The Covid-19 pandemic uncertainty behavioural factor model

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Abstract. The Covid-19 pandemic raised a few issues concerning how market participants react to a global pandemic. The pandemic was a black swan event on some levels; there had been few pandemics that have had such a global impact: the Spanish Flu of the late 1910s and 1957 influenza. Moreover, global interconnection means that the Covid-19 pandemic was able to spread across the globe quickly, thus indicating that extreme measures were needed to bring it under control. The policies taken by governments around the world had a significant adverse impact on the economy. It is with these factors in mind that we research the psychology of the market participants during the pandemic. Conversely, we introduce a new model of behaviour during uncertainty, which explains how market participants react during crises such as the Covid-19 pandemic. The model analyses the psychological issues, both emotional and cognitive, influencing the pandemic. We found that like any other crises, market participant reacted to government actions and announcements and the impact on the economy. Therefore, leading to the old issue of miscommunication and insufficient actions.

Keywords. Behavioural economics, COVID-19, Emotions, Cognitive, Pandemic, Economic crisis.

JEL. D81, D91, E71, G01, G41, H11, I18, Z18.

1. Introduction

Influenced by the seminal work of Tversky and Kahneman (Tversky & Kahneman, 1973), (Tversky & Kahneman, 1974) and (Kahneman & Tversky, 1979), the theory of behavioural economics dictates that it is homo sapiens and not homo economicus that make decisions about every aspect of economics as pointed by (Thaler, 2016). Thus meaning psychological and sentimental factors influence the decision-making process, which is made difficult by the uncertainty surrounding the decision. Moreover, the opposite scales of emotional behaviour, greed and fear, often play a critical role in the process. Additionally, the process is usually clouded by behavioural biases and heuristics. Conversely, the key to understanding the decision-making process during a period of uncertainty is thru the analysis of these behavioural factors.

Furthermore, several external factors and actors could play an influencing role in the decision-making process; these externalities change with the underlying context of the period or event. These externalities could include factors such as financial, political, economical, nature and

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health; however, the actors also play a critical role: governmental, financial and consumers. Thus, pointing to a requirement to research these externalities to gain a more accurate and full picture of the market trend during a period of uncertainty. The uncertainty behavioural factor model is derived as a top-level view of these externalities and behavioural factors influencing the market participants decisions during an uncertain period, an extreme example of which is the unprecedented Covid-19 pandemic.

On 31 December 2019, the Chinese authorities informed the World Health Organisation (there after known as WHO) of the emergence of a new viral disease in the city of Wuhan. According to (Sohrabi *et al.*, 2020), the virus had infected 27 people with links to the Hunan Seafood Whole sale Market, which trades in fish and live animals. As stated by (Sohrabi *et al.*, 2020), the Chinese Centre for Disease Control and Prevention and the WHO identified the new virus as a new increment of the Severe Acute Respiratory Syndrom Coronavirus; subsequently named COVID-19 by the WHO. On 30 January 2020, the WHO declared the Chinese COVID-19 outbreak as a Public Health Emergencyof International Concern; however, on 11 March 2020, Covid-19 was revised from epidemic to pandemic status[2]. The globalisation and highly infective nature of the COVID-19 pandemic from such a niche beginning is exceptionally worrying. The global statistics as of 30 June 2020 stands at approximately 10.27millions cases with 505.30 thousands deaths according to the European Centre for Disease Prevention and Control (there after known as ECDPC). These statistics illustrate how unprepared the global community was in the face of such an infectious disease. Moreover, they show that the global community never learns from past events and always seem to underestimate events.

According to the statistics from the ECDPC, the first reported confirmed UK case was on 31 January 2020. However, the initial spike in new cases of COVID-19 did not occur until 2 March 2020 when the number of daily confirmed cases rose to 13. Furthermore, this number quickly rose above 1,000 by 22 March 2020, a few days later the number became consistently over 1,000 peaking at 8,719 on 12 April 2020. The total COVID-19 cases and deaths stand at 311,965 and 43,575 respectively as of 30June 2020, thus making the UK the worst country in Europe by pure figures according to the ECDPC. So how did the UK get its policies so wrong and did not react to the COVID-19 pandemic quick enough? The signs were there from the rest of Europe; Italy, for instance, spiked to over 1,000 new cases on 8 March 2020. So, the UK had a window of 14 days to prepare; yet the UK's government did not react until 12 March 2020, according to (Hunter, 2020). Remember, the number of daily new cases rose to more than ten on 2 March 2020; thus, the UK's government remained inactive on the COVID-19 front for ten days after. According to (Hunter, 2020), even then there was no action or recommendations. It was not until 16 March 2020 that the UK's government gave sound advice as conferred by (Hunter, 2020). However,

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[2] Source: [Retrieved from].

actions did not come until 18 March 2020 when based on the guidance of a medical report by Imperial College schools were closed, as stated by (Hunter, 2020). Nevertheless, the law enforced social distancing and lockdown orders did not come until 23 March 2020, when the total number of cases has risen above 5,000.

