BEHAVIOURS IN THE STOCK MARKET
AN EMPIRICAL STUDY

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Abstract

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This study has two main purposes. Its first purpose is to analyse the influence of sociodemographic characteristics and investment experience of individual and institutional investors on their investment behaviours in the stock market. The second purpose of the present paper is to study the impact of the investment behaviours on the investment decisions following the market selloff in March 2020 that preceded the emergence of COVID 19. Additionally, this study seeks to analyse the potential impact of the social distancing measures on the herd mentality influencing the investment decision.

Quantitative techniques were used to address those research problems. Firstly, a survey was designed based on existing literature in the field of behavioural finance. Then, the survey was distributed online to more than a thousand investors, of whom 124 completed it. Out of those 124 participants, 104 met the criteria to be selected and be part of the sample studied. Lastly, a data analysis was performed on the collected data using both descriptive and inferential statistics.

This study shows that most of the sociodemographic characteristics of the investors as well as their experience have an impact on the level of influence behavioural biases have on their investment decision. Another finding of the present paper is that institutional investors are not influenced by the same set of behavioural factors than individual investors. This paper proves that institutional investors tend to remain more unbiased and tend to base their investment decisions on the fundamentals of the underlying stock, whilst individual investors are influenced by the availability, the gambler's fallacy, and the loss aversion biases.

In regard to the influence of the investment behaviours on the investment decisions following the emergence of the coronavirus, several correlations were found between the behavioural factors influencing the investment decision and the decisions taken by the investors. It shows the influence of the behavioural biases on actual investment decisions taken by investors following the market selloff in March 2020. Finally, this study found not significant impact of the social distancing measures on the herding behaviour.

This study fills several gaps in the literature. One of those gaps is that it compares the influence of a wide spectrum of investment behaviours between individual investors and individual investors, which has never been performed for such a wide range of behaviours. A second gap is that it analyses the actual impact of the behavioural factors on the investment decisions that preceded the emergence of the coronavirus.

Declaration

Submission of Thesis and Dissertation

National College of Ireland
Research Students Declaration Form
(Thesis/Author Declaration Form)

Name: Aymeric Dispa

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Degree for which thesis is submitted: Master of Business Administration

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Chapter 1: Introduction

Nofsinger (2017) explains that studies in the past four decades in the field of finance have assumed that individuals always make rational investment decisions and are impartial in their predictions about the future.

Based on those assumptions, a plethora of tools was created to help investors manage their portfolio. The Modern Portfolio Theory (MPT), developed by Markowitz (1952), is a dominant financial theory that is meant to help investors design an optimal portfolio that will generate the maximum return based on a given level of risk.

The MPT assumes that the markets are efficient, which, as explained by Fama (1965) with the Efficient Market Hypothesis (EMH), means that stock prices encompass all the relevant information available. This hypothesis suggests that the stock market is allocatively efficient and that there are no pricing anomalies. Because of the extreme belief in the efficiency of the market, some investors tend to rely exclusively on those neoclassical theories to make investment decisions, which may lead to poor portfolio performance. Indeed, several studies in the field of behavioural finance have proven the EMH wrong as they do not take investors psychological biases into account.

Behavioural finance refers to "the study how psychology affects financial decisions, corporations, and the financial markets" (Nofsinger, 2017).

Leković (2019) explains that this new school of thought try to understand the investors and their decision-making process, and consider investors as ordinary people that are not always perfectly informed, have cognitive biases and who do not always make rational decisions. Blanco (2017) describes cognitive biases as imperfections people have in their perceptions of reality, which can lead to errors in judgement and unreasonable investment decisions.

De Bondt and Thaler (1985) were among the first to refute the EMH by introducing the overreaction hypothesis. The authors have proven that investors tend to overreact to unexpected events, which creates market anomalies.

Another bias that will be discussed in this paper is the overconfidence bias, which is defined by Thaler (2005) as the tendency for investors to overestimate their own ability in making investment decision. This bias is becoming increasingly impactful as there are now numerous of online discount brokers providing reduced commissions on trades and attracting investors every day. Barber and Odean (2002) have proven that such platforms exacerbate overconfidence. The authors found that overconfidence tends to lead investors to invest more aggressively and negatively impact the overall returns of their portfolio.

Herding is another theory that the author will discuss in this paper. Nofsinger (2017) explains that investors, as they share their thoughts and learn about what other people think about various stocks, tend to form a herd. Just like an antelope in the Savanna, the typical investor does not want to be left behind and exposed to danger, and always look at what the other investors are doing. When things start moving, investors will tend to mimic the herd, rather than act based on formal analysis. A rise in stock price is seen as a positive signal, leading other investors to follow the herd and purchase the stock. The Dot-com bubble that happened

in the 90s perfectly illustrates how the herd behaviour can impact the entire market and can have disastrous consequences.

In the light of how disastrous those biases can have on economics and finance and as it has never been so easy to invest in the stock market, it is now paramount to understand how those biases impact the investment decision of both individual and institutional investors and whether experience may help mitigate irrational investment decisions.

For this purpose, the present paper will discuss and measure the impact of no less than fifteen behavioural factors influencing the investment decisions of investors, categorised in four different dimensions: heuristic, market, prospect, and herding. It will explore and assess the implications of these behaviours and analyse how they affect different groups of individual investors based on their characteristics. The present study will also seek to identify potential relationships between those behaviours and the investment decisions made by stock investors following the market selloff caused by the emergence of COVID 19.

The second chapter of this paper contains the literature review. In that chapter the author introduces some of the concepts of neoclassical finance and provides an overview and discussion of the various behaviours impacting the investment decision that will be further explored in the paper.

The third chapter, named “Research Problem”, highlights the purposes of this dissertation and provide its main objectives. That section is built upon the literature review and also explains how the emergence of COVID 10 has impacted the stock market.

Then, the “methodology” chapter is provided, which explains in detail how the objectives outlined in the “Research Problem” section will be tackled. For this purpose, the author has decided to use a framework developed by Saunders, Lewis and Thornill (2015) called the “research onion”, which helped develop an effective methodology. That section explores all the aspects of the quantitative research that was performed for this study, from subjects such as the research philosophy and the research approach to more concrete material such as the research strategy and the data collection methods.

The fifth chapter of this dissertation contains the results of the statistical analysis, which was performed based on the information outlined in the research methodology section. In that section descriptive statistics help give an overview of the data collected, whilst exploratory statistics are used to analyse the potential correlations between the different dependant and independent variables mentioned in the research methodology section and to test the various hypotheses outlined in the third section.

Then, the sixth chapter discusses the findings of this paper in the light of the existing literature in the area of behavioural finance, and provides the various limitations identified by the author as well as suggestions for further research.

Finally, the last chapter concludes this study with a brief summary of its key findings.

Chapter 2: Literature Review

Whilst this research will mainly focus on behavioural finance, it is still important to introduce the neoclassical theories that have been influencing financial theories for decades. Therefore, the literature review, organized by theme, will cover both neoclassical finance and behavioural finance.

The first part of the literature review will present, review, and discuss the limitations of the theories of neoclassical finance. Neoclassical theories assume that individuals are totally rational, that perfect information governs investment decisions and that asset prices include all the relevant information available (Pompian, 2011).

The first theory of this school of thought that will be discussed is the Modern Portfolio Theory (MPT), which was introduced by Markowitz (1952). This is one of the most taught theories and the techniques it inspired are still widely used by individuals for portfolio optimization, even though MPT has been vividly critiqued by various behavioural finance academics over the years.

The MPT assumes that share prices in the stock market reflect all the relevant information available, which is a market classified by Fama (1965) as efficient. Fama presented the concept of market efficiency with the Efficient Market Hypothesis (EMH), and is the second neoclassical theory that will be discussed in the present literature review.

The second part of the literature review will introduce and discuss behavioural biases influencing investors in the light of existing empirical studies. Behavioural finance differs from neoclassical finance as it considers that human perceptions and behaviour are two key elements of financial decision making (Daniel *et al*., 1998), whilst neoclassical theories simply ignore those two elements.

De Bondt *et al.* (2008) suggest that understanding the true nature of people, their irrationality and flaws are paramount to understand financial institutions and their actors. Plus, behavioural finance concepts can assist individuals in their investment decisions by helping them identify their own mistakes and learn from them, as explained by Leković (2019).

2.1. Neoclassical Finance

The neoclassical finance theory assumes that investors make rational investment decisions based on all the relevant information available. The following will give an overview of some of the most important concepts in the field of neoclassical finance.

2.1.1. The Modern Portfolio Theory and the Efficient Market Hypothesis

The Modern Portfolio Theory (MPT) is a dominant theory of neoclassical economics introduced by Markowitz (1952) – for which he won a Nobel Prize in Economic Sciences in 1990.

With the MPT Markowitz explain that investors can eliminate idiosyncratic risk, or the risk in investing in a particular investment due to its unique characteristic, by constituting a diversified portfolio. According to Markowitz, a portfolio constituted of shares picked based on statistical measures such as correlation and variance is statistically better as it maximises

the expected return of the overall portfolio, for a given level of risk. Markowitz assume that investors are perfectly rational and risk averse individuals who would always take on increased risk if there are rewarded by an increased expected return. Markowitz also highlights the importance of investing in multiple assets, which nowadays is still one of the most frequent portfolio management advice. One of the pillars of the MPT is that it assumes that markets are efficient, which suggest that share price always reflect all the information available and that it is impossible to make excess return. This concept was introduced by Fama (1965) with the Efficient Market Hypothesis. Its author explains that share prices always reflect all the relevant information available, and that it is impossible to generate excess returns through active portfolio management. Following the MPT would permit to generate a 'normal' (not an excess) expected return for a given level of risk, which complies with the EMH that states that it is impossible to generate excess return.

Fama introduced three forms of market efficiency:

- The weak form, which describes a market where share prices reflect only the information about the past prices. Thus, this form suggests that technical analysis cannot be used to predict future price and earn excess return (Ross *et al.*, 2012).
- The semi-strong form, which describes a market where share prices incorporate all past prices and all publicly available information. In this type of market investors cannot use publicly available information in order to predict future price and only private information can help them earn excess return (Ross *et al.*, 2012).
- The strong form, which describes a market where share prices reflect all the information (past prices, private information and private information).

The MPT is important for investors as the concepts and tools originating from this theory are still thought and used by many investors for the purpose of portfolio optimization. In theory, it allows investors to design a portfolio considered "efficient", which is described as a portfolio expected to offer the highest expected return for a specific level of risk (Goetzmann *et al.*, 2014). But it has some pitfalls and investors willing to use those tools originating from the MPT must be cautious. One of them is that it assumes individuals are risk averse by nature and have a consistent level of risk aversion, but Nofsinger (2017) explains that individuals routinely violate this assumption and exhibit both risk aversion and risk-seeking behaviours in their day-to-day life. Another pitfall of the MPT is that it relies on the fact that markets are efficient (EMH), which was proven wrong by several behavioural finance theorist.

Over the years numerous of other researchers have tested, discussed, and contested the EMH, such as Baru (1977), who contested it shortly after its publication. Indeed, Baru studied stock prices over a 14-year period and prove that it is possible to earn excess return by investing in stocks which have a low price-to-earnings (P/E) ratio, which is a public information.

By generating excess return by investing in companies in certain stocks based on publicly available information, the author prove that the market does not have a semi-strong efficiency and is at best weakly efficient.

Also, Cited by Yildirim, Tufan (2008) contested the EMH by arguing that people's perception of the relevant information can be influenced by their sociodemographic characteristics, which may in turn impact their investment decision and the share prices. Numerous of other researchers have contested the efficient market hypothesis.

The purpose of this paper is not to discuss the MPT and the EMH in great details and for more information the author of this paper recommends the study published by Barr Rosenberg and Lanstein (1984), who contested the EMH by using earning excess return by using two different strategies to. The book written by Ross *et al.* (2012) is also a good resource to learn more about the Efficient Market Hypothesis and neoclassical finance in general.

Overall, little evidence seems to support the efficient market hypothesis and the modern portfolio theory, and behavioural finance proposes an alternative view to finance that is growing in popularity, as explained in the next section.

2.2. Behavioural Finance

Riccardi and Simon (2000) explain that behavioural finance seeks to "explain the what, why, and how of finance and investing, from a human perspective.". Its main difference with neoclassical finance resides in the fact that it considers investors as humans who are not totally rational and who are not always trying to minimize the risk when making investment decisions. Simply put, Riccardi and Simon argue that behavioural finance seeks to understand the reasoning patterns of investors. The authors also explain that this subfield of finance is gaining in popularity and constitutes an alternative to the neoclassical finance theories.

The burst of the dotcom bubble in March 2000 is one of the events that highlighted the need to understand investment behaviours. As explained by Valliere and Peterson (2004), many people saw the potential that the internet had in generating revenue for both new and existing tech companies, which led to speculation and the cascade of 'good signals' drove people to invest more, and the stock price of a significant number of companies skyrocketed. It is when the investment capital started to dry up that the bubble began to burst, which had terrible consequences for many investors and companies. This is a perfect example of the herding behaviour, which will be discussed further in this literature review, and how investment behaviours can have terrible consequences for investors and the economy in its globality.

In this section the main concepts of behavioural finance are discussed. For this purpose, this part of the literature review is structured based on the four dimensions of investment behaviours: heuristics, prospects, markets, and herding, as illustrated in table 1 (Kimani, 2011; Ngoc, 2014; Sarkar and Sahu, 2018; Waweru *et al.,* 2008). Each of those dimensions are constituted of a set of behavioural factors, which will be explained in this literature review.

Table 1. Dimensions of investment behaviours

Dimensions	Behavioural factors
Heuristic	Representativeness
	Overconfidence
	Anchoring
	Availability Bias
	Gambler's fallacy
Prospect	Loss aversion
	Regret aversion
	Mental accounting
Market	Overreaction
	Prices change
	Market information
	Past trend of stock
	Customer preference
	Fundamentals of underlying stocks
Herding	Herding

Source: Adapted from Sarkar and Sahu (2018), Ngoc (2014) and Kimani (2011)

2.2.1. The Heuristics

Nofsinger (2017) describes heuristics as shortcuts taken by the brain to reduce the complexity of analysis information. Simply put, it underpins the "rule of thumbs" that allow to estimate answers without having to undertake complex analysis. Kahneman (2011) has proven that heuristics, which he also calls intuitive thinking, produce predictable bias in judgements. The author explains heuristics in more detailed and found some twenty biases as manifestations of this intuitive thinking in the study he performed with Tversky (Tversky and Kahneman, 1974).

Nofsinger explain that heuristics have implications for investors and can impact the way they analyse information, which can lead to inaccurate conclusions. He identified representativeness as one of those bias impacting the investment decision.

Boussaidi (2013) explains in simple terms that representativeness is the belief that "a history of a remarkable performance of a given firm is "…representative of a general performance that the firm will continue to generate into the future". Representativeness can have serious implications on investment performance. Laskonishok *et al.* (1994) have studied the stock market over the period of 1963-1990 and have proven that it was actually more profitable to invest in companies which had a poorer growth prospect (known as "value" companies) over companies which had better growth prospects (known as "growth" companies) . However, it is important to note that investing in value stocks do not guarantee over-performance against growth stock, as shown by Lauricella (2019). The author analysed the performance of value vs growth stocks over the period of 1999-2019 and have identified growth stocks as a better investment, by more than 25% over the period of 20 years. Those two contradicting research results show that investors should not rely on company's past performance and growth potential to predict future stock performance, and thus should not rely on representativeness to make sound investment decision.

