hours after the announcement in the parliament, the value of the stock rose from 130 to 300 pounds. *(Malkiel, 1973)*

By April of 1720 the Company's stock had become so sought-after that even the King had ordered shares for a total value of 100000 pounds. People were enthusiastic so a new emission was issued by the Company, this time at the price of 400 pounds each, but soon the value of the security rose to 550. On the 15th of June 1720 the price had reached 800 pounds thanks to a further emission. *(Malkiel, 1973)*

The South Sea Company's market capitalization was even over 150 million pounds, about ten times the value of the national debt and other assets then held by the Company.

Corruption was the order of the day, as Richard W. Painter says: "Many MPs and Lords had invested in South Sea Company stock and then voted on bills to extend the Company's monopoly on South Sea trade. Now they voted again on the Company's proposal to fund the national debt. The Company meanwhile accelerated its program of bribing MPs and other officials by selling them stock for little or no money down. Robert Knight, the Company's Treasurer, kept a record of these transactions in a green book, but many of these fictitious sales were never transferred to the Company's official records, and when scandal broke neither the green book nor Knight were ever seen again." *(Painter, 2006)*

Not even the managers of the Company were able to meet the increasing demand for stock, so this led to an authentic "investment fever" all over England. People would desperately search for some investment opportunity and, obviously, many new companies popped up just to attract great investments and easily turn them into profits: just to name a few initiatives, some of them were proposing to (inexplicably) import huge numbers of donkeys from Spain or to "purify" seawater or even hair trade. Needless to say, the vast majority of these projects was never going to see realization, but still they managed to attract large capitals. *(Malkiel, 1973)*

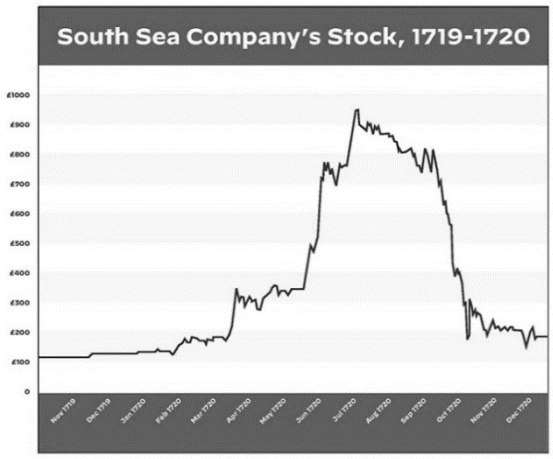

Figure 5

Then, in August 1720, the South Sea Company stock price dropped drastically as even directors realised that the value of the stock was completely different from the actual possibilities of the Company, selling their shares. The company left a financial hole of enormous proportions, among whose victims were thousands of investors of the time, including Isaac Newton. With it also the previously mentioned Mississippi Company capitulated, as people understood that printing an exaggerated number of paper money only has the effect of raising inflation. *(Malkiel, 1973)*

"Then came the Bubble Act of 1720. The Act was not a reaction to the dramatic crisis but merely part of an effort to keep the Bubble afloat by stifling competition from hundreds of other copy-cat joint stock company schemes, many boasting of other non-existent or grossly exaggerated ventures. Some were actually called Bubbles. Some lasted for weeks, some for less than that. Many involved leading aristocrats. On June 11, 1720 the King proclaimed these projects a public nuisance that should be prosecuted." *(Painter, 2006)*

The historical events of the South Sea Bubble inevitably brought lot of criticism about it, leading also to different opinions: on one side, many scholars have embraced the widely agreed belief that this bubble is a representation of the madness that crowds can reach on markets but, on the other side, some critics have objected to this conclusion, stating that this bubble could have been mistakenly believed more damaging than what it actually was.

An important distinction is made in the literature between bubbles that result from rational as opposed to irrational behaviour. *(Katsaris, 2002)*

Rational bubbles occur when asset prices continue to rise because investors believe that they will be able to sell the overvalued asset at a higher price in the future. Investors are aware that a point will be reached when the bubble will burst and, consequently, they require compensation for the risk in the form of higher returns. As the bubble grows, the probability of a price collapse increases and investors require ever increasing returns. *(Dale, Johnson, Tang, 2005)*

Oppositely, intrinsic rational bubbles occur when investors systematically and persistently misvalue fundamentals. This might arise, for example, during a period of rapid innovation, when even rational investors find it difficult to determine an asset's fundamental value. It is demonstrated that intrinsic bubbles can result in prices rising significantly for long periods, and then crashing as a result of informational dynamics. *(Zeira, 1999)*

In contrast to the rational expectations framework theory, some authors have argued that these bubbles may result from investors being driven by irrationally

optimistic expectations, fashion, or fads. Under such conditions, investors are no longer able to develop expectations about a company's future profitability, leading to a development of totally unrelated prices. *(Shiller, 2000)*

These bubbles have been associated with herd behaviour, and it has been suggested that investors may be driven by psychological factors unconnected to fundamental values. For example, when investors are uncertain about the quality of information they hold, they may revert to a simple heuristic of following market trends. If investors use the market in this manner to improve their information set, it can result in a form of herd behaviour or mimetic contagion that displays the typical features of a bubble. Although, the distinction between bubbles developed from rational or irrational behaviour may not be as clear as suggested. *(Avery, Zemsky, 1998)*

About the South Sea Bubble, more quantitative contributions to the debate have attempted to explain the bubble within a rational expectations framework. For example, evidence to suggest that the rise in the South Sea share price from early February to May was caused by investors re-evaluating the company's fundamentals was presented. *(Neal, 1993)*

The reasoning of the ones who sustain this thesis is that, as it is likely that investors understood that a greater volume of shares would come onto the market the higher the share price rose, then bubble theory suggests that in such circumstances a rational bubble is not possible, since the market will be unable to absorb an ever-increasing supply of stock at a price higher than its fundamental value. *(Tirole, 1985)*

On the other hand, many scholars have expressed their doubts and scepticism about the South Sea Bubble beliefs, stating that there may be myths and platitudes about it and suggesting slightly different points of view.

Julian Hoppit is one of the many authors who have suggested alternative views about the Bubble, in particular suggesting that, to start with, the South Sea Bubble was originated by the necessity of the government to renegotiate the debts of the 1690s and 1700s, making it look not like a herd caused crisis from the very beginning. *(Hoppit, 2002)*

He then continues stating that "Clearly the weaknesses of the South Sea scheme were carefully detailed in February and March 1720, before it gained statutory authority. Those criticisms were powerfully and widely voiced, such that those who embraced the scheme would often have had to set aside such criticisms or been persuaded of the merits of the Company's proposal." *(Hoppit, 2002)*

Of course, as also Hoppit admits, avarice and greed played a crucial role in the investment choices of people, but according to him there were several other motives that may explain the huge commitment to the Company's stock.

For example, the governor of the Company was the king, the scheme had been championed by the chancellor of the Exchequer and endorsed by parliament and even some professional investors believed in it, including the Bank of England, the East India Company and the Million Bank. Indeed, investing in it was almost considered a patriotic act. *(Hoppit, 2002)*

The considerations of Julian Hoppit are after all true, nevertheless a fact remains still: even if premises seemed consistent, multitudes of people were willing to invest in the project in a reckless way and creating an important precedent of financial crisis for a wide mass of individuals.

The lesson we can surely learn from this dramatic event is surely that the South Sea Bubble stands as a valid historical example of the exuberance and speculative fervour that can conquer financial markets. The episode serves as a reminder of how unchecked optimism, along with herd mentality and both founded or unfounded expectations can lead to catastrophic consequences. The consideration that we can surely make is that, as we reflect on this historical episode, it becomes important for investors, policymakers, and scholars alike to remain vigilant in understanding and addressing the inherent irrationalities that persist in financial markets, as (and we will see the demonstration later) herd behaviour effects like the one just cited have never stopped, and the experience from the 18th century did not help much.