The lockdown order meant the closure of non-essential businesses, only food retailers, pharmacies and banks could open. According to a weekly report by Price Waterhouse Coopers dated 13 May 2020, the impact on GDP is likely to be between 5 and 10%. Furthermore, the report forecasts a budget deficit of 10 to 15% of GDP, thus having a significant impact on the total debt. Remember, the deficit ceiling is 3% of GDP to maintain sustainable long-term fiscal policies. The report points to 28% of the workforce furloughed as a possible reason for the low impact on the unemployment rate. However, this is likely to change because of the lockdown impact on the financial status of many organisations.

While there can be no doubt that the Covid-19 pandemic did affect the financial markets, we are under no illusion that any impact pales into insignificant in comparison to the effect on the general public and NHS staff. As so elegantly put by (Wren-Lewis, 2020, p.109), *"It is worth saying at the start that the bottom line of all this for me is that the economics are secondary to the health consequences for any pandemic that has a significant fatality rate."* However, as hinted by (Wren-Lewis, 2020), financial economics is a vital subject in its own rights, and as a warning not to take drastic actions that do not positively influence the mortality nor infectious rate. Moreover, it is hard not to analyse the impact of Covid-19 on a vital sector of Western capitalism, the financial markets. Nevertheless, as (Wren-Lewis, 2020) states, there is no meaningful trade-off between the reduction on the mortality rate and the GDP or financial market.

According to (Baker *et al.*, 2020a), the impact of Covid-19 on the equity market was unprecedented; indeed, very few episodes can match the high volatility levels or loss. At its lowest on 23 March 2020, the FTSE 100 has loss 2,548.6, an unprecedented 33.79%, of its value since 31 December 2019. thus, there is a requirement to analyse market participants behaviour during the COVID-19 pandemic. Moreover, the psychological impact on the market participants reactions may provide clues as to the behaviour of the population during the COVID-19 pandemic. During any event that has a considerable adverse effect on the mindset of any human, the critical behavioural trait is fear. However, there is anobligation to explain the behavioural reasonings influencing the fear reactions during this pandemic. Hence, this article will use behavioural economics to explain the impact on market participants.

The main contribution of the paper is the uncertainty behavioural factor model which gives an illustrative view of the factors influencing the decision-making process of market participants during a period of uncertainty. It shows the influence of behavioural psychological and emotional factors, such as biases and heuristics, on the market participants. It also illustrates the effect of events and external factors/actors on the

decision-making process. There is a definite requirement to analyse these factors/actors to understand the actions of the market participants. Therein lays the key to the second contribution of the model, the model is derived to illustrate the impact of such events and external factors/actors.

Another crucial side contribution to the model is the derivation of four new heuristics and biases in the explanation of the impact of the Covid-19 pandemic:

- Relative Time Influence bias is the tendency to let the most recent past event or information cloud a judgement. The influence diminishes with time as new events or information occurs. This bias is connected to the event-time conjuncture.
- Political-effect heuristic is the tendency for the actions or inactions of policymakers to affect the decision-making process of the market participants.
- Media Effect heuristic is the tendency to associate extreme events with TV programmes or films.
- Brexit Effect heuristic is the tendency to concentrate on Britain's exit of the EU disregarding all other information or events. Since Brexit is the most recent past event, thus the Brexit effect is a by-product of the relative time influence bias.

However, there remains a requirement to test for these heuristics and biases in the real world. The tests should be implemented in questionnaire-based research to analyse the response from a wide range of the population.

The secondary contribution of this paper is the behavioural reaction analysis of the market participants to the Covid-19 pandemic. There have been a few papers on the impact of the Covid-19 pandemic on the financial market:

- (Albulescu, 2020), study the effect of the announcements on the volatility of the financial market.
- (Baker *et al.*, 2020a), analyse the impact of the policy responses on the US equity.
- (Corbet, Larkin & Lucey, 2020) examine the contagious effect in the financial market.
- (Ramelli & Wagner, 2020) study the equity market reactions.
- (Zhang, Hu & Ji, 2020) research the impact of country and systemic risks on the global financial markets.