Regarding the demographic factors and their impact on representativeness, Sarkar and Sahu (2018) have found that age has no impact on representativeness. On the other hand, they also found that the level of income and the level of education have a positive correlation with the level of representativeness. Overall, the authors have found that representativeness is a bias impacting most of the individual investors, as 82 % of the participant either agreed or strongly agreed that it is impacting their investment decision. In this paper this author will also seek to find out whether this behavioural factor also influence institutional investors.

The heuristic of overconfidence is another bias that can significantly impact on the investment decision, as explained, and demonstrated in an experimental study conducted by Lambert, Bessière and N'Goala (2012). This bias can be described as the tendency of investors to overestimate their ability to make investment decisions. Lambert et *al.* (2012) explain that overconfidence affects investors' risk-taking behaviour, which can lead to poor portfolio performance. The authors conducted an experiment on different groups of investors categorized by their level of expertise, which is described by Bedard and Chi (1993) as the number of years of practice or experience. One group was constituted of bankers and the other group was made of students.

The authors found that the degree of overconfidence was similar between the two groups. However, it is important to note that although the level of overconfidence was the same, the overconfidence experienced by the bankers had a direct impact on their investment decisions as it influenced them to invest more, whilst no such relationship was observed for the group of students. Whilst their research proved that bankers tend to be overconfident in their investment decision, it would have been interesting to study the impact of overconfidence on the investment decision of individual investors against institutional investors. Another element influencing the overconfidence is the platform used by investors. Indeed, as mentioned in the introduction, online trading platforms exacerbate the overconfidence of the investors (Barber and Odean, 2002), leading to even more excessive trading, more risk and lower portfolio returns.

Lambert *et al.* (2012) explain three major consequences caused by overconfidence. Firstly, citing Odean (1999), Lambert *et al.* explains that overconfident investors trade too much, which leads to poorer investment performance. Then, the authors give the two remaining consequences by citing Daniel *et al.'* (1998) study, who inform that overconfidence causes excessive volatility as well as underreaction and overreaction to information. Overreaction is another bias that is part of the "market" dimension, and that will be discussed further later in this literature review.

Anchoring is another heuristic bias. To explain this bias, Shefrin (2008) uses the analogy of a boat whose anchor has dropped, keeping it from moving too far. Anchoring suggests that investors tend to rely on the initial price or price trends, they have found for a stock when making subsequent investment decision. Simply put, it suggests that investors tend to estimate a stock as being undervalued when its price is lower than the initial price found (or anchor), and tend to consider a stock as being overvalued when its price is higher than the anchor. It also suggests that the price of stocks are often impacted by the prices of the past, and that investors who are influenced by this bias expect share prices to be in line with

historical trends (Shiller, 1998). Cen, Hilary and Wei (2013) have found that investment professionals are no strangers to this bias, as the authors have proven that analysts' earnings forecasts tend to be influenced by it. Of course, the misleading information published by those analysts can have a negative impact as it may cause financial market participants to make incorrect financial decisions, leading to poor investment performance.

In regard to the demographic factors, Sarkar and Sahu (2018) have found a relation between education and anchoring. Indeed, they have found that investors with a higher level of education tend to show a higher level of anchoring.

Availability is the fourth heuristic bias mentioned in Sarkar and Sahu's (2018) research. Pompian (2011) explains that availability is a heuristic whereby people make assumptions based on examples of the event that they have experienced in the past, and based on how easy it is to imagine a potential outcome from an investment based on information that comes to mind. Shefrin (2008) has proven that investors tend to be impacted by this bias and tend to make assumptions of price trends of the overall market based on the past returns of their own portfolio. Those biased judgements can therefore lead to poor investment decisions. Barber and Odean (2008) have found that investors tend to choose to invest their money in stocks that have recently caught their attention (such as stocks of companies that were recently in the news). The authors have proven that professional investors are less impacted by this bias compared to retail investors, as professionals are more likely to rely on explicit purchase criteria and tools (such as computer algorithms) rather than just using information that come to their mind. Interestingly, Sarkar and Sahu (2018) have proven that experienced and well-educated investors are more inclined to be impacted by this bias.

The last heuristic bias that will be discussed and for which investors will be assessed in this study is called the "gambler's fallacy". Hon-Snir, Kudryavtsev and Cohen (2012) describe the gambler's fallacy as an "incorrect belief in negative autocorrelation of non-autocorrelated random sequences". In other words, it is the belief that an event that has occurred more frequently in the past is unlikely to happen in the future (Javed and Marghoob, 2017). This bias is also called the Monte Carlo fallacy, and it was first discovered in a casino in Monte Carlo in 1913, as explained by Javed and Marghoob. Numerous scholars have demonstrated the existence of the gambler's fallacy. For instance, as explained by Hon-Snir *et al.* (2012), Clotfelter and Cook (1991) prove that people who participate in a lottery tend to avoid betting on numbers that have recently won, even though the probability for those winning numbers to win again remain the same. Javed and Marghoob (2017) explain that this bias may lead to incorrect expectations as investors impacted by this bias may incorrectly predict a reverse of a trend of bad (or good) market returns. Hon-Snir *et al.* (2012) have found that whilst this bias is well documented and demonstrated in laboratory and in the real world, there is a gap in the literature as little evidence of its influence in the stock market decision-making was found. Sarkar and Sahu (2018) have partially filled that gap and have found that investors are impacted by the gambler's fallacy bias. The authors also found that experience has a positive correlation with heuristics, which means that experienced investors tend to be more influenced by this type of bias. The present study will extend the findings of Sarkar and Sahu by also analysing the influence of this bias on institutional investors.

This section has highlighted the importance heuristics on the investment decision. Heuristics do not only impact investment decisions, but any type of decisions. Extensive research in the area of heuristics has been conducted by many scholars and the author of this research highly recommend the study performed by Tversky and Kahneman (1974) "Judgment under uncertainty: Heuristics and biases" and Kahneman's book "Thinking, fast and slow" for me information.

2.2.2. The prospect factors

Prospect is the next dimension of the framework to be discussed. As its name indicates, this dimension relates to the prospect theory, which was developed by Kahneman and Tversky (1979). Simply put, this theory seeks to explain how people make and value decisions involving uncertainty. The present study will focus on three components of the prospect theory.

The three components (or factors) of the prospect theory are loss aversion, regret aversion and mental accounting. Shefrin (2008) explains that a major difference between the traditional (neoclassical) approach and the behavioural approach to asset pricing is the latter consider sentiment as a major determinant of market prices. Instead, as already explained, the neoclassical theories consider that investors are free from sentiments and biases. The prospect theory studies how people value and frame decision involving uncertainty (Nofsinger, 2017).

It is important to note that this theory is an alternative to the utility theory, which is a traditional theory that takes its roots in the assumption that the investors are risk averse, as explained by Lekovic (2019).

Kahneman and Tversky (1979) led a series of experiments which demonstrated that people are more hurt by losses than they are feeling good when they earn a similar amount of gain some gain, which is referred as loss aversion. During their experiments they also found that people tend to be more risk averse when only gains are involved and become risk seeking when they face the risk of losing money (Shefrin, 2008).

Thaler and Johnson (1990) also led experiences in the domain of risk perceptions and found out that people tend to be more risk averse after having experienced a loss. This behaviour may have had a major impact during the recent market selloff of March 2020, as the S&P500 lost more than 30% of its value, which may have led some investors to become more risk averse.

Regret aversion is another prospect factor, and it refers to the behaviour some investors show when they avoid taking investment decisions because they are too afraid of making that might make them feel regretful (Pompian, 2011). In other words, those investors try to mitigate the risk of experiencing the feeling of regret caused by poor decision-making by not taking decisions. For instance, Pompian explain that those investors tend to hold losing positions for too long instead of selling them because they do not want to realize a loss, recognize their mistake, and experience regret. Citing Shefrin and Statman (1985), Pompian explains that this bias causes investors to invest too conservatively, to hold on stocks for too long and it also

fosters the herding behaviour, as investors may seek the validation of their strategies or try to mimic others.

Mental accounting is the third and last prospect factor that will be researched in this paper. Kimani (2011) describes mental accounting as "propensity for individuals to organise their world into separate mental accounts". Citing Shiller (2000), Kimani explains that investors tend to treat each of their investments separately instead of considering their impact on their entire portfolio, which may lead to inefficient and inconsistent investment decisions.

Numerous scholars have studied the impact of those factors on the investment decision. Ngoc (2014) found that most individual investors at the HOSE are impacted by the three prospect factors described. The results found by Ngoc showed that mental accounting was the factor impacting investors the most, whilst they were only moderately impacted by the regret aversion and mental accounting behaviours. Rekik and Boujelbene (2013) performed a similar study. The authors researched the impact of six different biases, which included mental accounting and loss aversion, and found that Tunisian investors are impacted by loss aversion and mental accounting (regret aversion was not part of the study). Sarkar and Sahu (2018) have found that mental accounting and regret aversion is a factor that strongly impact individual investors, while loss aversion had only a moderate impact. Interestingly, Kimani (2011) found that all three factors have a significant impact on investors' behaviours, loss aversion is the prospect factor impacting the investors of the National Stock Exchange of India the most. The difference in the findings may be explained by the fact that the target population was different, as Kimani was only focusing on NSE investors. Regarding the experience of investors, Sarkar and Sahu found that there was no correlation between the prospect factors and the experience of individual investors.

In regard to how prospect biases compare with heuristics in terms of their impact on the investment decision, citing Masomi and Ghayekhloo (2011) Sarkar and Sahu explain that heuristics have a greater impact than prospect factors, with anchoring and gambler's fallacy being the most impactful biases.

Whilst numerous studies measured the impact of those biases on the investment decision, there is still a gap in the literature as none of them has compared how those biases impact individual investors against institutional investors. As institutional investors usually mostly invest on the behalf of others, it would be interesting to discover whether those investors try to avoid the feeling of regret and the pain of losing money as much as individual investors do. Plus, as already mentioned, Barber and Odean (2008) explain that professional investors invest based on criteria and using tools, therefore one can imagine that those investors would tend to simply follow the procedure and therefore be less impacted by the biases emerging from the prospect theory.

2.2.3. The Market Factors

Citing De Bondt and Thaler (1995), Ngoc (2014) explains that investment behaviours of investors can affect the overall financial market (such as stock prices and traded volumes), which may in turn influence the investment decisions of investors. Ngoc has based his research on the study performed by Waweru *et al.* (2008) and has studied six market factors influencing the investment decision of investors. Those factors are price changes, market information, past trends of stocks, customer preference, overreaction, and fundamentals of underlying stocks. Sarkar and Sahu (2018) consider those factors as being subdivisions of the 'market bias', which is also the pattern followed by the present research. Therefore, rather than going through each market factor in great details, this subsection will give a brief description of each of them and will discuss and compare the results of studies performed by various scholars. For more information about the different market factors and their implications, please refer the studies conducted by Ngoc (2014), Waweru *et al.* (2008) Kimani (2011) and Sarkar and Sahu (2018), which explore them in greater detail.

Overreaction, which was introduced by De Bondt and Thaler (1985), is the first market factor to be discussed. The authors explain that people tend to overreact to unexpected news events, and that they tend to give more importance to recent information whilst overlooking prior data. De Bondt and Thaler argue that an extreme movement in a share price is followed by another movement in the opposite direction, and that there is a correlation between the intensity of the first movement and the intensity of the subsequent movement.
To prove their theory, the authors have constituted two portfolios: one portfolio containing stocks that have experienced extreme capital gains ('Winners'), and the other one with stocks that have had extreme losses ('Losers'). In the long run, the 'Losers' portfolio outperformed the 'Winners' by 24.6%.
This concept of overreaction is in contradiction with the Efficient Market Hypothesis that suggests that stock prices reflect all the available information at all time and that it is fruitless to pick stocks. By selecting the stocks that experienced extreme losses, De Bondt and Thaler were able to outperform the market by 19.6%.

Although this theory was created more than three decades ago, it has still its implications and is still very relevant. Marks (2018), co-founder of Oaktree Capital, explains that it is important for investors to be unemotional. He also says that the value of a company in the next decades does not change much day to day, and that changes in the year's or quarter's earnings are not that important, but people overreact to these things. He also explains that when prices rise, the emotion turns more positive and people start to buy more, until the price is at its maximum – which marks the perfect time to sell. Unfortunately, most people feel so positive about the shares that they don't sell. The reverse is also true, and people tend to feel depressed when share prices drop, and therefore are unlikely to buy more. As professional investors rely on tools and metrics, it can be argued that those investors would be more inclined to remain unemotional. It is a fact that has not been proven yet, and that the present study will seek to prove. This paper will also seek to compare the behaviours of experienced and inexperienced investors, as it will be interesting to find out whether experienced investors are more able to control their emotions in order to figure out the best time to buy and sell shares.

"Price changes" is another market factor, which relates to the influence of recent stock price changes on the investment decisions. Odean (1999) found that investors prefer to buy shares for which the prices rose in the past two years. However, citing Waweru *et al.* (2008), Sarkar and Sahu (2018) explain that price changes may negatively impact investors' portfolios as they may incorrectly estimate returns based on recent price changes. This factor is related to some extent to the Anchoring factor and therefore the present research may outline a positive correlation between them.

The third factor is "market information", which relates to the information available about the company such as details about the customer base, the company's performance, etc. (Kimani, 2011). Investors influenced by this factor seek information and pay attention to details about a company before investing.

"Past trends of stock" is the fourth factor studied. Citing Waweru *et al.* (2008), Ngoc (2014) explains that past trends of stocks are often used in conjunction with analysis methods to identify whether a stock is worth being invested in or not. Indeed, the past trends can be used to determine the risk of a stock, which can then be used for portfolio management purposes. This relates to the MPT, which offers techniques to construct an 'efficient' portfolio where return is maximised for a certain level of risk. This factor is linked to the 'price changes' factor, and Sarkar and Sahu (2018) have found a strong correlation between the two. There is currently a gap in the literature as no study has compared the behaviour of institutional and individual investors.

Finally, the fifth market factor studied is customer preference. Investors who are influenced by this factor take the companies' customer preference into account before investing in their stock. "Fundamentals of underlying stocks" is the sixth factors, which relates to the financial information of the company (such as revenue, assets, etc.). Investors who are influenced by this factor would search analyse financial information of a company before investing.

As institutional investors use tools and techniques to select stocks, and past trends as well as fundamentals are two metrics that are often used by those tools and techniques, those factors probably influence institutional investors's decision-making process. This assumption will be tested in the present study.