2.3 DOTCOM BUBBLE

As just said, it could be simple to address the cause of such historical crises to the inexperience of people leaving 300 or 400 years ago; nevertheless, it is even easier to look at markets' irrationality examples in this century (and also in the past one, of course), demonstrating that human reasoning always falls in the same patterns.

In fact, the next example that is going to be provided goes back to nothing more than the 90s.

The financial crisis known as "dotcom bubble" plants its roots in the promise of revolutionary business models and technologies following the arrival of the internet.

Although the technological apparatus that we all know as internet was originally invented in the late 60s, it was not until the 1990s that the internet began to gain widespread commercial adoption, thanks to the development of the World Wide Web and user-friendly web browsers.

As the internet became more accessible to the general public, investors began to recognize its potential to disrupt traditional industries and create entirely new markets: this led to a surge of investment in internet-related companies, particularly those involved in e-commerce, online advertising, and software development. *(Shiller, 1996)*

Many start-ups were immediately born, indeed; these companies were often valued based on metrics like website traffic, user growth, or the promise of future earnings rather than traditional financial fundamentals, although many of them had little or no profits at all.

So, in the late 90s the trend was clear: a speculative environment that fuelled a "gold rush" mentality among investors, who poured billions of dollars into internet stocks in the hopes of striking it rich. *(Cassidy, 2003)*

The euphoria was so vast that companies only needed to change their names to something reminiscent of the internet field like "tech", "net" or ".com" in order to receive millions of dollars in funding.

The euphoria surrounding internet stocks reached its peak in March 2000 when the tech-heavy NASDAQ Composite index peaked at over 5,000 points, more than double its value just a year earlier. However, the bubble soon began to burst as investors started to realize that many internet companies were overvalued and unsustainable. *(Bradford DeLong, Magin, 2006)*

In the picture it is shown the rapid growth (and subsequent fall) of the Nominal Value of the NASDAQ Index.

Figure 6

Even if, on the one hand, there were many optimistic investors arriving to the market willing to pay high prices for Internet stocks, on the other hand, some pessimistic investors were willing to short these stocks at the high prices. However, because the amount of shorting is limited in practice, the pessimistic investors' beliefs got overwhelmed by the optimistic beliefs, leading to the high valuation of Internet stocks. *(Ofek, Richardson, 2003)*

To the question raised by many on why sceptical investors didn't short sell enough stock to offset enthusiast investors, it was argued that mutual funds were reluctant to short stocks. *(Chen, Hong, Stein, 2002)*

In fact, internet stocks were much more volatile than other stocks during this period. This led to an inevitable overload of the stock value of internet companies that actually didn't have solid financial foundations.

The market had reached such enormous proportions that, resulting from a "Return analysis" of first day return and quiet period return for Internet firms, with a sample of 305 Internet IPOs between January 1998 and April 2000, the mean return after one day from the IPO was 96.24%. *(Ofek, Richardson, 2003)*

Assumed that the level of euphoria on the markets was extremely high, it goes without saying that this mentality also brought investors to drastically reconsider their investing strategy, no longer relying on Generally Accepted Accounting Principles but, by times, searching for other sources of information such number of clicks, streams etc.; at times (given the frenetic and impellent nature of those

investments) investors were so reckless to invest only relying on the name of the company.

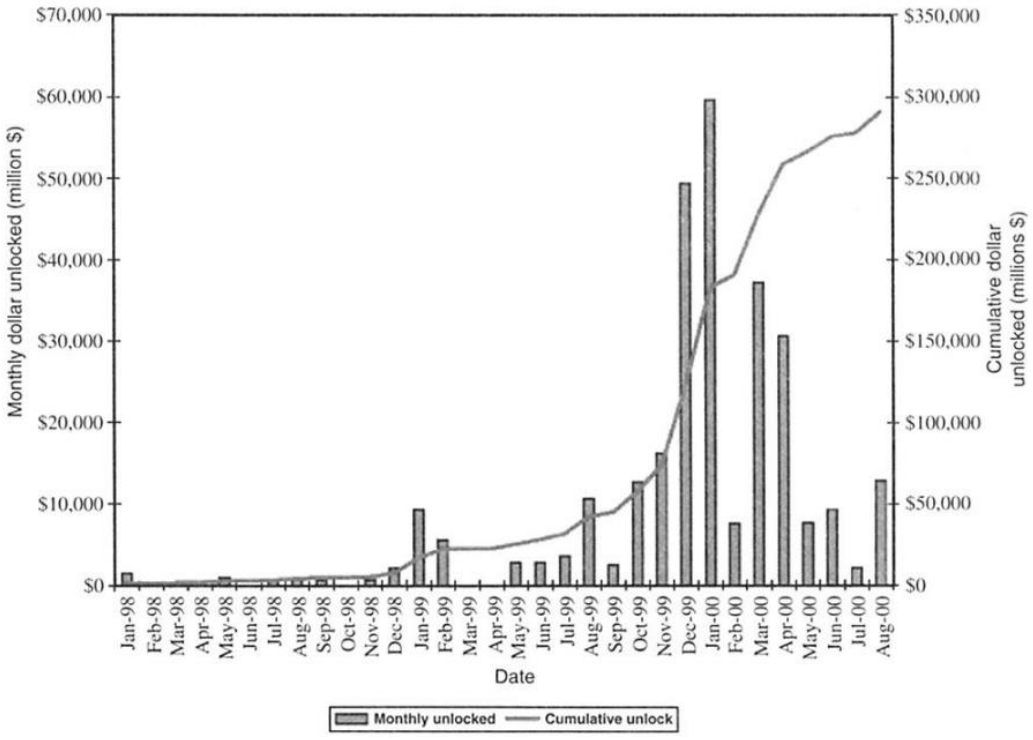

Figure 7

The graph shows both the dollar amount of shares being unlocked by month and the cumulative effect over the sample period January 1998 to September 2000.

By the summer of 2000, almost $300 billion of shares had been unlocked in a short period of time.

As said before, investors realised that the value of Internet companies' shares was totally disconnected from the actual value and reliability of the prospects of the firms; another explanation, maybe a more "rational" one for the decline in value relevance may be related to a decline in the quality of financial information provided to investors. It is argued that in addition to "irrational exuberance," other forces were at work during the bubble that led to the collapse. Scholars point to a number of high profile business failures including; Enron, WorldCom, Tyco, and Global Crossing who misrepresented their financial condition, and blame auditors, financial analysts, and mutual fund managers for ignoring fundamental analysis and contributing to the "herd mentality." *(Healy, Palepu, 2003)*

Just as for the other cases provided above, critics have vastly discussed ideas concerning the nature of this bubble. The technological innovation that the internet brought, in fact, was surely not to be considered just a "passing investing trend", as it would lay the foundations of the world we live in. Some argue that the force that powered the whole extension of the bubble was surely the euphoria caused by the

new inventions, some other justify this enthusiasm stating that, with such levels of dividends growth, it would have been considered rational any investment. *(Suri, 2024)*

Again, what's sure is that the Dotcom bubble provides us a more recent illustration of the power of herd behaviour in financial markets and the consequences of limitless speculation. However, the subsequent collapse of the bubble served as a reminder of the dangers of irrational exuberance and the importance of investing with caution in order to avoid the development of speculative manias.

The Dotcom bubble serves as a valuable lesson for investors, highlighting the need for research, prudent risk management, and a focus on long-term fundamentals rather than short-term hype. That's why this financial bubble is considered as one of the most valuable study-cases to understand financial behaviour.