However, the key to understanding the impact of the Covid-19 pandemic on the financial market is thru the analysis of the behavioural factors and external factors/actors influencing the decision-making process. The other critical element to consider is the context in which the decision is taken; the key here is the effect of any past events on the current environment. In the case of the Covid-19 pandemic effect on the UK's financial market, the white elephant in the room is the ongoing Brexit process.

In essence, our uncertainty behavioural factor model illustrated the mixture of cognitive and emotional biases and heuristics influencing the

Covid-19 pandemic. Additionally, the model highlighted the impact of external factors and actors on the financial market during events such as the Covid-19 pandemic. Moreover, it demonstrated a principal idea in the behaviour of humans in general and market participants in particular; the impact of an information or event diminishes with time. The critical issue is that the most recent event often clouds the action of the actors during the event; during the Covid-19 pandemic, we suspect that Brexit did cloud the actions of the actors in the UK to a certain extent.

To a certain extent, the Covid-19 pandemic did impact the global affairs like no other events in the past 60 years. Whether the Covid-19 pandemic could be classified as a black swan event depends on the initial assumptions. Indeed, in terms of global viral pandemics, there were two such cases during the last century: the 1918 Spanish Flue and 1957 influenza. Moreover, the economic impact of the pandemic is often overstated in comparison to other recent economic crises such as the global financial and Eurozone debt crises. However, the key is the speed at which the Covid-19 pandemic was able to freeze everyday life and hike uncertainty, globally. This speed was the influential factor in the volatile global markets. And although many will point to the Dow Jones dropping 15% approximately in 1957, it is debatable whether the decline was entirely due to the influenza pandemic. The "overreaction" by market participants during the Covid-19 pandemics meant that on 23 March 2020, the FTSE 100 fell by an unprecedented 33.79% since 31 December 2019.

The reactions of the market participants during the pandemic, once again point to the lack of communication and inactions by governments seen in most recent crises. However, the UK's government did fix the issue later in the pandemic by acting firmly and communicating more often. Yet the actions were too late to reduce the impact of the virus, which made the UK the worst affected country in Europe. With potentially a second wave coming over the next few months, we advise any government to communicate effectively and act fast and stringently on both the health and economic fronts.

Firstly, the paper lays the foundation of the uncertainty behavioural factor model, reviewing the theory of behavioural economic underpinning the model. In the next section, we discuss the Covid-19 pandemic and the UK's response. We follow on with a brief analysis of the impact on the UK's economy, including a review of the economic policy and consumers response. Next, we analyse the Covid-19 effect on the behaviour of market participants in the equity market. Finally, we conclude with a summary of the theoretical underpinnings of the model and impact of Covid-19 in general and on the behavioural factors influencing the decision-making process of market participants.

2. A brief review of the theories influencing the uncertainty behavioural factor model

As illustrated by Figure 1, there is an essential factor to consider in the analysis of the reaction of the financial markets to an uncertain event, the psychological impact on the market participants depend on the external factors such as economics, finance, policy, international affairs, and others such as health or natural. For the psychological impact, we need to delve into the theory at the heart of our model: the theory of behavioural economics. Influenced by the seminal works of Tversky and Kahneman: (Tversky & Kahneman, 1973), (Tversky & Kahneman, 1974) and (Kahneman & Tversky, 1979); basically, the theory dictates that it is the reactions of market participants that drive the trend in the market.
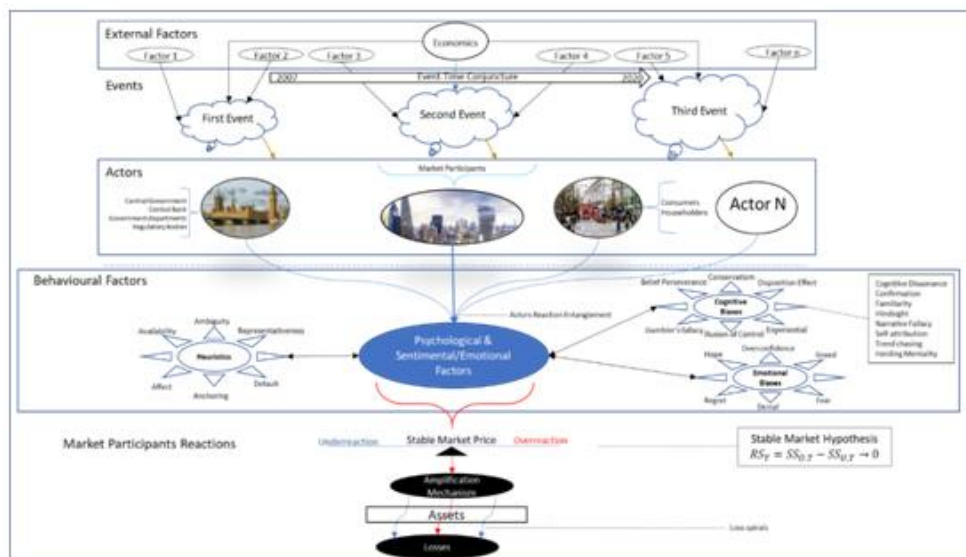