Various studies have been undertaken to assess the effect of market factors on the investment decision. Although those studies were targeting investors investing in different stock markets, they all found that the above-mentioned factors influence the investment decisions of individual investors (Sarkar and Sahu, 2018; Ngoc, 2014; Kimani, 2011). Kimani found that investors at the NSE are highly influenced by price changes, price trends and market information factors. Ngoc found similar results, as those three factors are impacting investors at the HOSE the most. According to the author, this may be explained by the fact that most of the participants have been attending courses and training in investment, and therefore understand the importance of market information and price movement. It is important to note that Kimani and Ngoc only tested the following three market factors: price changes, price trends and market information. Sarkar and Sahu have studied the impact of

the six market factors and found out that five factors strongly impact the investment decision, and that most participants indicated that they are not influenced by overreaction. Sarkar and Sahu have analysed the impact of demographic characteristics on the market factors and have found that age has a positive impact on most of the factors, whilst education and occupation have only a limited impact. Regarding the experience of the individual investors, Sarkar and Sahu have found that experience has a significant impact on only two factors: overreaction and customer preference. Currently no scholar has studied and compared the impact of those factors on institutional investors versus individual investors, which is something the present study will seek to do.

In regard to overreaction, it is worth noting that other authors have found contradictory results when testing this particular bias, depending on the methods of research and the stock market studied. For instance, the British stock market showed evidences of the overreaction effect, as explained by Campbell and Limmack (1997), and the Spanish stock market showed a systematic overreaction, as shown by Alonso and Rubio (1990). However, there were only weak evidences of overreaction in the Australian market, as demonstrated by Brailsford (1992). Kryzanowski and Zhang (1992) made the same conclusion about the Canadian stock market. It is also worth noting that Maheshwari and Dhankar (2014) have found "a huge gap" in the existing literature regarding the concept of overreaction, and that most evidences were collected in highly developed markets, and that less developed markets were overlooked. The authors also say that more empirical research would have to be conducted in both developed and less developed market. Although this concept is hard to proof and might require more research and empirical data, it has serious implications for investors, has proven by De Bondt and Thaler (1985).

2.2.4. Following the Herd

The last bias to be discussed in this review is herding, which as already explained, is the tendency some investors have to share their thoughts, group with other investors, and base their decisions based on a social consensus.

Marks (2018) urges to stand against the herd: "We must stand against mass psychology. We must sell when fundamentals are at their peak and emotions are the most positive, and we must buy when fundamentals are at the trough and people are most depressed. The goal is to buy low and sell high. More people buy high than buy low. ". By saying that, Marks also refer to the contrarian strategy. As explained by Maheshwari and Dhankar (2014), by applying the contrarian strategy it is possible to earn abnormal profit. The strategy suggests that there is some predictability in the stock market, which violates the weak form of market efficiency. On a similar note, Merli and Roger (2013) have proven that anti-herders (or the investors who decide to trade against the crowd) have dramatically increased their returns by investing against the rest of the population. It is important to note that the herding behaviour can also be rational. For instance, a fund manager might decide to mimic a benchmark to protect themselves from a poor performance, once compared to the benchmark. Merli and Roger describe this action as "hiding in the herd". Whilst the rational herding is an interesting topic, the present study is only assessing the irrational herding.

Hon-Snir *et al.* (2012) explain that herding is one of the most studied and complicated biases to measure and quantify, as it is hard to measure the influence of others on the investing decision and such data is hard to find and capture. Scholars have used different approaches to assess this behaviour. For instance, Cipriani and Guarino (2005) have tested this behaviour in laboratory financial markets whilst Lakonishok, Shleifer and Vishny (1992) have assessed the bias in real market situations by studying the tendency some investment managers have to buy and sell the same stocks at the same time. On the other hand, Sarkar and Sahu (2018), Ngoc (2011) and Kimani (2011) have measured the impact on the herding behaviour via a survey. Hon-Snir *et al.* (2012) explain that despite the different ways used to assess herding, researchers agree that the herd behaviour has an impact on market anomalies, and also that herding leads to situations where market price does not reflect all the relevant information available, which contradict the efficient market hypothesis.

Ngoc found that investors at the HOSE are moderately impacted by the herding bias, which does not support the research conducted by Farber, Nguyen and Vuong (2006) suggesting that investors in Vietnam are highly influenced by the bias. Ngoc justifies this difference by the fact that the HOSE had been running for over ten years when the study was performed, and that the impact of the bias might have been lessened as investors were more experienced than during Farber, Nguyen and Vuong's research. Unfortunately, this is just an assumption, Ngoc did not capture the experience of the investors and therefore a correlation between the experience and the impact of the bias could not be empirically established, which is something the present study will seek to do. However, In the Tunisian stock market, the herding behaviour was found to be the bias impacting investors investing the most (Rekik and Boujelbene, 2013). Unfortunately, the authors did not capture enough information about the investors so that the difference between the results found by Ngoc could be compared with the ones found by Rekik and Boujelbene. In a recent study, Sarkar and Sahu (2018) found that individual investors are barely influenced by the herding behaviour, which contradicts the results found by Rekik and Boujelbene (2013) and Ngoc (2014). Sarkar and Sahu found a negative correlation between the experience of investors and the impact of herding, which confirms the assumption of Ngoc that experience reduces the influence of herding. As already mentioned, there is a gap in the literature as those studied have not compared the potential herding behaviour of individual against institutional investors. However, as professionals rely on investing techniques and metrics, the author of the present study assumes and will try to prove that that herding is less impactful for this type of investor than for individuals.

Chapter 3: Research Problem

The main purpose of this paper is to study the influence of sociodemographic characteristics and investment experience of individual and institutional investors on their investment behaviours in the stock market. For this purpose, the relationship between the investors' sociodemographic characteristics and investment experience with the behavioural influencing the investment decision will be tested.

Plus, based on the existing empirical studies discussed in the literature review, the different studies the present paper is built upon and seeks to extend, as well as the gaps identified, the following hypotheses will be tested.

Hypothesis 1

H1. Institutional investors are more influenced by the "past trends of stock" behavioural factor than individual investors.

H0. Institutional investors are no more influenced by the "past trends of stock" behavioural factor than individual investors.

Hypothesis 2

H1. Institutional investors are more influenced by the "fundamentals of underlying stocks" behavioural factor than individual investors.

H0. Institutional investors are no more influenced by the "fundamentals of underlying stocks" behavioural factor than individual investors.

Hypothesis 3

H1. Institutional investors are less influenced by the "loss aversion" behavioural factor than individual investors.

H0. Institutional investors are no less influenced by the "loss aversion" behavioural factor than individual investors.

Hypothesis 4

H1. Institutional investors are less influenced by the herding behaviour compared to individual investors.

H0. Institutional investors are no less influenced by the herding behaviour compared to individual investors.

Additionally, this paper will also study the impact of the investment behaviours on the investment decisions following the emergence of the coronavirus. As explained by Zhang *et al.* (2020), the emergence of the coronavirus has dramatically impacted financial markets which led to a market selloff in March 2020. Of course, the extent of its impact is yet to be discovered, and the present paper will seek to partially fill that gap by testing the potential relationships between the behavioural factors influencing the investment decisions and a series of potential investment decisions taken by investors following the market selloff.

Finally, as many countries introduced social distancing measures to limit the spread of the coronavirus, the following hypothesis was identified to test whether those measures negatively impact the influence of the herding behaviour since investors may be less likely to follow investment advice or ideas received during an online conversation than during a face-to-face conversation.

Hypothesis 5

H1. Investors are less likely to follow investment advice or ideas received during an online conversation than during a face-to-face conversation.

H0. Investors are no less likely to follow investment advice or ideas received during an online conversation than during a face-to-face conversation.

Chapter 4: Methodology

In this section the author will explain the research methodology employed to study the research problem. Buckley and Chiang (1976) define research methodology as "a strategy or architectural design by which the researcher maps out an approach to problem-finding or problem-solving". For this purpose, the author has decided to use the research "onion" developed by Saunders *et al.* (2015), represented in Figure 1. The research onion is a tool that summarises all the elements that a researcher must address to answer the research question(s). Each of those elements are represented in Figure 1 as the onion's layers. In this section the author will address all these elements, one layer at a time.

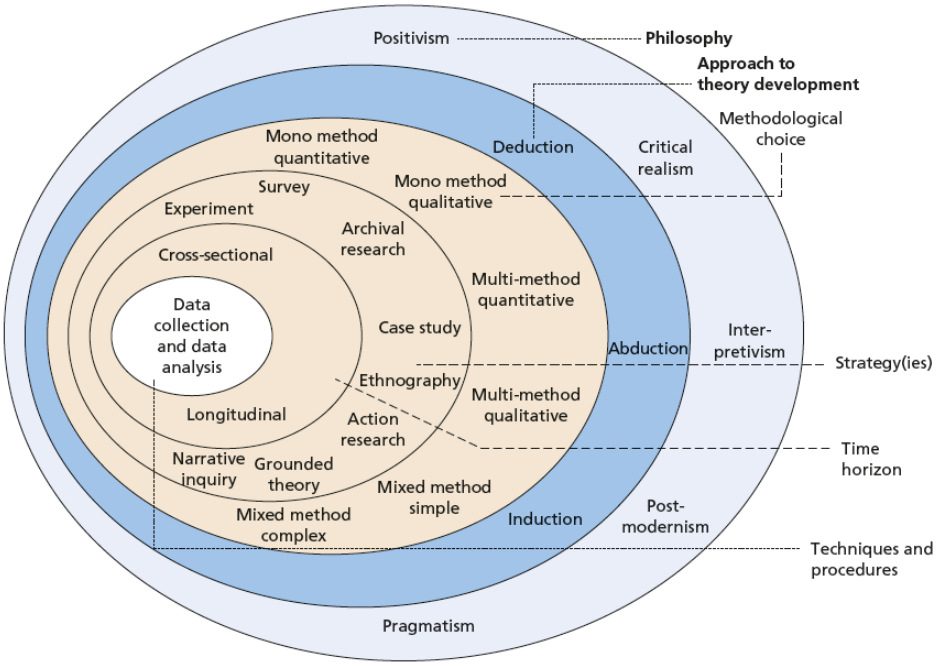

Figure 1. The research 'onion' (Lewis and Thornhill, 2015)

4.1. Research Philosophy

Research philosophy is the first layer of the onion and relates to "…a system of beliefs and assumptions about the development of knowledge and the nature of that knowledge in relation to research" (Lewis and Thornhill, 2015). Citing Burrell and Morgan (1979), the authors explain that during the research several types of assumptions will be made. Collis and Hussey (2013) explain that there are three main types of assumptions the researcher must consider: epistemological assumptions (which relates to the human knowledge), ontological assumptions (which relates to the realities encountered during the research), and axiological assumptions (which relates to extent and ways the researcher's values impact the research process). Lewis *et al.* (2015) have identified five main philosophies in business and management that can be used to approach those assumptions, which are positivism, critical realism, interpretivism, postmodernism and pragmatism. In this section the author will present and discuss the approaches that suit the various assumptions best. The purpose of this paper is not to discuss all the existing philosophies and more information regarding those can be found in Lewis *et al.* book.

4.1.1. Ontological Assumption

Lewis *et al.* (2015) explain that ontology refers to assumptions about nature and reality, and that those assumptions shape the way the researcher see and study the research objects. In regard to the ontological assumption, the author of this research will take a positivist approach. Lewis *et al.* explain that positivists assume that the world is external and that there is only one true reality to any research problem which is not influenced by the researcher belief or perspective.

Interpretivism is the other main approach to ontology, and relates to the belief that reality is multiple and relative, that the researcher and the subjects studied are interdependent and that the elements researched are too complex and unpredictable, making the development a fixed research design impossible (Hudson and Ozanne, 1988).

The aim of this study is to measure the potential impact of the sociodemographic characteristics, the investment experience and the investor type (individual or institutional) on their investment behaviours, as well as the impact of those behaviours on the investment decisions following the market selloff caused by the spread of the coronavirus. Those elements are external to the author, which makes objectivism more suitable than interpretivism.

4.1.2. Epistemological Assumption

Citing Burrell and Morgan (1979), Lewis *et al.* (2015) explain that epistemology refers to the assumptions about what constitutes valid and legitimate knowledge, and how knowledge can be communicated to others. For this research, this author is taking a positivist approach to the epistemological assumption. Burrell and Morgan (1979) explain that the positivist approach is based on the traditional approach used in natural science which tries to seek and predict was is happening by looking for causal relationships and regularities among its constituent elements. This study aims to find a relationship between the above-mentioned characteristics of the investors on their investment behaviours rather than trying to explain why those characteristics may impact those behaviours, which matches with the description of the positivist approach. Positivism advocates that the researcher must use scientific empiricist techniques that will generate pure data and facts that will not be impacted by human interpretation nor bias (Lewis *et al.,* 2015). On a similar note, Carson *et al.* (2001) argue that statistical and quantitative methods that adhere to specifically structured research techniques are essential to positivist research.

4.1.3. Axiological Assumption

Axiology concerns assumptions about the role of ethics and values during the research (Lewis *et al.,* 2015), and specifically relates to the role of the researcher's own values and the values of the research participants at every step of the research process (Li, 2015). Simply put, axiology focuses on what the researcher value, which will impact both the research process and what will be considered as valuable findings. In this paper the author has taken a positivist approach to the axiological assumption, which means that the research has been led in a value-free way. Positivists try to keep the research free of values as those values it could bias the findings, as explained by Lewis *et al.* (2015).

4.2. Research Approach

The next layer of the research onion focuses on the research approach used by the researcher. The two main approaches discussed by theorists are the deductive approach and the inductive approach. In this section these two approaches will be discussed and compared, which will lead to the selection of the most suited approach for this research.

According to Bryman (2012), the deductive approach relates to the relationship between the theory and the research in which the latter is performed based on assumptions and hypotheses derived from the former. On a similar note, Wilson (2014) explains that with this approach, the researcher develops one or several hypotheses based on the existing theory, and that the research strategy will be designed based on the hypotheses that need to be tested. The approach to deductive research is illustrated below in Figure 2.

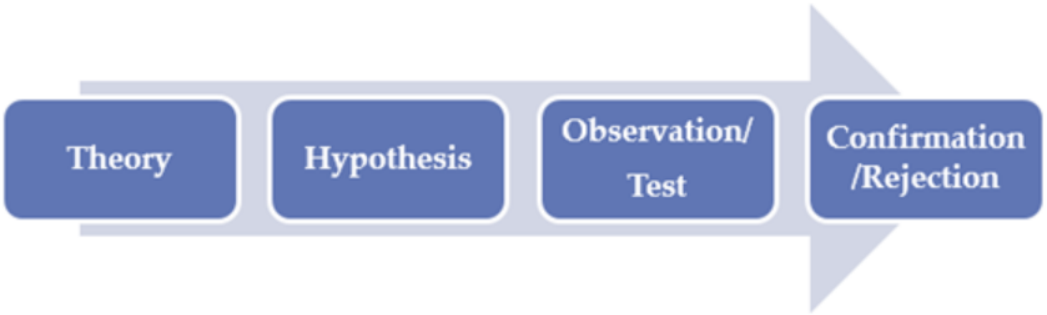

Figure 2. The deductive approach (Research Methodology, 2020)

On the opposite side, Goddard and Melville (2004) argue that the inductive approach begins with the observations and theories are developed and proposed towards the end of the research process based on the research findings.

For this research the author has decided to take the deductive approach because there are plenty of sources and theories available in behavioural finance so that it is possible to develop a clear and testable theoretical position. Indeed, in this research the author was able to derive hypotheses from existing theories and studies in the area behavioural finance and existing studies.