CHAPTER 3

ACTUAL STUDIES ABOUT BEHAVIOURAL FINANCE

3.1 KAHNEMAN & TVERSKY

As the first two chapters of this work are aimed to explain firstly the objective functioning of financial markets and the general herd of investors behaviours and secondly an analysis of the actual historical example of such behaviours, the third part will be interested in relating the actual studies through which scholars have been able to identify financial-related problems such the ones largely cited above.

It is clear that, as part of this thesis, the understanding of human psychology and reasoning biases become strictly needed, as this detail can sometimes call into question the principles of Portfolio Theory, according to which investors act rationally; in fact, a rational investor should act as a "Prussian General", a similarity to intend that investors should collect information and declare personal aversion to risk and then constitute their ideal portfolio. (Helmuth Karl von Moltke, 1800-1891)

Maybe for this reason many scholars put so much interest in the matter. However, it was already clear at the start of the 20th century that the risk propensity of people who invest in markets changes depending on the situation of the economic cycle for many different reasons, invalidating the Theory that presupposes consistency in the various market phases. Human beings are indeed naturally conditioned by emotions.

Several original books written in the 1800s and early 1900s marked the beginning of the behavioural finance school. Selden's 1912 book "Psychology of the Stock Market" was one of the first to apply the field of psychology directly to the stock market. *(Ricciardi, Simon, 2000)*

In order to try to explain the actual behaviour of investors, behavioural finance was born: a branch of psychology born in the early 1900 but whose most significant contribution arrived only in the 90s.

Behavioural finance attempts to explain the reasoning patterns of investors, including the emotional processes involved and the degree to which they influence the decision-making process. Essentially, behavioural finance attempts to explain the what, why, and how of finance and investing, from a human perspective. *(Ricciardi, Simon, 2000)*

As said, the great development of Behavioural Finance will not come until the end of the past century, in whose decades many psychologists and economists started researches and studies on this matter.

In particular, the “spotlight” will be put on the various publications of Daniel Kahneman and Amos Tversky, that have undoubtedly been the largest contributors to the study of behavioural finance and economics.

Although many other studies will be cited, an introductory overview of the collaboration works of those two psychologists seems, if not due, at least beautiful and interesting to provide.

The initial contact between the two happened in 1969 in the Psychology faculty of the Jerusalem Hebrew University. Amos Tversky, who enjoyed high consideration in the decision-making process field of study, was invited by Daniel Kahneman to discuss in a seminar. *(Kahneman, 2011)*

After the talk, the two met again to begin a research together: they wanted to answer the question on whether the human mind was a good statistical estimator or not. What they did next was to subject statisticians to questions requiring intuitive answers, so that they could demonstrate that even a trained mind can fall in some common tricks.

To provide an example, directly taken by their later publication, “Judgement Under Uncertainty, Heuristics and Biases”, one experiment was to describe an individual as: “Extremely shy and introvert, always available but not much interested in the world outside, mild and precise soul, always needs order in his personal life.”

As they expected, to the question on whether this hypothetical individual was most likely a farmer or a librarian, the vast majority of the population of the experiment answered “librarian”, even though in the USA farmers are about twenty times the number of librarians. *(Tversky, Kahneman, 1974)*

The evidence resulted to be that situations like these happen because people need to make judgments and decisions quickly using limited cognitive resources, so they necessarily use shortcuts. *(Simon 1956; Kahneman, Tversky 1982)*

This, as well as many other experiments, proved that even knowledgeable scientists and professors, ignoring statistical data to rely only on the resemblance of the character. They named this “go by feel” approach as “heuristics”, namely a rule of thumb which is concerned with fostering the search for new theoretical developments, new empirical discoveries and new technologies, with an approach to problem solving that does not follow a clear path, but relies on intuition and the temporary state of circumstances in order to generate new knowledge. According to their theory, so, reliance on heuristics caused bias, a judgment developed on basis

of information in possession, not necessarily corroborated by evidence logically connected. *(Tversky, Kahneman, 1974)*

The term heuristics encompasses innate and automatic processes as well as learned or consciously selected rules of thumb. Heuristics often work well within some domains and for some types of problems, but badly in others. *(Hirshleifer, 2015)*

Kahneman describes human thinking as largely intuitive and heavily influenced by the associations that are triggered by the presentation of a decision problem. People are overconfident that their intuitive way of thinking about a problem is correct; information that does not immediately come to mind tends to be completely neglected. *(Kahneman, 2011)*

As shown in Kahneman and Tversky publications, indeed, humans are "weak" in their rational processes, leaving aside the huge role that emotions play on an investor through all the investing phases. Feelings provide the value weights assigned to possible outcomes to motivate decisions and actions. Affective reactions can also facilitate making fast use of urgent information about the environment, as in the affect heuristic. *(Slovic, Finucane, Peters, MacGregor, 2002)*

The "emotional roller-coaster" to which an investor is subject to, can be summarized in short in a graph of this type, showing how we are inducted to be optimistic by price growth and, in periods of price fallings, we lost lucidity and are led to make wrong choices.

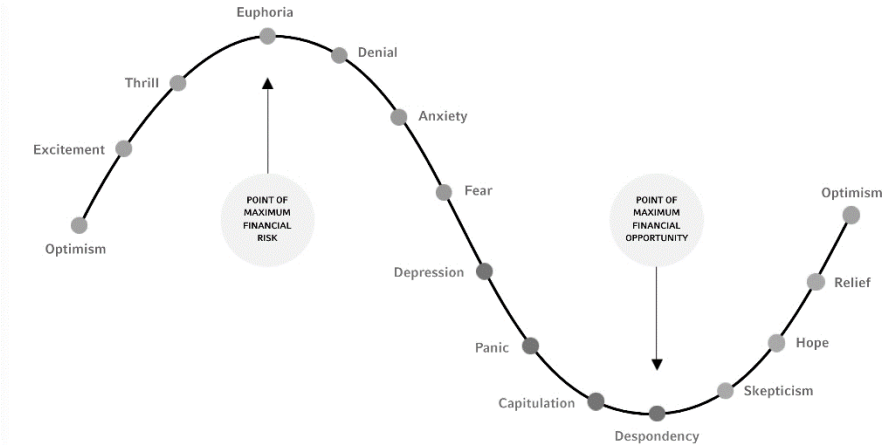

Figure 8

Hence, behavioural finance helps us understand which mechanisms are triggered in us when we make investment decisions, and by getting to know ourselves it becomes possible to make corrections to improve our behaviours, because "The

investor's chief problem – even his worst enemy – is likely to be himself". *(Graham, 1949)*

Going back to the developments of the studies of Kahneman and his colleague, there are some features that should necessarily be pointed out: heuristics and biases become, at this stage, crucial for the understanding of human mind in general, but with a particular stress on the financial field of application we are interested in.

In the theory of Trivers of 1991, people overestimate their personal merits so as to be more persuasive to others about them. *(Hirshleifer, 2015)*

In this regard, it is surely coherent to talk about the "error" of overconfidence. In fact, from the experiments carried on in the 90s, we can now affirm without doubts that humans have the tendency to over-estimate their own skills and predictions for success. *(Ricciardi, Simon, 2000)*

An immediate consequence of the self-deception mechanism is that people will be overconfident about their merits of various sorts. In particular, people think that their judgments are more accurate than they really are. Overconfidence tends to be stronger when correct judgments are hard to form, such as when uncertainty is high. The difficulty effect is the finding that overprecision is stronger for challenging judgment tasks. *(Hirshleifer, 2015)*

Because high ability contributes to good outcomes, overestimation of one's merits promotes overoptimism about one's prospects. People tend to be overoptimistic about their life prospects. *(Weinstein, 1980)*

By projecting this problem into the financial world, we denote that this issue causes investors to trade more aggressively, which tends to reduce their welfare. *(Odean 1998)*

Overconfidence, therefore, helps solve an important question in finance: individual investors trade individual stocks despite losing money doing so, and they invest in active funds instead of indexing to obtain better net performance; moreover, trading activity by individual investors increases after they experience high returns. *(Barber, Odean, 2000)*

This statement finds a confirm in models of the dynamics of overconfidence, profits on an investor's existing long or short position increase confidence, resulting in greater subsequent trading aggressiveness. *(Daniel, Hirshleifer, Subrahmanyam, 1998)*

Remaining in the field of finance, there are also other professional figures that, when affected by overconfidence, may give a contribution in driving core changes in the economy.