**Figure 1.** *The General Uncertainty Behavioural Factor Model*

Before we could delve onto the main factors of behavioural economics theory influencing our model, there is a need to review the primarily model underpinning behavioural economics; the prospect theory of (Kahneman & Tversky, 1979) and (Tversky & Kahneman, 1992). Market participants often violate the predictions of the traditional model of decision making, the theory of expected utility introduced by (von Neumann & Morgenstern, 1944). As proposed, the expected utility theory argues that rational market participants should always opt to the option which maximises their earnings taking account of their risk aversion behaviour. The issue is market participants do not always make choices according to the rational choice behaviour underlining the expected utility theory. Two critical effects come into play when market participants are deciding amongst several risky option: certainty and isolation effects. The certainty effect states that market participants often underweight uncertain outcomes in comparison with specific results. Thus, contributing to risk aversion and risk-seeking in situations of individual gains and losses, respectively as hinted by (Kahneman & Tversky, 1979). Conversely, according to

(Kahneman & Tversky, 1979), the isolation effect contend that in general market participants discard shared components amongst all prospects under consideration. Furthermore, as argued by both (Tversky & Kahneman, 1992) and (Barberis, 2013b), market participants are loss avert meaning they are more sensitive to loss than to gains of similar margins, no matter how small the losses are.

Figure 2. *Prospect Theory*
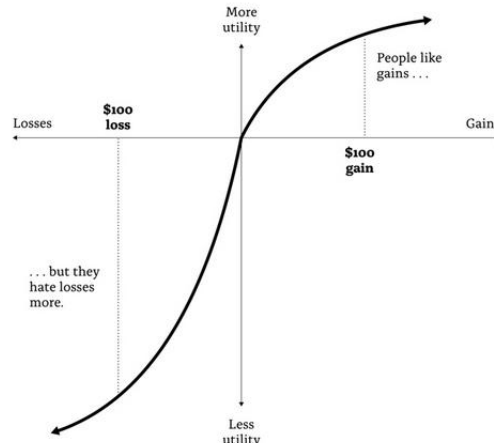
The prospect theory introduced by Kahneman and Tversky over two influential papers, (Kahneman & Tversky, 1979) and (Tversky & Kahneman, 1992), was an attempt to resolve the violations of the expected utility theory, as stated by (Barberis, 2013b). The original prospect theory, as illustrated by Figure 2, derived in (Kahneman & Tversky, 1979), did overcome the main issues presented by the expected utility model. Additionally, (Kahneman & Tversky, 1979) provided some essential insights into the working of the theory and is regarded as the influential paper on behavioural economics.

Figure 3. *Cumulative Prospect Theory*
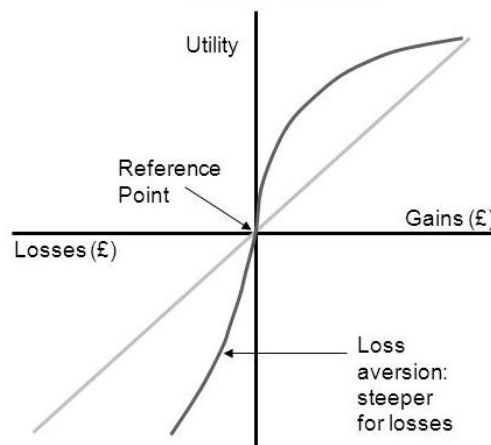
However, the prospect theory, as derived by (Kahneman & Tversky, 1979) violated the first-order stochastic dominance. In overcoming this issue, (Tversky & Kahneman, 1992) proposed a new version of the

prospective theory called cumulative prospect theory which employs a cumulative rather than separable decision weighing function, as illustrated by Figure 3. As derived by (Tversky & Kahneman, 1992), the prospect theory relies on four key characteristics of the human decision process:

- Reference dependence, people evaluate the value of gains or losses from a reference point.
- Loss aversion, people are more sensitive to losses than to gains as indicated by (Kahneman & Tversky, 1979).
- Endowment effect, people demand more to give up an object than they are willing to pay.
- Diminishing sensitivity, the marginal value of both gains and losses decreases with their size.