Plus, positivism is the philosophical position that was applied in regard to the ontological, epistemological, and axiological assumptions, and Lewis *et al.* (2015) argue that the deductive approach is typically the most suited approach for that philosophical position.

4.3. Methodological Choices

The next layer of the research onion is the "methodological choice", which refers to the methods that will be used to collect and analyse data for the research. Lewis *et al.* (2015) explain that the three main types of research methods are the quantitative methods, the qualitative method, and mixed methods. To help choose the most suited methodologies, the authors argue that the researcher must take their philosophical assumptions and their research approach into account.

Quantitative research is defined by Bryman (2015) as "entailing the collection of numerical data and exhibiting the view of relationship between theory and research as deductive, a

predilection for natural science approach, and as having an objectivist conception of social reality". Simply put, quantitative research uses data collection techniques and data analysis techniques that generate or uses numerical data (Lewis *et al.*, 2015).

The second type of research is the qualitative research, which uses research techniques that generate or uses non-numerical data, such as interviews. Citing Denzin and Lincoln (2011), Lewis *et al.* explain that this type of research is usually preferred with the interpretive philosophy because with interpretivism the author seeks to make sense of a reality that they believe is subjective, socially constructed and could be perceived in different ways. Since the researcher of this paper is taking a positivist approach (and not an interpretive approach), qualitative methods appear not to be suited for this research.

Finally, the mixed methods combine quantitative and qualitative research techniques. Lewis *et al.* explain that the mixed methods are typically used by researchers who have a philosophical position of realism or pragmatism, which is not the philosophical approach taken by the author. As explained, this research paper will not discuss all the philosophical positions, and an extensive amount of information about those can be found in Lewis *et al.* (2015)' book.

In this paper the researcher has decided to use quantitative techniques because they are the most suited. Indeed, Lewis *et al.* (2015) explain that quantitative methods are generally associated with positivism and the researcher of this paper is taking a positivist approach. Also, as mentioned, Carson *et al.* (2001) explain that statistical and quantitative methods are paramount to positivist research, especially when they adhere to specifically structured research techniques. Plus, one of the aim of this paper is to extend the studies performed by various authors (Ngoc, 2014; Sarkar and Sahu, 2018, Waweru *et al.* 2008) who all used quantitative techniques. It is important for this study to use similar techniques in order to produce comparable results.

Finally, Carson *et al.* also indicate that quantitative techniques are typically used with the deductive approach, as it focuses on using data to test theories, which is also the approach that the author has decided to use. For all those reasons, in this research the author has decided used quantitative techniques.

4.4. Research Strategy

The next layer of the research onion is the "research strategy", which is described by Lewis *et al.* (2015) as the plan of action explaining how the researcher will answer its research question. Citing Denzin and Lincoln (2011), the authors explain that the strategy is developed upon the philosophy applied by the searcher and the subsequent choice of techniques that will be used to collect analysed data. Lewis *et al.* have identified four different research strategies that can be used for a quantitative research: experiment, survey, case study and archival and documentary research.

For this research the experimental approach was considered by the author, but due to the social distancing measures applied following the spread of COVID 19, the survey was chosen as the most appropriate strategy. Practically, Jackson (2015) describes this strategy as the

method of asking questions to individuals about one or multiple subjects and then describing their responses.

Lewis *et al.* explain that this strategy is commonly used for descriptive research (such as this one), as it allows the collection of standardised quantitative data which can then be analysed using statistics to answer the research question. Also, when probability sampling is used, the findings can be statistically representative of the whole population, as explained by Lewis *et al.* (2015). In this paper the author seeks to assess the influence of investors' characteristics on the existence of behavioural factors impacting the investment decision and to measure the impact of those factors on the investment decision during the recent selloff that happened in March 2020, and a significant number of participants were required in order to have accurate findings representing the entire population of investors. For those reasons, the survey strategy appeared as the most suited strategy. It helped the researcher collect quantitative data quickly from an appropriate pool of participants so that the findings statistically represented the whole population of individual investors.

4.5. Time Horizon

The penultimate layer of the research onion relates to the time horizon of the study. There are two options that are suggested: cross-sectional and longitudinal. The former refers to the type of research that seeks to present results that relate to a particular time (like a snapshot), whilst the latter have a longer timeframe and can vary from months to decades.

Due to time constraints, this study is cross-sectional. More time would have been required for a longitudinal study. Plus, Lewis *et al.* (2015) explain that the main strength of longitudinal studies is that it permits studying change over a period of time, which is not something the researcher wanted to do in this study. For those reasons, the author has decided to disregard this option.

In regard to the cross-sectional studies, Lewis *et al.* explain that they often use the survey strategy to explain the incidence of a phenomenon or explain how some factors are related, which matches with this research. The researcher has decided to collect the quantitative data over a period of two to four weeks.

4.6. Data Collection and Data Analysis

The final layer of the research onion refers to the data collection and data analysis. In this section the author will discuss the data collection and analysis techniques that were used for this research.

4.6.1. Secondary Data Collection

Collecting and analysing data can be time consuming and expensive. For this reason, this research is partially reusing existing data, known as secondary data. Bryman and Bell (2011) describe secondary data as the existing studies that can be reused as a starting point for developing new knowledge, as opposed to primary data which refers to the data that is directly collected and analysed during a research using methods such as interviews and surveys. Secondary data allows the researcher to save time and to make sure they are not "reinventing the wheel" by analysing phenomena that have already been studied and analysed in the past, allowing them to focus on extending the existing knowledge and

theories. The secondary data used for this research was mainly found using the EBSCO Discovery Service, which is a search engine available on the National College of Ireland library website that gives access to research databases.

4.6.2. Primary Data Collection

As already mentioned in the "Research Strategy" section, the method of collection chosen for the primary data is the survey

Sample size

The aim of this research is to study the behaviours of all investors, which represent a significant portion of the population. Parker and Fry (2020) found, based on the Survey of Consumer Finances (SCF) available on the Board of Governors of the Federal Reserve System (2016), that 14% of the American population invest directly in the stock market, which represents roughly 46 million of investors in the United States only. Due to the absence of data for the global population, the author of this paper assumes that 14% of the entire population directly invest in the stock market, which roughly represents 1 billion people. Of course, it would be impossible to survey all those investors, and therefore the author surveyed only a subset of this population.

The process of selecting only a subset of the population of interest is called sampling (Proctor, 2003). Saunders *et al.* (2015) argue that in regard to the sample size, the larger the better. The authors explain that the sample size should be significant for the research to be representative, while taking time and cost constraints into account. Indeed, the authors argue that the larger the sample size is, the more expensive and time consuming it will be for the researcher to collect and analyse the data. Cohen, Monion and Morris (2018) argue that the minimum sample size for a quantitative survey research should be 100. It is important to note that a more precise sample size can be calculated based on the confidence level, the population size, and the margin of error (Cohen *et al.*, 2018). Using the online sample size calculator available on "Creative Research Systems" and referenced by Cohen *et al.*, the optimal sample size for the present research, with a level of confidence of 95%, a margin of error of 5% and a population size of 1 bn, is 384. However, due to time constraints the author of this paper managed to only collect data from 124 participants, of whom 104 participants met the criteria to be part of the final sample studied.

Instrument

Sampling can be done using non-probabilistic and probabilistic techniques. When probabilistic techniques are used, population members are selected randomly and therefore have an equal chance to be selected to participate in the research (Saunders *et al.,* 2015). On the other hands, non-probability sampling refers to the methods that do not select population members randomly and therefore only certain members will have the opportunity to participate in the research. For the purpose of this research, the author has chosen the non-probabilistic approach.

More specifically, the author has chosen the convenience sampling method, which refers to the method of collecting data from population members who are conveniently available to be surveyed. Due to time constraints, this method was chosen for this study as it is easy to

implement, and it is the best approach for finding a significant number of participants quickly. It is important to note that the main drawback of this approach is that it is not representative of the entire population and therefore lacks credibility (Saunders *et al.*, 2015).

For this research, the author has shared the survey online on the social media platforms Facebook and LinkedIn. LinkedIn appeared to be the best method to find participants, especially institutional investors as it permits filtering people based on the company they work for and their job title, but the process was also very time-consuming. A total of 1231 individual messages were sent in total to find the participants required for the present study.

The survey was created using Google Form, which is an easy tool for survey creation. Plus, survey results can easily be exported to a table, which can then be imported to a data analysis tool (such as SPSS).

Survey Design

The questionnaire used for the purpose of this study as well as the sources for all the different questions can be found in Appendix A.

The first two questions of the questionnaire asked if participants want to participate in the study and if they invest in the stock market. The purpose of those two questions were to filter the participants, as this research is only studying people who are willing to participate and who invest in the stock market. Participants who answered no to any of those two questions were directly thanked for completing the survey.

The other questions were divided into three parts.

The first part of the questionnaire was focusing on the sociodemographic characteristics of the participants in order to establish the age group, gender, marital status, education level, investor type (individual or institutional) and experience in the stock market of the participants and whether they are an individual or an institutional investor. Those questions helped identify the independent variables. Spiegelhalter (2019) defines an independent variable as a "variable that is fixed by design or observation, and whose association with an outcome variable may be of interest".

The second part of the questionnaire was built based on an existing questionnaire developed by Ngoc (2014). Since the questionnaire did not cover all the biases that were studied in this research, the author completed the original questionnaire with questions from other sources as well as new questions that were developed for the purpose of this research. For further information, all the different sources that were used to develop the questionnaire can be found in Appendix A. Those questions helped identify the dependent variables, which can be described as the variables on which we seek to analyse the impact of the independent variables. (Spiegelhalter, 2019). However, as the present study also seeks to measure the influence of those factors on the investment decisions following the recent selloff of March 2020, those variables will also be treated as independent variables. The different investor's behavioural factors that were assessed can be found in Table 1 in the literature review section.

The last part of the questionnaire captured the impact of the emergence of COVID 19 on the investment decisions. The aim of those questions was to capture the different investment decisions taken by investors following the market selloff that happened in March 2020. The questions were developed by the author based on personal observations and discussions that happened on social media platforms and helped identify dependent variables.

Likert scales were used to measure each behavioural factor and each investment decision that were influenced by the emergence of COVID 19, a Likert scale was used. Cohen *et al.* (2018) explain that a Likert scale is an instrument that can be used to provide a range of responses to a question. They explain that it is a very useful instrument as they "build in a degree of sensitivity and differentiation of response whilst still generating numbers". In this research the author has chosen to use a 5-point Likert scale ranging from 1 "Strongly disagree" to 5 "Strongly agree". Please refer to Appendix A for the entire list of questions and sources.

4.6.3. Pilot Study

A pilot study was completed to anticipate potential issues with the survey. As explained by Oliver (2003), pilot studies are small preliminary studies that can help assess the feasibility of a piece of research. In total, three investors close to the researcher were asked to complete the survey and share their feedback and potential questions. This process helped improve the questionnaire and clarify some of the questions assessing the investor behaviours. A few definitions and descriptions were added to guide future participants, for more information please refer to Appendix A.

4.6.4. Data Analysis

Descriptive Statistics

Cohen *et al.* (2018) explain that descriptive statistics describe and summarise the characteristics of the collected data. As this aim of this research is to fill the gaps of the findings of the research undertaken by Sarkar and Sahu (2018), the author has decided to take a similar approach to the data analysis and therefore tables and graphical presentation will be mostly used for descriptive statistics.

Data Cleaning

The collected data was exported from Google Form and analysed using SPSS, which is a statistical software platform developed by IBM. First, the data was cleaned, and all the incomplete questionnaires were removed. It was a simple process since all the questions required an answer for the participants to be able to submit the questionnaire, and therefore only the questionnaires from participants who do not invest in the stock market had to be removed. Although most of the survey items were taken from existing studies and thus are already tested and verified by their respective authors (Mouna and Anis, 2015; Ngoc, 2014; Pompian, 2011; Kengatharan, 2014; Metawa, 2019; Sarkar and Sahu, 2018), the author has calculated the Cronbach's alpha coefficient to assess the internal consistency, or reliability, between survey items that study the behavioural factors. For this purpose, the Cronbach's alpha was calculated to measure the reliability of the overall scale assessing the investment behaviours and two subscales constituted of items measuring specific behaviours (representativeness and herding).

Normality Test

Since none of the dependent variables of the present study is normally distributed, no normality test was performed. Indeed, all the variables but one was measured using Likert scales, and as explained by Roberson *et al.* (1995), Likert scales are not normally distributed.

Whether the participant is influenced by the emergence of COVID 19 is the only dependent item that was not measured using a Likert scale. However, no normality test was required for this variable since its type is dichotomous, which is not normally distributed. For the reasons listed above, testing the normality of the dependent variables of the present study would be pointless and would yield erroneous results. Therefore, the author has decided not to perform this type of test.

Inferential Statistics

Cohen *et al.* (2018) explain that inferential statistics "strive to make inferences and predictions based on the data gathered". The aim of this type of statistics is to test hypothesis and reach conclusion using the data gathered. In this study the hypotheses and the various relationships between the dependant and independent variables were tested using ANOVA, Spearman rank-order correlation and paired t-tests using the software SPSS.

To establish the relationship between categorical variables (such as marital status) and the impact of the behavioural factors (measured using a Likert scale), the ANOVA method was used. Whether ANOVA can be used with Likert scales is still a subject of debate among statisticians. However, the author of the present paper agrees with the mainstream position defended by Carifio and Perla (2008), who state that Likert scales should be considered as interval scales (instead of ordinal scales). The interval scales share the same characteristics of the ordinal scales, but also introduces "a metric – a regular and equal interval between each data point" (Cohen *et al.*, 2018), which permits to use parametric statistical methods such as ANOVA (Carifio and Perla, 2008).

The Spearman rank-order correlation method was used to assess the relationships between ordinal variables. For instance, it permitted to assess the potential relationships between the age groups and behavioural factors. It also permitted to assess the relationships between the behaviours and the investment decisions following the emergence of the COVID 19. This method was chosen because it allows to assess the relationship between two ordinal or continuous variables, as explained by Cohen *et al.* (2018).

Lastly, a paired T-test was performed to test whether investors tend to be more influenced by advice and investment ideas received during a face-to-face conversation than during an online conversation. As explained by Shier (2004), this type of test is used to compare the means between two sets of observation and to determine whether there is a significant difference between the two. Shier explains that is can be used to compare two different measures applied to the same subjects.

In the present paper the alpha significance level (α) chosen is 0.05, which as explained by Cohen *et al.* (2018), is the usual significance level for statistical studies. Thus, the correlation coefficients found in this study will require a significance value (p-value) lower than 0.05 to be deemed statistically significant.

Ethical Considerations

According to Hickey (2018), "Research ethics provide a guideline or set of principles that support researchers in conducting research so that it is done justly and without harming anyone in the process."

In regard to the ethical considerations, the present study respected the General Data Protection Regulation (GDPR) requirements and its author ensured that all participants agreed to take part in the study and that all the information gathered was securely saved. As explained by Cohen *et al.* (2018) "There are several ethical considerations surrounding observation" and receiving consent from participants is required before undertaking any data collection or observation.

Therefore, in the first section of the questionnaire participants were informed that all the responses will be kept anonymous and confidential and will be stored in a secure, password-protected file and were asked to confirm that they agreed to take part in the study.

The author of the present paper followed all the ethical guidelines provided by the National College of Ireland and is confident that were no ethical issue during the study.