In the model of Bernardo & Welch, overconfidence has a major role, as it encourages entrepreneurs to engage in socially desirable experimentation, estimate that is confirmed by empirical studies. *(Hirshleifer, 2015)*

Anyway, both overconfidence and overoptimism are associated with greater corporate investment; so, potentially from a positive point of view, overoptimistic managers spend more on R&D and obtain more patents relative to their R&D spending, perhaps because of a greater risk propensity. *(Hirshleifer, Low, Teoh, 2012)*

However, the biases plaguing the world of finance do not end there, as next on the list we find a "mental error" that makes people feel anxious and in tension when exposed to conflicting beliefs. Also this bias, maybe more than the others, finds its fertile ground in finance. This bias is called cognitive dissonance.

As individuals, we attempt to reduce our inner conflict and we have two ways to do it: changing our past values, feelings, or opinions or, more often, attempting to justify or rationalize our choice. This theory may apply to investors or traders in the stock market who attempt to rationalize contradictory behaviours, so that they seem to follow naturally from personal values or viewpoints. As investors, in fact, we have an inherent ability of forgetting or failing to learn from our past errors (such as a bad investment or financial decision).

In the work of Goetzmann and Peles of 1997, which examines the role of cognitive dissonance in mutual fund investors, it's argued that some individual investors may experience dissonance during the investment process.

Essentially, the investors in the under-performing funds are reluctant to admit they made a "bad investment decision", and if the proper course of action would be to sell the underperformer more quickly, instead, investors choose to hold on to the bad investments. By doing so, they do not have to admit (to their selves and to others) that they made an investment mistake. *(Ricciardi, Simon, 2000)*

For instance, to provide an example likely reliable to the Dotcom Bubble, a traditional investor who usually evaluates companies using fundamental analysis may be tempted to change his investment beliefs in order to purchase stock of internet companies, which cannot be evaluated with profitability measures; now this traditional investor can rationalize this change of strategy in two ways: he may

convince himself that the “new internet era” we’re living in requires also different financial rules or, secondly, he could just put aside fundamental analysis rules to focus only on price momentum. *(Ricciardi, Simon, 2000)*

Cognitive dissonance, therefore, can cause various behaviours at junctures such as: self-assertion, denial of responsibility, distraction, change of attitude, etc.

However, to remedy the problem, some studies have been done on how to reduce this bias: the dominant paradigm used to test dissonance theory is based on inducing compliance, and in which participants are asked to write counter-attitudinal essays. After completing this task, participants are given the opportunity to reduce the dissonance they experience by altering their attitude, so it is consistent with the position they argued for in their essay. *(McGrath, 2017)*

Next, one of the most famous biases theorised by Kahneman, which happens to have become a prevalent theme in behavioural finance, goes by the name of “regret theory”, and substantially defines that an individual may compare a given outcome or state of events with the state of a missed choice’s outcome, indeed regretting it. *(Bell, 1982)*

This theory is intuitive, being based on the idea that people do not only care about what they get, but also about what they might have gotten if they had chosen differently. It is based on two functions: a utility function capturing attitudes toward outcomes, and a function capturing the magnitude of the possible regret. *(Bleichrodt, Cillo, Diecidue, 2010)*

The classical example explains how an individual is more inclined to consider buying an already known brand’s product rather than remaining disappointed (or regretting) for choosing another brand. The same may easily hold for stocks, bonds and investments in general.

For instance, investors may find it easier to buy the current "trendy" stock or mutual fund: essentially, they're simply going along with the crowd. Consequently, if the chosen investment significantly drops in value, the investor can rationalize their decision more easily. This is because they can minimize emotional responses, such as regret or anxiety, knowing that others in the group of investors also suffered losses from the same wrong investment. *(Ricciardi, Simon, 2000)*

This bias is perfect for understanding how, in behavioural finance and sociology, the boundary defining individual and group standards of behaviour is, in reality, very thin. It is precisely this “reassuring” of the soul enjoyed by the subject that is validated by the fact that a plurality of individuals behaved in the same way, laying

the foundations for the formation of a herd effect, a concept we will discuss openly in the next chapter.

Additionally, an important challenge in examining regret theory lies in the observation that the two pairwise choices, to which the individual is subjected, can be to intransitive. Essentially, this suggests that individuals with “regret preferences” could potentially be exploited by a "money pump" mechanism, using successive pairwise choices over three or more options. However, scholars such as Loomes and Sugden argue that individuals employing regret-theoretic preferences would consider the entire choice set comprehensively, thus rendering them less susceptible to manipulation by a money pump. This issue can be better evaluated within a framework of regret theory that accounts for multiple choices rather than just pairwise comparisons, as shown in the model reported by professor John Quiggin, in which it is essentially shown that, under plausible assumptions, there is a unique extension of regret theoretic preferences from the pairwise to the general case. The only assumption additional to those imposed in previous presentations of regret theory is that choices should not be influenced by the availability of alternatives which are state-wise dominated. *(Quiggin, 1994)*

Afterwards in the list, since regret theory provides valuable insights into the decision-making process by highlighting the significance of anticipated regret in shaping individuals' choices, the next bias is something that for certain aspects works quite the same way as regret theory.

The model in question is called “prospect theory”. Firstly-formulated by Kahneman and Tversky in 1979, prospect theory serves as an alternative method of explaining choices made by individuals under conditions of risk. It was designed, in essence, as a substitute for expected utility theory.

Kahneman and Tversky, in fact, realized that the expected utility theory model did not fully describe how individuals make decisions in uncomfortable and risky situations and that, therefore, there are situations in which a subject’s choice could not be predicted. *(Edwards, 1996)*

Specifically, prospect theory suggests that decision-makers tend to overweigh small probabilities and under-weigh moderate and high probabilities: investors tend to evaluate prospects or possible outcomes in terms of gains and losses relative to some reference point rather than the final states of wealth. *(Schwartz, 1998)*

This means that most people become risk-averse when confronted with the expectation of a financial gain, demonstrating that if investors are faced with the

possibility of losing money, they often take on riskier decisions aimed at loss aversion. *(Ricciardi, Simon, 2000)*

So, having noted that in the standard utility theory of Von Neuman-Morgenstem decisions in risky situations are made based on final wealth and probabilities, Kahneman and Tversky conceptualized a new model in which decisions are based on values assigned to gains and losses with respect to a reference point and decision weights that are lower than those in the utility theory (except in cases of very low probabilities). By doing so, they pointed out why individuals choose to accept insurance and gambling at the same time. *(Edwards, 1996)*