Limitations

The proposed analysis presents some limitations.

The first limitation is that the number of participants is lower than 384, which was calculated as the sample size representative of the target population. As a result, the findings of the present study cannot be considered statistically representative of the population. The second limitation also relates to the sampling, as the study is limited by the fact that the sampling method is non-probabilistic. According to Saunders *et al.* (2015), using a probabilistic method would have led to a sample that would have been more representative the target population.

Finally, the third limitation was found in the way the participants were assessed. Indeed, the present survey assumes that investors are plainly conscious of the behaviours impacting their investment decisions, which may also not be the case. An experimental approach would probably have been more accurate but was impossible to implement due to the social distancing measures in place at the time of the study.

Chapter 5: Results

In this section the author presents the results of the statistical analysis. It is divided in three subsections. The first subsection contains the results of the reliability test. The second subsection gives an overview of the sample studied by using descriptive statistics techniques such as graphs and tables.

Lastly, the third subsection contains the results from the inferential statistics. It is in that part that the various hypotheses outlined in the "Research problem" section are tested and that the various correlations between dependent and independent variables are explored. For a better readability, this last subsection is divided in three parts:

- The first part presents the findings relating to the influence of the demographic characteristics, experience, and investor type on the investment behaviour.
- The second part contains results in relation to the influence of behavioural factors on the investment decision following the recent market selloff of March 2020.
- The last part contains the results relating to the likelihood for investors to follow investment advice or ideas received during a face-to-face conversation versus an online conversation.

5.1. Reliability Test

Cronbach's alpha coefficient was calculated to assess the reliability of the questionnaire and identify potential items to remove. The author has assessed the reliability of the overall scale that measures the investment behaviours (20 items), which is a similar approach to the approach undertaken by Sakar and Sahu (2018), who also studied the impact of the behaviours on the investment decision.

As illustrated in Table 2, the result of the reliability test for the 20 questions that assess the investment behaviours is 0.773, which as explained by Cohen *et al.* (2018) indicate that the items are reliable. Indeed, the authors explain that an alpha coefficient between 0.70 and 0.79 mean that the items are reliable. Sarkar and Sahu, who assessed the same behaviours but with a different questionnaire, found a reliability coefficient of 0.712.

Table 2. Cronbach's Alpha for items assessing the investment behaviours

Cronbach's Alpha	N of Items	Scale
.773	20	Items measuring all the investment behaviours.
.779	5	Items measuring the herding behaviour.
.236	2	Items measuring the representativeness heuristic.

Then, the Cronbach's alpha was calculated to measure the internal consistency of items assessing the same behaviour factors: representativeness and herding. The results of those tests can be found in Table 2.

Table 2 shows that the Cronbach's alpha found for the 5 items measuring the herding behaviours is 0.779, which indicates that the measure is reliable, and therefore no item was removed.

In regard to the representativeness, the reliability coefficient found was 0.236, which as explained by Cohen *et al.* (2018) is an unacceptable level of reliability. For this reason, the author of the present study decided to remove one of those items. However, since only two items are assessing this behaviour it is not possible to determine which item would be the best to remove using the "Cronbach's Alpha If Item Deleted" calculated in SPSS, as illustrated in Table 3. Therefore, the author decided to remove the item that would positively impact the Cronbach's alpha of the overall scale the most (for the 20 items assessing investors' behaviours), which is the item "Representativeness (1)", as shown in Appendix B (Table 20).

Table 3. Cronbach's alpha for the representativeness behaviour

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Representativeness (1)	3.13	1.632	.141	.
Representativeness (2)	4.13	.855	.141	.

5.2. Descriptive statistics

5.2.1. Sample Characteristics

In total, 124 people completed the survey. It is not possible to provide a precise response rate since the survey was also shared on Facebook groups, however it is important to note that most of the participants were found on LinkedIn where the survey was sent individually to 1231 people. A rough estimate of the response rate would be of around 10%.

As explained in the previous section, the present study focuses solely on investors who invest in the stock market, therefore data collected from participants who failed to meet that criteria were removed from the data set, which led to a final sample size of 104. Table 4 gives an overview of the sample.

Table 4. Sample characteristics

		Frequency	Percentage
Age	17 – 28	30	28.8%
	28 – 37	32	30.8%
	38 – 47	23	22.1%
	48 – 60	14	13.5%
	Over 60	5	4.8%
Gender	Female	22	21.2%
	Male	82	78.8%
Marital status	Single	38	36.5%
	Living with a partner as if married	11	10.6%
	Married	53	51.0%
	Separated	1	1.0%
	Divorced	1	1.0%
Education level	Primary	3	2.9%
	Secondary	11	10.6%
	Third level	46	44.2%
	Masters	42	40.4%
	PhD	2	1.9%
Investor type	Retail/Individual	59	56.7%
	Institutional	45	43.3%
Experience	Less than a year	10	9.6%
	1 year to 4 years	32	30.8%
	5 years to 9 years	20	19.2%
	10 years and above	42	40.4%

Age

As shown in Table 4, the dataset reveals that most of the investors studied are between 28 and 37 years old, and that most of them are younger than 38 years old.

Gender

Most of the participants of the dataset are men. As illustrated in table 4 less than a quarter of our sample (21.2%) are women.

Marital Status

In regard to the marital status, most of the investors who completed the questionnaire are married (51%), as specified in Table 4 only a small portion of the participants were separated or divorced at the time of the study.

Education Level

Table 4 shows that participants have a high level of education, as 86.5% of the sample has a third-level degree or higher. Only 2.9% of the participants specified that their education level was primary.

Experience

40.4% of the investors of the present study have at least ten years of investment experience, as illustrated in Table 4.

Investor type

Table 4 shows that out of the 104 respondents studied, 59 of them (56.7%) are individual investors, and 45 (43.3%) are institutional investors.

5.2.2. Behavioural factors

Table 5 shows the means and standard deviations of measures of the influence of behavioural factors on the investment decision. It shows that market information and the fundamentals of underlying stock are the behavioural factors with the highest means, which indicates that those items had on average the highest level of agreement from the participants. On the other hand, loss aversion and herding are the factors with the smallest mean.

Table 5. Mean and standard deviation of the investor behaviours

				Range of possible values	
Dimension	Behavioural factor	Mean	Std. Deviation	Min	Max
Heuristics	Representativeness	3.13	1.278	1	5
	Overconfidence	3.37	1.175	1	5
	Anchoring	2.73	1.143	1	5
	Availability	3.29	1.282	1	5
	Gambler's fallacy	3.03	1.234	1	5
Prospects	Loss aversion	2.52	1.174	1	5
	Regret aversion	3.03	1.194	1	5
	Mental accounting	3.16	1.442	1	5
Market	Overreaction	3.21	1.267	1	5
	Price changes	3.84	1.071	1	5
	Market information	4.43	.798	1	5
	Past trends of stocks	3.89	1.014	1	5
	Customer preference	3.36	1.246	1	5
	Fundamentals of underlying stocks	4.22	1.052	1	5
Herding	Herding	2.58	0.841	1	5

It is important to note that market information is also the factor with the smallest standard deviation, which means that it is the item for which responses had the least variation from its mean, as illustrated in Figure 3, and indicate a greater consistency and predictability.

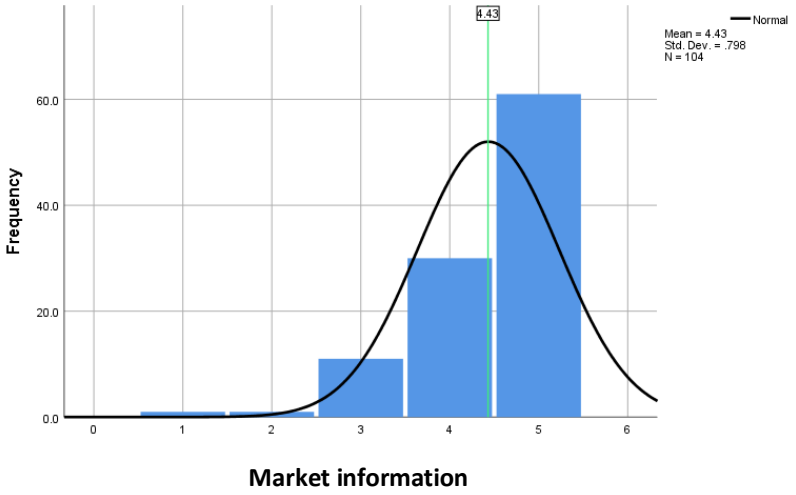

Figure 3. Histogram of the "Market Information" behavioural factor

On the other hand, mental accounting is the factor which has the highest standard deviation, as illustrated in Figure 4, which shows that this is the item for which responses are spread out around the mean the most.

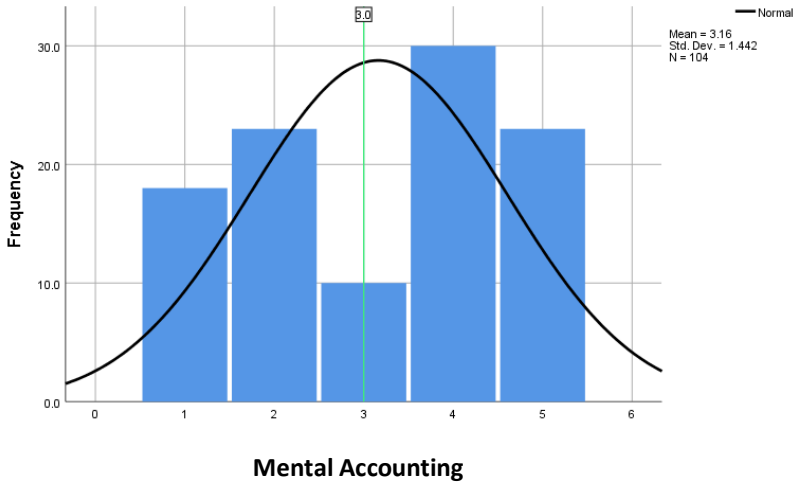

Figure 4. Histogram of the "Mental Accounting" behavioural factor

5.2.3. Influence of COVID 19 on the Investment Strategy

As shown in Figure 5, 63 participants (60.6%) have indicated that the emergence of the COVID 19 has influenced their investment strategy, as illustrated in the figure below. A detailed breakdown of the answers for this question can be found in the appendix C (Table 21).

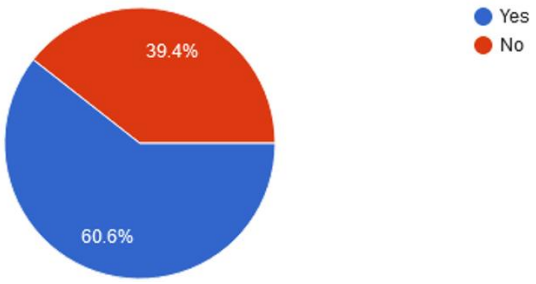

Figure 5. Impact of the COVID 19 emergence on the investment strategy

Table 6 shows the means and standard deviations of the measures of the impact of the COVID 19 emergence on the investment strategy of the 63 participants who indicated that the emergence of virus had impacted their strategy.

Table 6. Mean and standard deviation of the influence of the emergence of COVID 19

Statement	N	Mean	Std. Deviation	Range of possible values Min	Max
During the market sell-off you invested more aggressively compared to the same period last year as the market sell-off appeared to be a great opportunity to buy stocks at a lower price.	63	4.13	1.211	1	5
During the market sell-off you did not change your investment strategy and "stayed the course"	63	3.06	1.480	1	5
During the market sell-off you closed your riskiest positions or stopped investing in your riskier assets	63	2.57	1.304	1	5
During the market sell-off, you sold all of your remaining investment (your entire portfolio).	63	1.29	.831	1	5

Table 6 shows that the statement that indicates that the emergence of the virus has influenced investors to invest more aggressively has the highest mean, which indicates that this item has on average the highest level of agreement from the participants. Out of those 63 participants whose investment strategy has been impacted by the coronavirus, most of them have agreed (20.6%) and strongly agreed (55.6%) it has influenced them to invest more aggressively, as shown in Appendix C (Table 22).

On the other hand, the statement indicating that COVID 19 has influenced investors to sell all their remaining stock portfolio has the smallest mean (1.29). As shown in Appendix C (Table 22), only 2.9% of the participants impacted by the virus have either agreed or strongly agreed to have sold all their remaining investment.

5.3. Inferential statistics

The first part of this section will seek to find the potential relationship between the socio-demographic characteristics of the investors and the behavioural factors influencing their investment decision and will also test the different hypotheses that relate to that topic.

The second part will focus on the study of the correlation between the different investor behaviours and their potential impact on the investment decision following the market selloff of March 2020 and will also seek to test the hypotheses to are related to that subject. To improve the readability of this section, the Spearman's rank correlation coefficient will be referenced by the Greek letter ρ (rho) in all the tables.

5.3.1. Relationship between sociodemographic characteristics, experience, and investment type with investment behaviours

This section contains all the measures of the potential relationships between the sociodemographic characteristics of the participants and the behavioural factors. Spearman's rank-order correlation and ANOVAS were used to test those correlations and significant associations (please refer to the Methodology section for more details).

Age

As illustrated in Table 7, there are significant but weak correlations between the age and the following two behaviours: gambler's fallacy and regret aversion. Those correlations are deemed to be weak because their coefficient is between +/- 0.1 and +/- 0.3 (Akoglu, 2018). The coefficient between the age and the Gambler's Fallacy is -0.296. Since the coefficient is negative, it indicates that investors tend to be less influenced by the bias as they grow older. Similarly, the correlation coefficient found between age and the regret aversion bias is negative, which also indicates that investors tend to be less influenced by the bias as they age.

Table 7. Spearman rank-order correlations between age and behavioural factors

		Representativeness	Over-confidence	Anchoring	Availability	Gambler's Fallacy	Loss Aversion	Regret Aversion	
Age	ρ	.118	-.043	-.031	.049	-.296*	.030	-.201*	
	Sig.	.234	.662	.753	.620	.002	.759	.040	
		Mental Accounting	Over-reaction	Price Changes	Market Information	Past trends of stock	Customer preference	Fundamentals	Herding
Age	ρ	-.028	-.102	-.063	-.016	-.075	-.158	-.039	-.151
	Sig.	.777	.303	.527	.869	.449	.109	.694	.127

Significant at 5% level

Gender

Table 8 contains the results of the ANOVA analysis and illustrates whether there is a statistically significant difference in the investment behaviours between the different groups of investors, grouped by gender. It shows there is no significance value (p-value) less than 0.05, which indicates that gender does not significantly influence the presence of any of the investment behaviours.

Table 8. One-way ANOVA analysis results between age and investment behaviours

	Representativeness	Over-confidence	Anchoring	Availability	Gambler's Fallacy	Loss Aversion	Regret Aversion	
Sig. between two groups	.187	.151	.215	.153	.648	.079	.383	
	Mental Accounting	Over-reaction	Price Changes	Market Information	Past trends of stock	Customer preference	Fundamentals	Herding
Sig. between two groups	.208	.756	.228	.886	.014	.321	.844	.208

**Significant at 5% level*

Marital Status

In regard to the marital status, the ANOVA analysis results illustrated in Table 9 shows that there was a statistically significant difference between the groups of investors when grouped by marital status for two behavioural factors.

The first difference found was for the relationship between the marital status and the overreaction bias, for which the p-value of 0.046 found is lower than the alpha significance level chosen, as explained in the methodology section. It indicates that the difference between the groups is statistically significant for that bias. Simply put, it suggests that the marital status has a significant effect on the level of influence of the overreaction bias.

The second difference found was for the Market information factor, for which the p-value found is 0.017. Similarly, it indicates that the marital status has an influence on the effect of that bias.

A Post hoc analysis was performed to identify the difference within the groups, which can be found in Appendix D (Table 23). As shown in Table 23, It was found that separated participants are influenced by the overreaction behaviour the least as their mean is the lowest, whilst single participants were influenced by that behaviour the most, as their mean is the highest. In regard to market information, separated participants are influenced the least by the factor, whilst the divorced participants are influenced the most.

Table 9. One-way ANOVA results between marital status and investment behaviours

	Representativeness	Over-confidence	Anchoring	Availability	Gambler's Fallacy	Loss Aversion	Regret Aversion	
Sig. between groups	.586	.516	.757	.200	.086	.416	.806	
	Mental Accounting	Over-reaction	Price Changes	Market Information	Past trends of stock	Customer preference	Fundamentals	Herding
Sig. between groups	.621	.046*	.119	.017*	.456	.158	.206	.087

**Significant at 5% level*

Education Level

As illustrated in Table 10, there is a negative correlation between the education level and the market information factor. The correlation found is weak since its coefficient is -0.255, which is between - 0.1 and -0.3 (Akoglu, 2018). Since it is negative, the correlation coefficient indicates that investors with a lower level of education tend to be more influenced by the bias.

Table 10. Spearman rank-order correlations between experience and behavioural factors

		Representativeness	Over-confidence	Anchoring	Availability	Gambler's Fallacy	Loss Aversion	Regret Aversion	
Ed. Level	ρ	-.070	-.185	.084	-.057	-.057	.105	-.162	
	Sig.	.479	.059	.399	.567	.567	.290	.099	
		Mental Accounting	Over-reaction	Price Changes	Market Information	Past trends of stock	Customer preference	Fundamentals	Herding
Ed. Level	ρ	-.148	-.039	-.009	-.255	-.061	-.004	.055	-.081
	Sig.	.134	.694	.924	.009	.538	.967	.580	.416

**Significant at 5% level*

Experience

The spearman rank-order correlation helped identify five statistically significant correlations between experience and the following behaviours: anchoring, availability, gambler's fallacy, herding and past trends of stock. Those results are illustrated in Table 11. All the correlations found are weak, except for the correlation between experience and herding, which according to Akoglu (2018) is considered as moderate (as +/- 4 < ρ < +/- 5). It is important to note that all those correlations are negative, which indicate that investors tend to be less influenced by those behaviours as they gain in investment experience

Table 11. Spearman rank-order correlations between experience and behavioural factors

		Representativeness	Over-confidence	Anchoring	Availability	Gambler's Fallacy	Loss Aversion	Regret Aversion	
Exp.	ρ	-.182	-.069	-.211*	-.296*	-.320*	-.129	-.169	
	Sig.	.065	.487	.031	.002	.001	.191	.085	
		Mental Accounting	Over-reaction	Price Changes	Market Information	Past trends of stock	Customer preference	Fundamentals	Herding
Exp.	ρ	-.006	-.138	-.125	-.008	-.249*	-.140	.166	-.407*
	Sig.	.956	.163	.207	.936	.011	.156	.093	.000

**Significant at 5% level*

Investor type

One-way ANOVA was used to identify the potential relationships between investment behaviours and the investor type and helped identify four statistically significant differences between the two groups with the following behaviours: availability, gambler's fallacy, loss aversion and fundamentals, as illustrated in Table 12. It indicates that the investor type has a significant effect on the level of influence of those biases since their p-value is below 0.05, as stated in the methodology section.

Table 12. One-way ANOVA results between investor type and behavioural factors

	Representativeness	Over-confidence	Anchoring	Availability	Gambler's Fallacy	Loss Aversion	Regret Aversion	
Sig. between groups	.162	.926	.059	.045*	.048*	.000*	.779	
	Mental Accounting	Over-reaction	Price Changes	Market Information	Past trends of stock	Customer preference	Fundamentals	Herding
Sig. between groups	.067	.814	.503	.263	.071	.431	.000*	.685

**Significant at 5% level*

In order to identify the strength of the influence of those behaviours, a past hoc analysis was performed. The means of the level of influence per investor type available in appendix D (Table 24) shows that retail investors tend to be more influenced by the availability, gambler's fallacy and loss aversion behavioural factors, whilst fundamentals tend to influence the Institutional investors more than the other group of investors.

Based on the information above the present study rejects the null hypotheses 2 and 3, which state that:

- Institutional investors are no less influenced by the "loss aversion" behavioural factor than individual investors.
- Institutional investors are no more influenced by the "fundamentals of underlying stocks" behavioural factor than individual investors.

However, since the significance between the two groups of investors in regard to the past trends of stock and herding factors are greater than 0.05, the present study fails to reject the hypothesis 1 and 4, which state that:

- Institutional investors are no more influenced by the "past trends of stock" behavioural factor than individual investors.
- Institutional investors are no less influenced by the herding behaviour compared to individual investors.

5.3.2. Influence of the Investment behaviours on the investment decisions following the market selloff of March 2020

This section will seek to identify potential correlations between the various behavioural factors and the investment decisions investors made following the market selloff that happened following the emergence of COVID 19. The correlations will be tested for each decision by calculating the Spearman rank-order correlation coefficients, as explained in the research methodology section. It is important to note that in this section only the responses of the participants who admitted that the market selloff had impacted their investment strategy (60.6% of the participants) are taken into account.

Correlations between the decision to invest more aggressively following the Market selloff in March 2020 and the investment behaviours

Table 13 shows that there is a significant but weak negative correlation between the loss aversion behaviour and the change of investment strategy to a more aggressive approach following the market selloff. It suggests that investors who are less influenced by this bias tent to invest more aggressively following the market selloff that happened in March 2020.

Table 13. Spearman rank-order correlations between the decision to invest more aggressively and behavioural factors

		Representativeness	Over-confidence	Anchoring	Availability	Gambler's Fallacy	Loss Aversion	Regret Aversion	
MoreAggressive	ρ	.067	.026	.091	.045	.205	-.299*	.021	
	Sig.	.600	.838	.477	.724	.107	.017	.873	
		Mental Accounting	Over-reaction	Price Changes	Market Information	Past trends of stock	Customer preference	Fundamentals	Herding
MoreAggressive	ρ	.065	.183	.041	.289	.119	.142	.006	.084
	Sig.	.614	.151	.750	.022	.352	.266	.963	.514

**Significant at 5% level*

Correlations between the decision to stay the course following the Market selloff in March 2020 and the investment behaviours

Spearman rank-order helped identify a statistically significant weak correlation between the decision of staying the course and past trends of stock factor, as shown in Table 14.

Table 14. Spearman rank-order correlations between the decision to stay the course and behavioural factors

		Representativeness	Over-confidence	Anchoring	Availability	Gambler's Fallacy	Loss Aversion	Regret Aversion	
Stayed The Course	ρ	-.170	-.149	-.223	.136	-.071	.016	.038	
	Sig.	.184	.244	.079	.289	.579	.900	.768	
		Mental Accounting	Over-reaction	Price Changes	Market Information	Past trends of stock	Customer preference	Fundamentals	Herding
Stayed The Course	ρ	-.198	-.070	-.095	-.096	-.269*	-.012	-.020	-.003
	Sig.	.120	.587	.460	.457	.033	.927	.877	.979

**Significant at 5% level*

Correlations between the decision to reduce risk following the Market selloff in March 2020 and the investment behaviours.

As illustrated in Table 15, there is no statistically significant correlation between the decision to reduce risk following the market selloff and any of the investment behaviours.

Table 15. Spearman rank-order correlations between the decision to reduce risk following the market selloff in March 2020 and behavioural factors.

		Representativeness	Over-confidence	Anchoring	Availability	Gambler's Fallacy	Loss Aversion	Regret Aversion	
Reduce dRisk	ρ	.079	.009	.158	.152	-.037	.165	.021	
	Sig.	.540	.946	.215	.235	.772	.198	.872	
		Mental Accounting	Over-reaction	Price Changes	Market Information	Past trends of stock	Customer preference	Fundamentals	Herding
Reduce dRisk	ρ	.038	.041	.054	-.211	.005	-.032	-.163	.183
	Sig.	.769	.748	.674	.097	.969	.805	.201	.151

**Significant at 5% level*

Correlations between the decision to sell all the remaining of the investment following the Market selloff in March 2020 and the investment behaviours.

There are correlations between the decision to sell all the remaining of the investment (the entire portfolio) and five investment behaviours, as shown in Table 16. All the identified correlations are considered weak since their coefficient is between +/- 0.1 and +/- 0.4, as explained by Akoglu (2018). The correlations between the decision to sell and representativeness, overconfidence, overreaction, and herding are positive. However, the correlation between the decision to sell and the fundamentals factor is negative.

Table 16. Spearman rank-order correlations between the decision to sell all the remaining of the investment following the Market selloff in March 2020 and the investment behaviours.

		Representativeness	Over-confidence	Anchoring	Availability	Gambler's Fallacy	Loss Aversion	Regret Aversion	
Sold remaining	ρ	.330*	.274*	.225	.158	.224	.195	.127	
	Sig.	.008	.030	.076	.216	.078	.126	.323	
		Mental Accounting	Over-reaction	Price Changes	Market Information	Past trends of stock	Customer preference	Fundamentals	Herding
Sold remaining	ρ	.095	.290*	.185	-.025	.210	.232	-.345*	.274*
	Sig.	.457	.021	.147	.845	.098	.067	.006	.030

**Significant at 5% level*

5.3.3. Likelihood of following investment advice or ideas during a face-to-face conversation versus an online conversation

Table 17. Paired T-Test of the likelihood of following investment advice or ideas during a face-to-face conversation versus an online conversation

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig.
Pair	Herding (face-to-face) – Herding (online)	.154	.798	.078	1.967	103	.052

Table 17 shows the result of the paired t-test performed to compare the means of the likelihood for the investors to follow investment advice or ideas during a face-to-face conversation versus the advice and ideas received during an online conversation. Since the p-value of 0.052 found is greater than the alpha significance level chosen of 0.05, the null hypothesis suggesting that Investors are no less likely to follow investment advice or ideas received during an online conversation than during a face-to-face conversation cannot be rejected.

Chapter 6: Discussion

This section summarises and discusses the key findings of the present study in the light of existing literature in the field of behavioural finance.

The first aim of this study was to analyse the influence of the investors' characteristics on their investment behaviours in the stock market, whilst the second aim was to study the impact of the investment behaviours on the investment decisions following the market selloff that happened in March 2020. Finally, the last aim of this study was to identify whether social distancing measures had an impact on the herding behaviour.

6.1. Relationship between sociodemographic characteristics, experience, and investment type with investment behaviours

The first part of the statistical analysis sought to identify the potential relationships between sociodemographic characteristics, experience, and investment type with investment behaviours.

Age was the first characteristic for which a potential correlation with the investment behavioural was studied. The analysis showed that age negatively influence the level of gambler's fallacy and regret aversion. Simply put, it means that older investors tend to be less influenced by those biases than younger ones. Those findings contradict Sarkar and Sahu's (2018) study, which found that there was no significant relationship between age and the gambler's fallacy behaviour, but instead found a positive correlation between age, regret aversion and loss aversion. The differences with Sarkar and Sahu's study might be explained by the fact that the authors have only analysed the behaviours of individual investors, whilst the present study has also included institutional investors in the sample. Since the population studied is different, differences in the results were expected.

Another difference in the sample of those two similar studies relates to the proportions in terms of investment experience. As explained in the results section, more than 40% of the participants of the present study had at least 10 years of experience. In comparison, in their study Sarkar and Sahu found that only 27% of their sample had at least ten years of experience, and that most of their participants (41%) had between 5 and 9 years of experience, against only 19.2% in this study.

The higher level of experience in the present study can be explained by the fact that this research studies both institutional and individual investors whilst Sarkar and Sahu only studied individual investors. As shown in Table 18, professional investors tend to be more experienced than individual investors. Therefore, since the present study included institutional investors, it was expected that the participants would show a higher level of experience.

*Table 18. Experience * Investor type Crosstabulation*

			Investor type		
			Retail/Individual	Institutional	Total
Experience	Less than a year	Count	10	0	10
		% within Experience	100.0%	0.0%	100.0%
	1 year to 4 years	Count	19	13	32
		% within Experience	59.4%	40.6%	100.0%
	5 years to 9 years	Count	9	11	20
		% within Experience	45.0%	55.0%	100.0%
	10 years and above	Count	21	21	42
		% within Experience	50.0%	50.0%	100.0%
Total		Count	59	45	104
		% within Experience	56.7%	43.3%	100.0%

One of the key findings of this study is that the five correlations found between experience with the following behavioural factors are negative: anchoring, availability, gambler's fallacy, herding and past trends of stock, whilst no positive correlation was found. Those negative correlations indicate that investors tend to be less influenced by those biases as they gain in experience.

Similarly, Feng and Seasholes (2005) led an experimental study to identify whether sophistication and trading experience of investors eliminate their behavioural biases. The authors found that although experience does not eliminate behavioural biases, it reduces their influence, which is in line with the findings of the present study.

Bedard and Chi (1993) conducted an experimental study that sought to measure the influence of overconfidence on experienced and inexperienced investors and found that there was no significant difference between the two groups of investors, which is in line with the findings of the present paper since no correlation between the investor type and this bias was found. However, as explained by Bedard and Chi, Menkhoff *et al*. (2006) conducted a similar study and found that the influence of overconfidence decreases as investors gain in experience.

Overall, studies in the area of behavioural finance tend to agree that experience either do not influence the behavioural biases or negatively influences it, which is coherent with the findings of the present study.

Another key finding of this study relates to the relationship between the investor type and the level of influence of the behavioural factors. As explained in the previous section, this study found that individual investors tend to be more influenced by the availability, gambler's fallacy and loss aversion biases, whilst institutional investors are more influenced by the fundamentals of the underlaying stock.

The correlation between the institutional investors and the fundamentals of stock was expected, as explained the literature review. Indeed, the correlation may be explained by the fact that institutional investors tend to use techniques and metrics that rely on the fundamentals to make investment decision, as explained by Barber and Odean (2008). Further studies in the area of stock picking as well as a research seeking to test potential relationships between those techniques and behavioural factors impacting the investment decision would be required in order to confirm this assumption. Plus, it is worth noting that some of those techniques also require the use of the past trends of stock, and although it was suggested in the literature review that institutional investors would be more influenced by this factor, the statistical analysis highlighted no significant difference between the two groups of investors in regard to this factor.