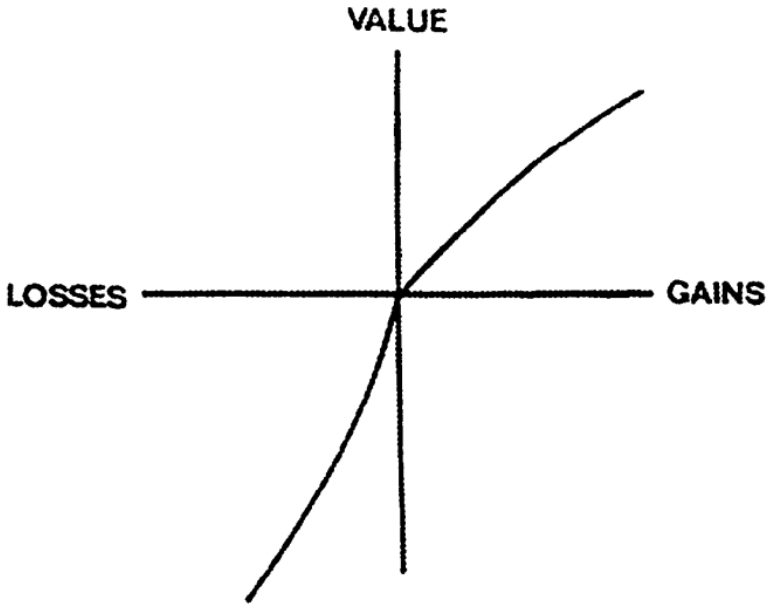

Figure 9

Kahneman and Tversky also developed a two-parts model to conceptualize situations with monetary outcomes, which is well described by Edwards: “During the editing phase, four major sequential operations occur: coding, combination, segregation, and cancellation. Coding involves the setting of a reference point by the decision-maker by which all gains and/or losses are measured. Combination consists of the aggregation of probabilities associated with identical outcomes. Segregation involves separating the risky components of a prospect from the riskless components of the prospect. Cancellation involves discarding the components of choices that are common to all prospects. In the evaluation phase, the decision-maker evaluates the prospects that are attainable to him or her after the conclusion of the editing phase. In the end, the prospect with the higher value is chosen”. *(Edwards, 1996)*

Even though some studies have been done in this particular direction, the model developed by Kahneman and Tversky remains a true milestone in the decision-

making and personal behaviour study field, to the point of being not only cited in many academic works, but also often taken as educational asset for banks and firms interested in human resources formation.

Further biases have been individuated and studied through the years, as the error of "anchoring", an error due to which when people are asked to make quantitative assessments, their assessments are influenced by suggestions.

For instance, when researchers in a study asked people about their incomes using questionnaires in which respondents are asked to indicate in which bracket their income falls into, the answers people gave resulted influenced by the brackets shown on the questionnaire. *(Shiller, 1999)*

Related to the anchoring phenomena is a tendency to place particular events into "mental compartments" based on superficial attributes. Instead of looking at the big picture, as would be implied by expected utility theory (and the Kahneman & Tversky model), they look at individual small decisions separately.

Market participants may tend to place their investments into arbitrarily separate mental compartments, and react separately to the investments based on which compartment they are in. This results in the illusion that their portfolio is protected from downside risk. *(Shiller, 1999)*

To sum up, investors will obviously be influenced by various behavioural and psychological factors. Nevertheless, individuals who invest in stocks and mutual funds should implement safeguards that can help control mental errors and psychological issues. *(Ricciardi, Simon, 2000)*

Up to this point, it could be surely useful to disclose some information that may be helpful in the shaping of a "as accurate as possible" investor mind.

It comes without saying that, at least for the ones investors who actually suffer the most from biases, the best way to maximize their investment returns is to control their "mental errors" with a long-term philosophy.

In this regard, it is interesting to know that, in November 1999, there was a conference entitled "Recent Advances in Behavioural Finance: A Critical Analysis", from which a quite unanimous statement could be extrapolated: the best trading strategy (in order to overcome human limits' generated issues) is a "long-term buy and hold" investment in a passive stock mutual fund such as S&P 500 index. *(Ricciardi, Simon, 2000)*

As it has become clear, from the late 80s and early 90s studies of Kahneman and Tversky, this important field has acquired more and more importance in the academic environment. Many further studies followed those on mental errors cited above and much progress have been made, nevertheless science is still far away from the reaching of a level of financial knowledge among participants that could be considered good.

Concerning this evident fact, it would be appreciated by the whole world of finance if the wishes of David Hirshleifer in his paper “Behavioural Finance” were to come true: “there is a need to move from behavioural finance to social finance (and social economics). Social finance includes the study of how social linkages affect information flows in securities markets, how social norms, moral attitudes, religions, and ideologies affect financial behaviours and of how ideologies that affect financial decisions form and spread”.

And again: “Previous research has documented the spread of investment and managerial behaviors through observation of public behaviors. However, contagion is consistent with the spread of almost any behaviour. To derive richer implications, it will be crucial to understand the transmission biases and amplification processes that make some investment ideas spread more easily than others. For example, the survey evidence and discussions of Shiller in 2000 provide an initial set of leads.” *(Hirshleifer, 2015)*

Precisely by taking these suggestions literally, the next part is going to “enlarge the sight”, no longer analysing just the behaviour of a hypothetical subject, but moving the focus to the mass of these subjects, studying the general behaviour of many individuals operating in the same market and “acting” in a manner that recalls the one of a herd.

3.2 SHILLER

This work starts talking about the general financial market functioning and, at some point, stresses the importance of information's flow in this environment; this is because information really play a pivotal role in market trends, being able to influence the decisions of multitudes of people. The focus is, thus, put on how these processes of information circulation can affect the reaction of other investors, also considering the tendencies and heuristics that those individuals may have and the "tricks" they may fall into.

The aim is to answer to questions involving the human nature under a sociological aspect, trying to figure out what induces hundreds of thousands (if not millions) of people to all collectively behave in an irrational and "wrong" way.

One of the first behavioural economics' scholars to move the attention from personal behaviour field to a more sociological aspect was, without any doubt, professor Robert Shiller.

Shiller is a professor of the Yale University and is considered (as the previously treated Kahneman and Tversky) a father of behavioural finance. Despite his many publications covering various aspects of this matter, his efforts were primarily devoted to studying the volatility of financial markets, price dynamics and the formation of speculative bubbles, studies thanks to which he was awarded the prestigious Nobel Prize.

In fact, in 1981 Shiller published an article in which he challenged the efficient market hypothesis (which was the dominant view at the time). It's also curious that, in 2013, Shiller received the Nobel along with Fama, who is the most important voice of the efficient market hypothesis, supposing that market prices accurately incorporate all the available information, whereas Shiller argues against this theory. *(Shiller, 2015)*

Shiller argued that, in a rational stock market, investors would base stock prices on the expected receipt of future, discounted dividends: he proceeded by examining the performance of the US stock market since the 1920s and considered the expectations of future dividends and discount rates that could justify the wide range of fluctuations observed in the stock market. Shiller concluded that stock market volatility was greater than could plausibly be explained by any rational view of the future. This article was later named as one of the "20 best articles in the 100-year history of the American Economic Association". *(Shiller, 1981)*

These exceptional findings inevitably led the professor to wanting to understand which could be the causes of stock markets fluctuations and what drives people to behave in irrational ways, especially paying attention on how a form of irrational exuberance sometimes leads to price bubbles.

Indeed, Shiller's definition of bubbles relies mostly on "investor enthusiasm, a sort of psychological epidemic", with people on the markets copying what "other investors" do and believing that, the more a title is bought and highly considered, the more it has to be valid. This behaviour may be due to the so called "precipitating factors", that are exogenous to market behaviour, coming from various fields, or "cultural factors", such as the news media and the recurrent tendency of market participants to write stories about "new eras" to justify the inconsistency of prices. *(Shiller, 2015)*

One clear example of those cultural factors could be the tendency of the main stream and media networks to refer to the internet companies in the 90s as a "revolutionary and new concept", passing on the idea that the fundamental analysis theory was changing during the Dotcom bubble.