On the other hand, this study showed that individual investors are more influenced by availability, gambler's fallacy, and loss aversion biases. Barber and Odean (2008) studied the influence of the availability bias on investors and found that individual investors tend to be more influenced by the bias than institutional investors, which is coherent with the results of this study. It is important to note that the influence of the availability bias has some serious implications for the individual investors as it can lead to poorer portfolio performance, as suggested by Shefrin (2008). Gambler's fallacy is another bias influencing the individual investors and that can have negative consequences for them as it may lead to incorrect expectations and incorrect predictions about price trend reversal, as explained by Javed and Marghoob (2017). In regard to the level of the influence of the loss aversion, which is higher for individual investors, the difference may be explained by the fact that institutional investors invest the money of others, which may reduce the potential bad effect they might experience by losing money in the stock market, as opposed to individual investors who invest their own money and therefore may be more impacted by a potential loss. Interestingly, Bodnaruk and Simonov (2016) found that the influence of loss-aversion leads to poorer performance and that institutional investors that are more risk-averse are more likely to see their contracts terminated than investors with a lower level of risk aversion.

6.2. Influence of the Investment behaviours on the investment decisions following the market selloff of March 2020

In the second part of the analysis, the author sought to find potential correlations between the investment behaviours and the potential investment decision that investors made following the market selloff in March 2020.

One of the important findings of that section is that a negative correlation between loss aversion and the change of investment strategy to a more aggressive approach following the market selloff was found. This correlation indicates that the more investors are influenced by loss aversion, the more they tent not to adapt their investment strategy to a more aggressive approach following the market selloff. This result confirms the loss aversion theory, which as explained in the literature review argues that investors experience loss and gain asymmetrically and that people tend to become more risk averse after having experienced a loss (Thaler and Johnson, 1979). The fact that investors who are influenced the most by this behavioural factor were the most risk averse following the market selloff is coherent with the

literature. Indeed, as explained by Nofsinger (2017), the regret of not acting, or regret of omission, is perceived as less painful for investors than the regret caused following an action, or regret of commission. Thus, following the loss caused by the market selloff that happened, investors decided not to act in order to maximize the chance of not feel even more regret.

Finally, five correlations were found between the behavioural factors and the decision taken by investors to sell all their remaining investment. The correlation between the decision to sell and overconfidence shows that investors who are more influenced by overconfidence tent to sell all their remaining investment more than individuals who are less overconfident. Lambert *et al.* (2012) explains that overconfidence causes overreaction to information, which is consistent with the fact that a correlation between the decision to sell and overreaction was also found. It is important to note that this behaviour have consequences in the market, as it creates creates anomalies which subsequently correct themselves, De Bondt and Thaler.

The positive correlation between herding and the decision to sell shows that people who are more influenced by others were more likely to sell all their remaining investment following the selloff. Marks (2018) suggests that in this type of situation standing against the herd and adopting a contrarian strategy would be more appropriate. on a similar note, Dhankar (2014) explains that the contrarian strategy would permit to earn abnormal profits. The fourth positive correlation found was with the representativeness behaviour, for which no support was found in the literature. Finally, a negative correlation was found between the decision to sell all remaining investment and stock fundamentals. This finding is coherent since the selloff was triggered by a factor external to the market (the emergence of a virus), which did not directly impact the fundamentals of the companies. Therefore, it is normal that investors who are more influenced by fundamentals of the underlying stock did not decide to sell following the market selloff as the change did not directly impact the fundamentals.

6.3. Influence of the social distancing measures on the herding behaviour

Finally, the third and last part of the statistical analysis compared the influence of investment advice received during a face-to-face conversation versus an online conversation. This short section demonstrated no impact of social distancing measures on the herding behaviour, with the assumption that investors would therefore be more likely to discuss about stock investing online because of the measures.

6.4. Limitations

This section provides the limitations of the present study identified by its author.

The first limitation identified is that the size of the sample studied was only 104, which is less than the 384 participants required to have a sample size representative of the target population, as explained in the methodology section. Unfortunately, due to time constraints it was impossible for the author to gather more data.

The second limitation is also related to sampling. Also due to time and cost constraints, the author used convenience sampling. As a consequence, the size of some of the subgroups studied was too small to be statistically representative. For instance, only two investors out of the 104 participants studied were either divorced or separated. In order to have a more representative sample it would have been better to use of other sampling methods such as quota sampling or random stratified sampling. As explained by Cohen *et al.* (2018), stratified sampling consists of constituting homogeneous and non-overlapping groups and then randomly sampling within those groups. The authors explain that with this method the researcher can decide the size of each subgroup to reflect the proportions of the population studied. Quota sampling is similar to stratified sampling except that with this method the researcher creates a sample representing the characteristics of the population studied and study each individual of that sample (Cohen *et al.*, 2018).

A third limitation comes from the research strategy used. Indeed, this study used a survey strategy to measure the influence of the behavioural factors on the investment decision, which assumes that investors are always plainly conscious of their behaviours in the stock market. Unfortunately, due to the social distancing measures in place at the time of the study, it was impossible to take an experimental approach such as the one used by Lambert *et al.* (2012) to assess the impact of the overreaction bias.

6.5. Scope for further research

As of today, there is no experimental study examining the impact of investors' characteristics on the level of influence of such a wide spectrum of investment behaviours such as the ones examined in the present paper, which represents a gap in the literature as well as an opportunity for further research. As explained in the previous subsection, this study used surveys to identify the influence of the behavioural factors on the investment decision, which assumed that investors are plainly aware of the influence of those various factors. It would be interesting and might be more accurate to conduct a similar study with a more experimental approach.

Lastly, one of the aims of this paper was to fill a gap outlined by Sarkar and Sahu (2018), who suggested comparing institutional investors and individual investors behaviours as an extension of their study. Now that this gap has been filled, as a final suggestion for further research it would be interesting to seek to explain why those two types of investors are influenced by different behavioural factors and whether those differences are due to the different techniques those two groups of investors use to constitute their portfolio.

Chapter 7: Conclusion

The first objective of this paper was to outline potential relationships between investors' characteristics and the behaviours impacting the investment decision. This objective was achieved as several correlations were found. This part of the study showed that experience tends to diminish the influence of investment biases, which is coherent with the study undertaken by Feng and Seasholes (2005). The present research did not limit itself by only studying characteristics already studied by others; it also sought to extend the existing literature by examining the relationship between the investor type and the investment behaviours. As explained by Sarkar and Sahu (2018), there is a gap in the literature in regard to the investment behaviours of institutional investors in comparison with the behaviours of individual investors and this paper filled that gap by proving that individual investors and institutional investors are not influenced by the same biases. This study revealed that institutional investors are more influenced by the stock fundamentals than retail investors. On the other hand, the availability, gambler's fallacy, and loss aversion biases have influence impact on the individual investors than on the institutional investors. Further research is required to understand why those two groups of investors are influenced by different biases.

The second objective of this study was to identify correlations between the investment behaviours and the actual decisions taken by investors following the market selloff caused by the emergence of COVID 19 that happened in March 2020. Obviously, this part of the study extended the literature in the field of behavioural finance, as there was no existing research of the investors' behaviours following the market selloff available at the time of the present study. One of the key findings is that the more investors are influenced by the loss aversion, the least they were likely to adapt their investment strategy to a more aggressive approach following the market selloff; which is in line with the loss aversion theory that suggests that people are more negatively impacted by a loss than they are positively impacted by a gain, and that they are more likely to be more risk averse following a loss (Thaler and Johnson, 1979). In total, seven correlations between the investment behaviours and actual decisions taken by investors following the emergence of the COVID 19 were found, which demonstrate the influence of the behavioural factors on actual investment decisions.

Finally, the last objective of this study was to identify whether social distancing measures would influence the behaviours of investors in the stock market. This study showed that the social distancing measures in place at the time of the study do not influence the herding behaviour, as there is no significant difference between the likelihood for investors to follow investment ideas or advice during a face-to-face conversation against an online conversation.

References

Akoglu H. (2018) ‘User's guide to correlation coefficients’, *Turkish journal of emergency medicine*, 18(3), pp. 91-93.

Alonso, A. and Rubio, G. (1990) ‘Overreaction in the Spanish equity market.’, *Journal of Banking & Finance,* 14(2-3), pp. 469-481.

Barber, B.M. and Odean, T. (2001) ‘Boys will be boys: Gender, overconfidence, and common stock investment.’ *The quarterly journal of economics*, 116(1), pp. 261-292.

Barber, B.M. and Odean, T. (2002) ‘Online investors: do the slow die first?’, *The Review of financial studies*, 15(2), pp. 455-488.

Barber, B. M., and Odean, T. (2008) ‘All that Glitters: The Effect of Attention and News on the Buying behavior of Individual and Institutional Investors’, *The Review of Financial Studies,* 21(2), pp. 785-818.

Barr Rosenberg, K.R. and Lanstein, R. (1984) ‘Persuasive evidence of market inefficiency’, *Journal of portfolio management*, 11, pp.9-17.

Bedard, J., & Chi, M. T. H. (1993) ‘Expertise in auditing’, *Auditing: A Journal of Practice and Theory*, 12, pp. 21-45.

Blanco, F. (2017) ‘Cognitive bias. In J. Vonk & T. Shackelford (Eds.)’, *Encyclopedia of Animal Cognition and Behavior,* pp. 1-6.

Board of Governors of the Federal Reserve System (2018) ‘Survey of Consumer Finances (SCF)’, Available at: https://www.federalreserve.gov/econres/scfindex.htm [Accessed 11 July 2020].

Bodnaruk, A. and Simonov, A., (2016) ‘Loss-averse preferences, performance, and career success of institutional investors’, *The Review of Financial Studies*, 29(11), pp. 3140-3176.

Boussaidi, R. (2013) ‘Representativeness heuristic, investor sentiment and overreaction to accounting earnings: The case of the Tunisian stock market’, *Procedia-Social and Behavioral Sciences*, 81, pp. 9-21.

Brailsford, T. (1992) ‘A test For the Winner-Loser Anomaly in the Australian Equity Market: 1958-87’, *Journal of Business Finance and Accounting,* pp. 225-241.

Bryman, A. (2012) *Social Research Methods*. 4th edition. Oxford University Press.

Bryman, A. and Bell, E (2011) *Business Research Methods.* Third Edition. Oxford, 2011.

Buckley, J.J., Buckley, M.H. and Chiang, H.F., (1976) *Research methodology and business decisions*. Canada: National Association of Accountants.

Burrell, G. and Morgan, G. (1979) *Sociological paradigms and organisational analysis: Elements of the sociology of corporate life.* London: Heinmann.

Campbell, K. and Limmack, R.J. (1997) 'Long-term over-reaction in the UK stock market and size adjustments', *Applied Financial Economics,* 7(5), pp. 537-548.

Carifio, J. and Perla, R. (2008) 'Resolving the 50-year debate around using and misusing Likert scales', *Medical education*, 42(12), pp. 1150-1152.

Carson, D., Gilmore, A., Perry, C., and Gronhaug, K. (2001) *Qualitative Marketing Research*. London: Sage.

Cen, L., Hilary, G. and Wei, K.J. (2013) 'The role of anchoring bias in the equity market: Evidence from analysts' earnings forecasts and stock *returns' Journal of Financial and Quantitative Analysis*, 48(1), pp. 47-76.

Cipriani, M. and Guarino, A. (2005) 'Herd behavior in a laboratory financial market', *American Economic Review*, 95(5), pp. 1427-1443.

Clotfelter, C.T. and Cook, P.J. (1991) 'Lotteries in the real world', *Journal of Risk and Uncertainty*, 4(3), pp. 227-232.

Cohen, L., Monion, L. and Morris, K. (2018) *Research methods in education,* 5th ed, London UK and New York.

Collis, J. and Hussey, R. (2013) *Business research: A practical guide for undergraduate and postgraduate students*. Macmillan International Higher Education.

Creative Research Systems, (n.d) *Sample Size Calculator.* Available at: https://www.surveysystem.com/sscalc.htm [Accessed 11 July 2020]

Daniel K., Hirshleifer, D., & Subrahmanyam, A. (1998) 'Overconfidence, Arbitrage, and Equilibrium Asset Pricing.', *Journal of Finance,* 53, pp. 921-965.

De Bondt, W.F. and Thaler, R. (1985) 'Does the stock market overreact?', *The Journal of finance*, 40(3), pp. 793-805.

De Bondt, W. F. M., Muradoglu, Y. G., Shefrin, H., & Staikouras, S. K. (2008) 'Behavioral finance: Quo vadis?' *Journal of Applied Finance*, 18(2), pp. 7-21.

Fama, E.F. (1965) 'The behavior of stock-market prices', Journal of Business, 38, 1, pp. 34-105.

Fama, E.F. (1970) 'Efficient capital markets: a review of theory and empirical work', *Journal of Finance,* 25, 2, pp. 383-417.

Farber, A., Nguyen, V.N. and Vuong, Q.H. (2006) *Policy impacts on Vietnam stock market: A case of anomalies and disequilibria 2000-2006*, CEB 06-005.RS,Universite Libre de Bruxelles.

Feng, L. and Seasholes, M.S. (2005) 'Do investor sophistication and trading experience eliminate behavioral biases in financial markets?', *Review of Finance*, 9(3), pp. 305-351.

Goddard, W. and Melville, S. (2004) *Research methodology: An introduction.* Juta and Company Ltd.

Goetzmann, W.N., Brown, S.J., Gruber, M.J. and Elton, E.J. (2014) *Modern portfolio theory and investment analysis,* John Wiley & Sons.

Hickey, C. (2018) Research Ethics in Social Research. Available at: https://www.teachingcouncil.ie/en/_fileupload/Research/Ethics-Webinar-Slides.pdf [Accessed 12 July 2018].

Hon-Snir, S., Kudryavtsev, A. and Cohen, G. (2012) 'Stock market investors: Who is more rational, and who relies on intuition.' *International Journal of Economics and Finance*, 4(5), pp. 56-72.

Hudson, L.A. and Ozanne, J.L. (1988) 'Alternative ways of seeking knowledge in consumer research' *Journal of consumer research*, 14(4), pp. 508-521.

Jackson, S.L. (2015) *Research methods and statistics: A critical thinking approach*. Cengage Learning.

Javed, M.A. and Marghoob, S. (2017) 'The effects of behavioural factors in investment decision making at Pakistan stock exchanges', *Journal of Advanced Research in Business and Management Studies*, 7(1), pp. 104-106.

Kahneman, D. (2011) *Thinking, fast and slow*. Macmillan.

Kimani, V.W., (2011) 'A survey of behavioral factors influencing individual investors' choices of securities at the Nairobi Securities Exchange', *Doctoral dissertation*.

Lambert, J., Bessière, V. and N'Goala, G. (2012) 'Does expertise influence the impact of overconfidence on judgment, valuation and investment decision?', *Journal of Economic Psychology*, 33(6), pp. 1115-1128.

Lakonishok, J., Shleifer, A. and Vishny, R.W. (1992) 'The impact of institutional trading on stock prices' *Journal of financial economics*, 32(1), pp. 23-43.

Lauricella, T. (2019) 'A Closer Look at Value vs. Growth Performance', *Morningstar*, 6 November. Available at: https://www.morningstar.com/insights/2019/11/06/value-vs-growth [Accessed 07 June 2020].

Leković, M. (2019) 'Behavioral portfolio theory and behavioral asset pricing model as an alternative to standard finance concepts', *Ekonomski horizonti*, 21(3), pp. 255-279.

Maheshwari, S. and Dhankar, R. (2014) 'A critique of overreaction effect in the global stock markets over the past three decades', *Journal of Business and Management,* 16(4), pp. 25-32.

Markowitz, H. (1952) 'Portfolio selection', *The journal of finance*, 7(1), pp. 77-91.

Marks, H. (2018) 'Humble Pie, Turkey Stocks, & Stocks We're Thankful For', *The Motley Fool* [Podcast]. 29 November. Available at: https://www.fool.com/podcasts/motley-fool-money/2019-11-29-humble-pie-turkey-stocks-stocks-for/ [Accessed 19 January 2019].

Merli, M. and Roger, T. (2013) 'What drives the herding behavior of individual investors?', *Finance*, 34(3), pp. 67-104.

Nofsinger, J.R. (2017) *The psychology of investing*. 6th edn. New York: Routledge.

Odean, T. (1999) 'Do investors trade too much?', *American Economic Review,* 89, pp. 1279-1298.

Oliver, P. (2003) *The Student's Guide to Research Ethics*. Maidenhead: Open University Press.

Parker, K. and Fry, R. (2020) *More than half of U.S. households have some investment in the stock market.* Available at: https://www.pewresearch.org/fact-tank/2020/03/25/more-than-half-of-u-s-households-have-some-investment-in-the-stock-market/ [Accessed 11 July 2020].

Pompian, M.M. (2011) *Behavioral finance and wealth management: how to build investment strategies that account for investor biases.* John Wiley & Sons.

Proctor, T. (2003) *Essentials of Marketing Research*. 3rd edition. Prentice Hall.

Rekik, Y.M. and Boujelbene, Y. (2013) 'Determinants of individual investors' behaviors: Evidence from Tunisian stock market', *IOSR Journal of Business and Management*, 8(2), pp. 109-119.

Research Methodology (2020) *Deductive Approach (Deductive Reasoning).* Available at: https://research-methodology.net/research-methodology/research-approach/deductive-approach-2/ [Accessed 21 May 2020].

Roberson, P.K., Shema, S.J., Mundfrom, D.J. and Holmes, T.M. (1995) 'Analysis of paired Likert data: how to evaluate change and preference questions', *Family medicine*, 27(10), pp.671-675.

Ross, S., Westerfield, R. and Jaffe, J. (2012) *Corporate finance*. McGraw-Hill Higher Education.

Sarkar, A.K. and Sahu, T.N. (2018) *Investment Behaviour: Towards an Individual-Centred Financial Policy in Developing Economies*. Emerald Group Publishing.

Saunders, M., Lewis, P. and Thornhill, A. (2015) *Research methods for business students*. 7th edn. Pearson education.

Shefrin, H. (2008) *A behavioral approach to asset pricing*. Elsevier.

Shefrin, H. and Statman, M. (1985) 'The disposition to sell winners too early and ride losers too long: Theory and evidence.' *The Journal of finance*, *40*(3), pp. 777-790.

Shier, R., (2004) 'Statistics: 1.1 Paired t-tests', *Mathematics Learning Support Centre*, *12*.

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

Shiller, R.J. (2000) *Irrational Exuberance*. Princeton University press.

Spiegelhalter, D. (2019) *The art of statistics: learning from data*. Penguin UK.

Thaler, R.H. (2005) *Advances in behavioral finance.* Volume II. Princeton University Press.

Thaler, R.H. and Johnson, E.J. (1990) 'Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice', *Management science*, 36(6), pp. 643-660.

Tversky, A. and Kahneman, D. (1974) 'Judgment under uncertainty: Heuristics and biases', *science*, 185(4157), pp. 1124-1131.

Valliere, D. and Peterson, R. (2004) 'Inflating the bubble: examining dot-com investor behaviour', Venture Capital, 6(1), pp. 1-22.

Waweru, N.M., Munyoki, E. and Uliana, E. (2008) 'The effects of behavioural factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange', *International Journal of Business and Emerging Markets*, 1(1), pp. 24-41.

Wilson, J. (2014) *Essentials of business research: A guide to doing your research project.* Sage.

Yildirim, Hakan. (2017) 'Behavioral Finance or Efficient Market Hypothesis?', *International Journal of Academic Value Studies,* 3, pp. 151-158.

Zhang, D., Hu, M. and Ji, Q. (2020) 'Financial markets under the global pandemic of COVID-19', *Finance Research Letters*, pp. 101528.

APPENDIX A – Questionnaire

1. Questionnaire

This appendix contains the questionnaire given to the participants. The first part of this appendix contains the questionnaire, whilst the second part contains a table associating the dimensions of the behaviours, the questions assessing the behaviours and well as and the source of each question.

Section 1

This section outlines important information in regard to the present study. Please read it fully prior to completing the questionnaire.

Author of the questionnaire:

My name is Aymeric Dispa and I am currently an MBA candidate at the National College of Ireland. I am completing this study in part fulfilment of my dissertation study.

Purpose of the study:

The purpose of this survey is to assess the potential impact of socio-demographic characteristics and investment experience of retail/individual and professional/institutional investors on their investment behaviour in the stock market. The results of this questionnaire will be analyzed and used for the completion of my MBA thesis. All information will be gathered anonymously and will not be linked to the candidate in any way.

The completion of this questionnaire is voluntary. If you want to withdraw from the study, please shut your browser window. Upon withdrawal, the questions you have already answered will not be recorded. However, should you decide to complete this questionnaire, all responses will be kept anonymous and confidential and will be stored in a secure, password-protected file.

The questionnaire consists of 33 closed-ended questions and will take no longer than 10 minutes to complete.
For any question, please contact me via e-mail: x17113938@student.ncirl.ie

Thank you for taking the time to participate in this study.

Question 1. Do you agree to take part in this study?

- Yes
- No

Section 2

This research studies the behaviors of investors who invest in the stock market

Question 2. Do you invest in the stock market?

- Yes
- No

Section 3

In this section we are interested in you and your background to better inform our analysis of your investment decisions.

Question 3. What is your age group?

- 18 - 27
- 28 - 37
- 38 - 47
- 48 - 60
- Over 60

Question 4. What is your gender?

- Male
- Female
- Transgender
- Prefer not to respond
- Other (please specify)

Question 5. What is your marital status?

- Single (and never married)
- Living with a partner as if married
- Married
- Separated
- Divorced
- Widowed
- Other (please specify)

Question 6. What is your education level?

- Primary education
- Secondary education
- Third level education
- Masters level education
- PhD or doctorate
- Other (please specify)

Question 7. How long have you been investing in the stock market?

- Less than a year
- 1 year to 4 years
- 5 years to 9 years
- 10 years and above

Question 8. What type of investor are you ?

A retail/individual investor is a person who trades securities for their own personal account rather than for an organization. An institutional investor is a person or organization who trades securities on behalf of other people (i.e: pension funds, mutual funds, money managers, etc...).

- Retail/Individual
- Institutional/professional

Section 4

The purpose of this section is to find out about your investment decision making and how it may be influenced by behavioral factors. Please indicate the extent to which you agree with the following (1 = Strongly disagree, 5 = Strongly agree)

Question 9. You try to avoid investing in companies with a history of poor earnings.

	1	2	3	4	5	
Strongly disagree	◯	◯	◯	◯	◯	Strongly agree

Question 10. You rely on past performance to buy stocks because you believe that the good performance will continue.

	1	2	3	4	5	
Strongly disagree	◯	◯	◯	◯	◯	Strongly agree

Question 11. You believe that your skills and knowledge of stock market can help you to outperform the market.

	1	2	3	4	5	
Strongly disagree	◯	◯	◯	◯	◯	Strongly agree

Question 12. You forecast the changes in stock prices in the future based on the recent stock prices.

	1	2	3	4	5	
Strongly disagree	◯	◯	◯	◯	◯	Strongly agree

Question 13. You are more likely to invest in a stock for which information is easy to find (advertising, suggestions from advisors, friends, etc...).

	1	2	3	4	5	
Strongly disagree	◯	◯	◯	◯	◯	Strongly agree

Question 14. You avoid investing in stocks that have recently risen in price over a series of subsequent trading sessions because you believe the trend is more likely to reverse.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 15. After a prior loss, you become more risk averse.
A risk averse investor prioritizes the preservation of capital and tries to avoid taking risks.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 16. You avoid selling shares that have decreased in value and readily sell shares that have increased in value.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 17. You tend to treat each element of your investment portfolio separately.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 18. You consider carefully the price changes of stocks that you intend to invest in.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 19. Market information is important for your stock investment.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 20. You put the past trends of stocks under your consideration for your investment.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 21. You analyze the companies' customer preference before you invest in their stocks.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 22. You research and analyse the company fundamentals before making an investment decision.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 23. You do react quickly to new information in the market.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 24. Other investors' decisions of the stock volume have impact on your investment decisions.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 25. Other investors' decisions of buying and selling stocks have impact on your investment decisions.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 26. You usually react quickly to the changes of other investors' decisions and follow their reactions to the stock market.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 27. You would be inclined to follow investment advice or ideas received during a face-to-face conversation from a friend or colleague.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 28. You would be inclined to follow investment advice or ideas received during an online conversation from a friend or colleague.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Section 5

From February 2020 through March 2020, stocks lost more than 33%... Has the COVID 19 emergence impacted your investment strategy?

Question 29. Has the COVID 19 emergence impacted your investment strategy?

- Yes
- No

Section 6

From February 2020 through March 2020, the S&P500 lost more than 30% of its value. The following questions will assess the impact of the emergence of COVID 19 on your investment strategy.

Please indicate the extent to which you agree with the following (1 = Strongly disagree, 5 = Strongly agree)

Question 30. During the market sell-off you invested more aggressively compared to the same period last year as the market sell-off appeared to be a great opportunity to buy stocks at a lower price.

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 31. During the market sell-off you did not change your investment strategy and "stayed the course"

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 32. During the market sell-off you closed your riskiest positions or stopped investing in your riskier assets

You sold your shares or stopped investing in companies that are most exposed or were most impacted by the COVID 19 outbreak, such as Airlines, Leisure, etc...

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Question 33. During the market sell-off, you sold all of your remaining investment (your entire portfolio).

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

2. Questionnaire – Dimensions of investment behaviours questions and sources

Most of the questions used to assess the behavioural factors influencing the investment decisions were taken from existing and validated questionnaire. Table 19 associates the questions of the questionnaire used for this research with the behavioural factors studied and contains the source of each question.

Table 19. Dimensions of investment behaviours - Questions and sources

Dimensions	Behavioural factors	Question	Source
Heuristic	Representativeness	9. You try to avoid investing in companies with a history of poor earnings	Author
		10. You rely on past performance to buy stocks because you believe that the good performance will continue.	Author
	Overconfidence	11. You believe that your skills and knowledge of stock market can help you to outperform the market.	Ngoc (2014)
	Anchoring	12. You forecast the changes in stock prices in the future based on the recent stock prices.	Ngoc (2014)
	Availability Bias	13. You are more likely to invest in a stock for which information is easy to find (advertising, suggestions from advisors, friends, etc...).	Author
	Gambler's fallacy	14. You avoid investing in stocks that have recently risen in price over a series of subsequent trading sessions because you believe the trend is more likely to reverse.	Author
Prospect	Loss aversion	15. After a prior loss, you become more risk averse.	Ngoc (2014)
	Regret aversion	16. You avoid selling shares that have decreased in value and readily sell shares that have increased in value.	Ngoc (2014)
	Mental accounting	17. You tend to treat each element of your investment portfolio separately.	Ngoc (2014)
Market	Prices change	18. You consider carefully the price changes of stocks that you intend to invest in	Ngoc (2014)
	Market information	19. Market information is important for your stock investment.	Ngoc (2014)
	Pat trend of stock	20. You put the past trends of stocks under your consideration for your investment.	Ngoc (2014)
	Customer preference	21. You analyze the companies' customer preference before you invest in their stocks.	Kengatharan (2014)
	Fundamentals of underlying stocks	22. You research and analyse the company fundamentals before making an investment decision.	Author
	Overreaction	23. You do react quickly to new information in the market.	Author

Herding	Herding	24. Other investors' decisions of the stock volume have impact on your investment decisions.	Ngoc (2014)
		25. Other investors' decisions of buying and selling stocks have impact on your investment decisions.	Ngoc (2014)
		26. You usually react quickly to the changes of other investors' decisions and follow their reactions to the stock market.	Ngoc (2014)
		27. You would be inclined to follow investment advice or ideas received during a face-to-face conversation from a friend or colleague.	Author
		28. You would be inclined to follow investment advice or ideas received during an online conversation from a friend or colleague	Author

APPENDIX B – Reliability test

Table 20. Cronbach's Alpha for investor behaviours if item deleted

	Cronbach's Alpha if Item Deleted
Representativeness (1)	.783
Representativeness (2)	.759
Overconfidence	.766
Anchoring	.752
Availability	.762
Gambler's Fallacy	.758
Loss Aversion	.774
Regret Aversion	.775
Mental Accounting	.776
Overreaction	.756
Price changes	.754
Market Information	.772
Past trends of stock	.754
Customer Preference	.774
Fundamentals	.789
Herding (1)	.751
Herding (2)	.743
Herding (3)	.742
Herding (4)	.772
Herding (5)	.764

APPENDIX C – Descriptive Statistics of the impact of the COVID 19 emergence on the investment strategy

Table 21. Frequency of the Impact of the emergence of coronavirus on the investment strategy

"Has the COVID 19 emergence impacted your investment strategy?" Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	41	39.4	39.4	39.4
	Yes	63	60.6	60.6	100.0
	Total	104	100.0	100.0	

Table 22. Mean and standard deviation of the influence of the COVID 19 emergence on the investment strategy

	N	Mean	Std. Deviation
MoreAgressive	63	4.13	1.211
StayedTheCourse	63	3.06	1.480
ReducedRisk	63	2.57	1.304
SoldAll	63	1.29	.831
Valid N (listwise)	63		

APPENDIX D – Post Hoc

Table 23. Descriptives of Overreaction and Market Information behaviours per Marital Status

		N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Overreaction	Single	38	3.66	1.214	.197	1	5
	Living with a partner as if married	11	2.55	1.508	.455	1	4
	Married	53	3.06	1.183	.163	1	5
	Separated	1	2.00	.	.	2	2
	Divorced	1	3.00	.	.	3	3
	Total	104	3.21	1.267	.124	1	5
Market Information	Single	38	4.58	.599	.097	3	5
	Living with a partner as if married	11	4.27	.786	.237	3	5
	Married	53	4.40	.862	.118	1	5
	Separated	1	2.00	.	.	2	2
	Divorced	1	5.00	.	.	5	5
	Total	104	4.43	.798	.078	1	5

Table 24. Descriptives of Gambler's Fallacy, Loss Aversion, Availability and Gambler's Fallacy behaviours per Investor Type

		N	Mean	Minimum	Maximum
Gambler's Fallacy	Retail/Individual	59	3.24	1	5
	Institutional	45	2.76	1	5
	Total	104	3.03	1	5
Loss Aversion	Retail/Individual	59	2.93	1	5
	Institutional	45	1.98	1	5
	Total	104	2.52	1	5
Availability	Retail/Individual	59	3.51	1	5
	Institutional	45	3.00	1	5
	Total	104	3.29	1	5
Fundamentals	Retail/Individual	59	3.86	1	5
	Institutional	45	4.69	3	5
	Total	104	4.22	1	5