This hypothesis was confirmed by Shiller himself and his "Valuation Confidence Index". This index shows a clear decline in investor confidence during the rise of the internet bubble, down to a minimum in 2000, with only 30 % of investors agreeing that the stock market was not overvalued. Investors were thus aware of the existence of one bubble.

Ultimately, professor Shiller argues that human tendency toward overconfidence is also a psychological characteristic capable of biasing market prices. Individual behaviour appears highly influenced by the one of surrounding humans. *(Shiller, 2015)*

From this very point, he writes that those fundamental factors are responsible of creating a "feedback loop", resulting in what he calls "naturally occurring Ponzi processes". This process results directly into the interesting concept called "herd behaviour".

The term "herd" actually recalls pretty well the kind of behaviour intended; in fact, an individual is said to herd when knowledge that others are investing changes his decision from not investing to making the investment. *(Bikhchandani, Sharm, 2001)*

This (if multiplied for a vast number of investors) turns up to be a very serious concern, as observers express concern that herding by market participants

exacerbates volatility, destabilizes markets, and increases the fragility of the financial system. *(Morris, Shin, 1999)*

This threat is known as “informational cascades”, which is a process that arises mainly from informational differences: first, the actions of investors who decide early may be crucial in determining which way the majority will decide. Second, the decision that investors herd on may well be incorrect. Third, if investors take a wrong decision, then with experience and/or the arrival of new information, they are likely to eventually reverse their decision starting a herd in the opposite direction. This, in turn, highly increases volatility in the market. *(Bikhchandani, Sharm, 2001)*

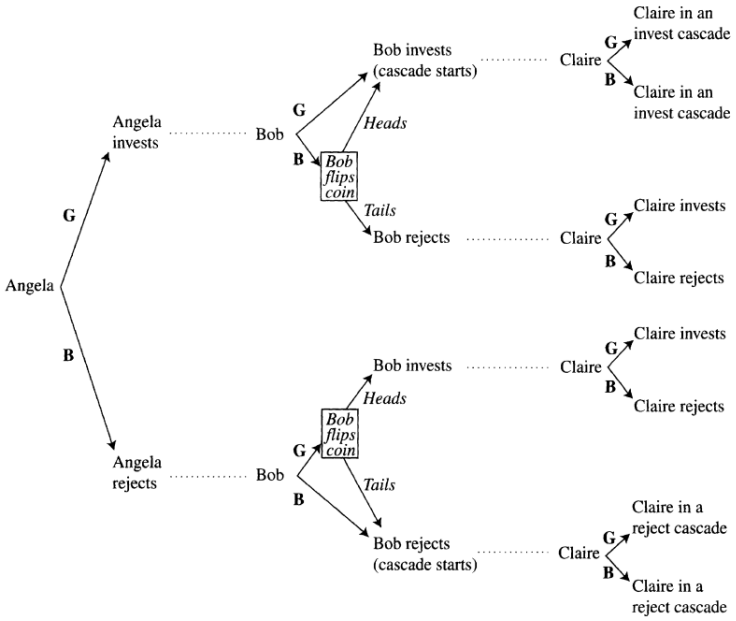

Figure 10

So, an invest cascade, starts with the first individual who finds that the number of predecessors who invested exceeds the predecessors who rejected. This individual and all subsequent individuals will then invest regardless of what their private signal tells them about the value of the investment: once a cascade starts, an individual's action does not reflect her private information.

The probability that a cascade will start after the first individuals is very high. Even if the signal is averagely noisy, a cascade starts after the first four individuals with probability greater than 0.93. *(Bikhchandani, Sharm, 2001)*

To be precise, through years several scholars have tried to develop models to actually demonstrate herd behaviour and its potential causes. One of the most reliable ones is the Avery and Zemsky model developed in 1998.

In their model, after every buy or sell decision by an investor, the price of a stock adjusts to take into account the information revealed by this decision: Every investor follows his or her own private information, as the price adjusts in such a manner that, based only on publicly available information, a person is exactly indifferent between buying and selling. If a person's private information tips the balance in favour of buying or selling, this private information is revealed by the individual's action.

Thus, informationally inefficient herd behaviour may occur and can lead to price bubbles and mispricing when the accuracy of the information with market participants is not common knowledge.

So, when the uncertainty is only about the value of the investment, the stock market price is informationally efficient and herd behaviour will not occur. However, when there is uncertainty about the accuracy of the information possessed by market participants, a one-dimensional stock price is no longer efficient and herd behaviour can arise, even when investors are rational. *(Bikhchandani, Sharm, 2001)*

Other scholars, instead, have provided a theory according to which herding may be based also on reputational factors, that are some concerns arising because of uncertainty about the ability or skill of a particular portfolio manager.

In brief, they reached the conclusion that when there are two or more investment managers facing a choice, everyone imitates the decision of the first manager as, being unsure of their ability, they will feel reassured by the collective compliance to the first strategy. *(Banerjee, 1992)*

Incidentally, there are several reasons for an investor to be influenced into reversing a planned decision after observing others: first, other people may know additional information about the return on the investment. Second, and this is relevant only for money managers who invest on behalf of others, the incentives provided by the compensation scheme and terms of employment may be such that imitation is rewarded. Additionally, it is straightforward to think that individuals may have an intrinsic preference for conformity*. (Bikhchandani, Sharm, 2001)*

People who interact with each other regularly, explains Shiller, tend to think and behave in a similar way. This behaviour seems to suggest some kind of irrationality, such as a sort of psychological motivation to be in accord with group members. *(Jost, 1995)*

To support this thesis, Solomon Asch in 1952 made an experiment that demonstrates the power of social pressure, but that might also demonstrate that

people rationally take into account the information revealed by others' actions. *(Shiller, 1995)*

In practice, Asch placed a subject in a group of people, with all other members being confederates. The group was asked to answer to 12 questions about the lengths of line segments. The answers to those questions were obvious and were nearly always correctly answered when presented to individual respondents outside of a group. In each experiment the confederates were told to give an incorrect answer on seven of the 12 questions. The subjects, reacting to the conflict between their own senses and the unanimous consensus of the rest of the group, showed evidence of anxiety and distress, and in a third of their responses then made the same error as the majority. *(Asch, 1952)*

“Human society has had an evolutionary advantage in its ability to act as a unit, to respond collectively to information. Group members must therefore exchange information among themselves before a crisis happens; they must promote a collective memory of important facts, common assumptions, and conventions” argues professor Shiller, and again: “There is a sense of conversation in the media, and many of the same patterns continue in these media. Moreover, the media appear to be somewhat less effective in transmitting information and opinions than ordinary interpersonal conversation”. *(McGuire, 1985)*

With regard to this, anthropologists have documented patterns of conversation that appear to transcend all cultures and are apparently part of the basic behaviour patterns of the human animal. *(Brown, Levinson, 1987)*

So, it results that many of the failures of human judgments that are then called "herd behaviour" might be due to the limitations imposed on human thought and memory by these patterns of communication. *(Shiller, 1995)*

Furthermore, there have been historical empirical examples of herding applied to financial markets as, for instance, the case of Malaysia, well explained by the local scholars Ming-Ming Lai and Siok-Hwa Lau in their paper. *(Lai, Lau, 2004)*

The 1997 Asian financial crisis which drew global attention and debate was partly due to the herd behaviour of human beings *(Jomo, 1998)*

In particular, the interesting result was a more prevalent herding in the lower market stress and bearish periods, meaning that investors are perceived irrational as they are unwilling to make their own decisions, following instead the collective actions of the market. Hence, this behaviour implies that the violation of the rational people assumption in which standard modern finance is based are

consistent with the suggestion of the need for market participants to understand the impact of psychology also in this field. *(Lai, Lau, 2004)*

In conclusion, through the pioneering work of Professor Robert Shiller and other scholars, it has been clarified how traditional economic theories, such as the efficient market hypothesis, are challenged by real-world phenomena of market volatility and speculative bubbles driven by human behaviour. Those important contributions illuminate the often underestimated role of psychological factors in financial decision-making. The studies presented above (even the preceding chapters' evidences) reveal that markets are not merely sorts of computational engines but are also arenas of human emotions, sentiments, and various behaviors.

These phenomena, in fact, illustrate how investors can collectively make decisions that lead to suboptimal market outcomes due to the influence of others' actions and the inherent desire for conformity. Such behaviors not only increases market volatility but also poses significant risks to the stability of financial systems; this view helps explain the occurrences of mispricing and market anomalies, challenging the previous assumption of informationally efficient markets.

Shiller, though, fights against the belief that markets should be left alone from different types of regulation, in addition to the creation of new financial markets and institutions. His vision is not to simply to condemn the financial industry, but to see it as a powerful tool for creating a better society.

In fact, Shiller has often described how, in human history, finance has contributed to society's wellbeing through different inventions, and the following quote sums up the academic recognition in full: "For all of the very specialized work he's done on financial markets, he's always cared more deeply for the welfare of society," says Peter Dougherty, Shiller's editor at Princeton University Press.

3.3 CONCLUSIONS

As this paper reaches its conclusion, the thesis around which the work has been built is finally shown, highlighted by the divided structure aimed at giving a logical path to the consolidation of the idea of behavioural finance and herding.

The paper, indeed, initiates with a general introduction about how financial markets are conceptually made, in order to give an understanding of some crucial factors, such as participants, the role of information flows among them and the stock reaction to some types of behaviour. These notions, in fact, have been rediscovered and applied through all the paper as they have been a proper rule to rationalize concepts and understand causes derived by them, explained in the following chapters.

In fact, the second chapter is aimed at trying to explain the real events in which the financial system (explained in the first chapter) has encountered some “glitches”.

Three of the main speculative bubbles of history are analysed: Tulip Mania, South Sea Bubble and the more recent Dotcom Bubble. All of them are filled with critical comments by respected scholars and the focus is put on the behaviour of the market participants in every different case studied, trying to state the causes that led to the crack of every bubble.

Finally, the third chapter enters in the core, reporting the principal and more influential studies about behavioural finance and herd behaviour. This is done presenting mainly three psychologists: Daniel Kahneman, Amos Tversky and Robert Shiller but, along with them, numerous studies, models, opinions of other scholars are widely reported.

Additionally, the concepts analysed happen to be the main “conceptual biases” that are also the more useful ones to understand certain behaviour-derived effects happening in financial markets and, later on, also some typical structures of informational cascades and other forms of herding that drive markets’ participants to behave in an irrational way.

In conclusion, through studying the various opinions of the experts, it becomes quite evident that human beings do not act in a totally rational way, even in finance and, consequently, this irrationality leads to bubbles and financial crises. Hence, the lesson that can surely be taken from the understanding of this process is surely that the further study of behavioural finance and implementation of an appropriate financial education system are considered to be necessary nowadays as, for too long, this important matter has been poorly treated.

CHAPTER 4

APPENDIX AND REFERENCES

4.1 CRYPTO BUBBLE?

It is known that professor Robert Shiller has, in many occasions, talked about cryptocurrencies and has given his opinion about them.

For instance, in an article published on the Project Syndicate website, Shiller refutes bitcoin's claim to be an innovation. He claims that some cases in the past had a similar spiel as bitcoin but failed to take off. For example, the Cincinnati Time Store sold items based on "labour notes" that were time units that represented the amount of labour required to bring the product to market. In effect, they represented a promise by the buyer to perform an equivalent amount of work for the store's owner in exchange for the product. But the concept proved to be unpopular and the store closed in 1830. *(Sharma, 2019)*

And again explains: "Practically no one, outside of computer science departments, can explain how cryptocurrencies work, that mystery creates an aura of exclusivity, gives the new money glamour, and fills devotees with revolutionary zeal." *(Shiller, 2018)*

Seems clear that (right so, in my opinion) prof. Shiller doesn't take cryptocurrencies in high consideration, believing that they may, in turn, be widely exacerbated by a supporting herd.

Anyway, even if this analysis was well fitting in the bubbles chapter, I decided to avoid including it as, for the lack of parallel studies and corroborated opinions, I didn't take it as a bubble comparable to the others, and I didn't want to taint the scientific nature of the work.

4.2 ACKNOWLEDGEMENTS

As the last thing before terminating, I feel the need to thank some people that have been helping and sustaining me, not only through the writing of this paper, which has taken me five months of work, but also through all of these three years of academic formation.

For this reason, I would like to thank my parents and my family in general, Chiara, and all the fellow students met during these three years at Luiss.

Then, a special acknowledgment is due to professor Di Colli, who has always showed himself available for tips and explanations.

Lastly, I want to express the sorrow I felt upon realising that, just as I was writing a paper on his studies, Professor Kahneman, whose book gave me the passion needed to decide to deepen these issues, passed away.

4.3 TABLE OF FIGURES AND SITOGRAPHY

Figure 1 Sources: https://2012books.lardbucket.org/books/finance-banking-and-money-v1.0/s08-the-economics-of-interest-rate.html

Figure 2 Sources: https://saylordotorg.github.io/text_principles-of-macroeconomics-v2.0/s14-01-monetary-policy-in-the-united-.html

Figure 3 Sources: https://www.britannica.com/money/supply-and-demand

Figure 4 Sources: Öztürk, A. (2022). Dutch Tulip Mania: Tulip Crisis. In *Black Swan: Economic Crises, Volume I* (pp. 13-31). Singapore: Springer Nature Singapore.

Figure 5 Sources: https://curiosity.lib.harvard.edu/south-sea-bubble/feature/the-crash

Figure 6 Sources: DeLong, J. B., & Magin, K. (2006). A short note on the size of the dot-com bubble.

Figure 7 Sources: Ofek, E., & Richardson, M. (2003). Dotcom mania: The rise and fall of internet stock prices. *the Journal of Finance*, *58*(3), 1113-1137.

Figure 8 Sources: https://russellinvestments.com/us/blog/b-is-for-behavioral-mistakes-how-much-value-comes-from-prevention

Figure 9 Sources: Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. In *Handbook of the fundamentals of financial decision making: Part I* (pp. 99-127).

Figure 10 Sources: Bikhchandani, S., & Sharma, S. (2001). Herd behavior in financial markets. *IMF Staff papers*, *47*(3), 279-310.

https://www.investopedia.com/news/why-nobel-economist-robert-shiller-still-bitcoin-skeptic/ (Sharma, 2019)

https://www.project-syndicate.org/commentary/cryptocurrencies-scientific-narrative-by-robert-j--shiller-2018-05 (Shiller 2018)

4.4 BIBLIOGRAPHY

Açıkgöz, 2022, “Black Swan: Economic Crises, Volume I”

Asch, S. (1952). Social psychology. Englewood Cliffs, NJ: Prentice-Hall.

Avery, C., & Zemsky, P. (1998). Multidimensional uncertainty and herd behavior in financial markets. *American economic review*, 724-748.

Ball, R. (2006). International Financial Reporting Standards (IFRS): pros and cons for investors. *Accounting and business research*, *36*(sup1), 5-27.

Banerjee, A. V. (1992). A simple model of herd behavior. *The quarterly journal of economics*, *107*(3), 797-817.

Barber, B. M., & Odean, T. (2000). Trading is hazardous to your wealth: The common stock investment performance of individual investors. *The journal of Finance*, *55*(2), 773-806.

Bell, D. (1982). “Regret in Decision Making Under Uncertainty.” Operations Research, 30,: 961-981.

Bikhchandani, S., & Sharma, S. (2001). Herd behavior in financial markets. *IMF Staff papers*, *47*(3), 279-310.

Bleichrodt, H., Cillo, A., & Diecidue, E. (2010). A quantitative measurement of regret theory. *Management Science*, *56*(1), 161-175.

Brown, P., & Levinson, S. C. (1987). *Politeness: Some universals in language usage* (Vol. 4). Cambridge university press.

Buiter, W. H. (2014). The role of central banks in financial stability: how has it changed. *The role of central banks in financial stability: How has it changed*, 11-56.

Cassidy, J. (2003). *Dot. con: How America lost its mind and money in the internet era*. HarperCollins Publishers.

Chen, J., Hong, H., & Stein, J. C. (2002). Breadth of ownership and stock returns. *Journal of financial Economics*, *66*(2-3), 171-205.

Dale, R. S., Johnson, J. E., & Tang, L. (2005). Financial markets can go mad: evidence of irrational behaviour during the South Sea Bubble 1. *The Economic history review*, *58*(2), 233-271.

Daniel, K., Hirshleifer, D., & Subrahmanyam, A. (1998). Investor psychology and security market under-and overreactions. *the Journal of Finance*, *53*(6), 1839-1885.

Dash M (1999) Lale Çılgınlı ˘gı. Sabah Kitapları, ˙Istanbul.

DeLong, J. B., & Magin, K. (2006). A short note on the size of the dot-com bubble.

Edwards, K. D. (1996). Prospect theory: A literature review. *International review of financial analysis*, *5*(1), 19-38.

Emmett, R. B. (2000). Great bubbles (Vol. 1). London, England: Pickering & Chatto.

French, D. (2006). The Dutch monetary environment during tulipmania. Q J Aust Econ 9.

Garber PM (2000) Famous first bubbles: the fundamentals of early manias. The MIT Press, Cambridge.

Graham, B., The Intelligent Investor (Harper & Brothers, 1949)

Healy, P. M., & Palepu, K. G. (2003). How the quest for efficiency corroded the market. *Harvard Business Review*, *81*(7), 76-76.

Hirshleifer, D., Low, A., & Teoh, S. H. (2012). Are overconfident CEOs better innovators?. *The journal of finance*, *67*(4), 1457-1498.

Hirshleifer, D. (2015). Behavioral finance. *Annual Review of Financial Economics*, *7*, 133-159.

Hoppit, J. (2002). The myths of the South Sea bubble. *Transactions of the Royal Historical Society*, *12*, 141-165.

Jomo, K.S. (1998). Introduction: Financial governance, liberalisation and crises in East Asia. Tigers in Trouble. Hong Kong: Hong Kong University Press.

Jost, J. T. (1995). Negative illusions: Conceptual clarification and psychological evidence concerning false consciousness. *Political Psychology*, 397-424.

Joyce, M., Lasaosa, A., Stevens, I., & Tong, M. (2010). The financial market impact of quantitative easing.

Kahneman, D., & Tversky, A. (1982). The psychology of preferences. *Scientific american*, *246*(1), 160-173.

Kahneman, D., Thinking, Fast and Slow (Farrar, Straus and Giroux, 2011)

Katsaris, A., Periodically collapsing speculative bubbles: An empirical investigation of the SIP 500 Composite index, 1888–2001 (Unpub. Ph.D. thesis, Univ. of Reading, 2002).

Lai, M. M., & Lau, S. H. (2004). Herd behavior and market stress: the case of Malaysia. *Academy of Accounting and Financial Studies Journal*, *8*(3), 85.

Malkiel, B. (1973). *A Random Walk Down Wall Street The Time-Tested Strategy for Successful Investing*. WW Norton&Company Ltd.

Manski, C. F., (2000). "Economic Analysis of Social Interactions," Journal of Economic Perspectives.

McGrath, A. (2017). Dealing with dissonance: A review of cognitive dissonance reduction. *Social and Personality Psychology Compass*, *11*(12), e12362.

McGuire, W. J. (1985). Chapter attitudes and attitude change. *Handbook of social psychology*, 233-346.

Moore, A., Artz, J., & Ehlen, C. R. (2017). TULIP MANIA. *International Journal of the Academic Business World*, *11.*

Morris, S., & Shin, H. S. (1999). Risk management with interdependent choice. *Oxford Review of Economic Policy*, *15*(3), 52-62.

Neal, L. (1993). *The rise of financial capitalism: International capital markets in the age of reason*. Cambridge University Press.

Odean, T. (1998). Volume, volatility, price, and profit when all traders are above average. *The journal of finance*, *53*(6), 1887-1934.

Ofek, E., & Richardson, M. (2003). Dotcom mania: The rise and fall of internet stock prices. *the Journal of Finance*, *58*(3), 1113-1137.

Pagano, M. (1993). Financial markets and growth: An overview. *European economic review*, *37*(2-3), 613-622.

Painter, R. W. (2006). Ethics and corruption in business and government: Lessons from the South Sea bubble and the bank of the United States. *Minnesota Legal Studies Research Paper* (06-32).

Quiggin, J. (1994). Regret theory with general choice sets. *Journal of Risk and Uncertainty*, *8*, 153-165.

Ricciardi, V., & Simon, H. K. (2000). What is behavioral finance?. *Business, Education & Technology Journal*, *2*(2), 1-9.

Schwartz, H. (1998). Rationality Gone Awry? Decision Making Inconsistent with Economic and Financial Theory. Westport, Connecticut: Greenwood Publishing Group, Inc.

Shiller, R. J. (1981). Do stock prices move too much to be justified by subsequent changes in dividends?

Shiller, R. J. (1995). Conversation, information, and herd behavior. *The American economic review*, *85*(2), 181-185.

Shiller, R. J. (1996). Price-earnings ratios as forecasters of returns: The stock market outlook in 1996. *Unpublished manuscript, Yale University*.

Shiller, R. J. (1999). Human behavior and the efficiency of the financial system. *Handbook of macroeconomics*, *1*, 1305-1340.

Shiller, R. J., Irrational exuberance (Princeton, N.J., 2000).

Shiller, R. J. (2002). Stock prices and social dynamics. *International Library of Critical Writings in Economics*, *143*, 383-424.

Shiller, R. J. (2015). Irrational exuberance: Revised and expanded third edition. In *Irrational exuberance*. Princeton university press.

Simon, H. A. (1956). Rational choice and the structure of the environment. *Psychological review*, *63*(2), 129.

Slovic, P., Finucane, M., Peters, E., & MacGregor, D. G. (2002). Rational actors or rational fools: Implications of the affect heuristic for behavioral economics. *The journal of socio-economics*, *31*(4), 329-342.

Suri, R. (2024). Reinvestigating the influence of the Dotcom Bubble on Financial Market and Investment. *International Journal of Social Science and Economic Research, Volume 09.*

Thompson, E. A. (2007). The tulipmania: Fact or artifact? *Public Choice*.

Tirole, J. (1985). Asset bubbles and overlapping generations. *Econometrica: Journal of the Econometric Society*, 1499-1528.

Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases: Biases in judgments reveal some heuristics of thinking under uncertainty. *science*, *185*(4157), 1124-1131.

Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of personality and social psychology*, *39*(5), 806.

Zeira, J. (1999). Informational overshooting, booms, and crashes. *Journal of Monetary Economics*, *43*(1), 237-257.