The influencing idea behind behavioural economics is that market participants are not homo economicus; they are homo sapiens, a point illustrated by (Thaler, 2016). The key here is the reaction by market participants to news or events relative to the fundamental price as derived by the efficient market hypothesis of (Fama, 1965) and (Malkiel, 1962). As put by Bernard Baruch:

"What is important in market fluctuations are not the events themselves but the human reactions to those events."

Moreover, as argued by (Barberis, Shleifer & Vishny, 1998), empirical evidence shows that market participants underreact to news and overreact to a series of good or bad news. The definition of underreaction is that average returns on any asset following good news is higher than average returns following bad news, which means that market participants underreact to the good news. Analogous to underreaction, the definition of overreaction takes the shape of average return following a series of good news is lower than the average return following a series of bad news, which means that market participants overreact to good news. Moreover, in both cases, the opposite reactions could also be correct.

Additionally, behavioural economics attempts to describe the psychology and sentiment influencing the decision-making process of the market participants based on several heuristics and biases. As argued by (Tversky & Kahneman, 1974), there is a constant overload of daily news and information; hence the requirement to simplify arises, this simplification is often called a heuristic. However, a heuristic may be a useful procedure in dealing with information overload; yet, there is the danger that using heuristic techniques to make decisions could lead to misjudgements. Listed below are some general heuristics:

- Affect is the tendency to make decisions based on emotional responses. (Finucane *et al.*, 2000)
- Ambiguity effect implies that people tend to select options for which the probability of a favourable outcome is known, over an opportunity for which the likelihood of a favourable outcome is unknown (Ellsberg, 1961; Heath & Tversky, 1991).

- Anchoring is the tendency to hold on to a belief and base any future judgements on it as a reference point (Tversky & Kahneman, 1974).
- Availability is the tendency to rely heavily on events from memory. Since not all memory is available at any given time, this could lead to short-termism or salient event heavily distorting beliefs (Tversky & Kahneman, 1973).
- Default is the tendency to do nothing if there is a default option (Gigerenzer, 2008).
- Representativeness is the tendency to decide on past information, disregarding current fundamental information (Tversky & Kahneman, 1974).

Conversely, a bias, generally, is a disproportionate probability placed in favour or against an idea or thing. As hinted by (Tversky & Kahneman, 1974), a bias could cloud the judgement of market participants leading to the wrong decisions. According to (Ackert, Church & Deaves, 2003), there are two main types of biases: cognitive and emotional. Cognitive biases refer to the limitation of any individual's abilities to encode, process, and retrieve information. Identified by (Tversky & Kahneman, 1974) as a critical behavioural factor influencing the decision-making process, common cognitive biases include:

- Belief perseverance is the tendency to tightly hold on to a belief for too long despite the availability of new information to the contrary (Lord, Ross & Lepper, 1979).
- Cognitive dissonance is the tendency to feel discomfort when an action conflicts with the positive self-image (Festinger, 1962).
- Confirmation is the tendencyto pay close attention to information that confirms their belief and ignore information that contradicts it (Wason, 1960).
- Conservatism is the tendency to revise an opinion insufficiently when new information becomes available (Edwards, 1982).
- Disposition effect is the tendency to sell "winning" assets too early or hold on to "losing" assets too long (Shefrin & Statman, 1985).
- Experiential is the tendency to believe recent events are increasingly likely to occur again; it is an extension of the representativeness heuristic (Tversky & Kahneman, 1974).
- Familiarity refers to the tendency of buying familiar assets despite the advantages of diversification. (Heath & Tversky, 1991) show in a series of experiments that when people are faced with a choice between two gambles, they will pick the one that is more familiar to them. Moreover, they will sometimes pick the more familiar bet even if the odds of winning are lower!
- Gambler's fallacy is the erroneous belief that if a particular event occurs more(less) frequently than usual during the past, it is less(more) likely to happen in the future (Tversky & Kahneman, 1974).
- Herd mentality refers to the tendency to follow and copy others (Bikhchandani & Sharma, 2000).

- Hindsight is the tendency to believe they predicted the outcome of a past event before it occurred; equally, they could, also, believe that they could forecast the future outcome (Fischhoff & Beyth, 1975).
- Illusion of Control is the tendency for people to overestimate their ability to control events; for example, it occurs when someone feels a sense of control over outcomes that they demonstrably do not influence (Thompson, 1999).
- Narrative fallacy refers to the tendency to let a good story cloud the decision-making process (Taleb, 2008).
- Self-attribution is the tendency to attribute success to personal skills and failure to external factors beyond their control (Miller & Ross, 1975).
- Trend chasing is the tendency to chase past good performance on the belief that it will continue (Baker & Ricciardi, 2014).
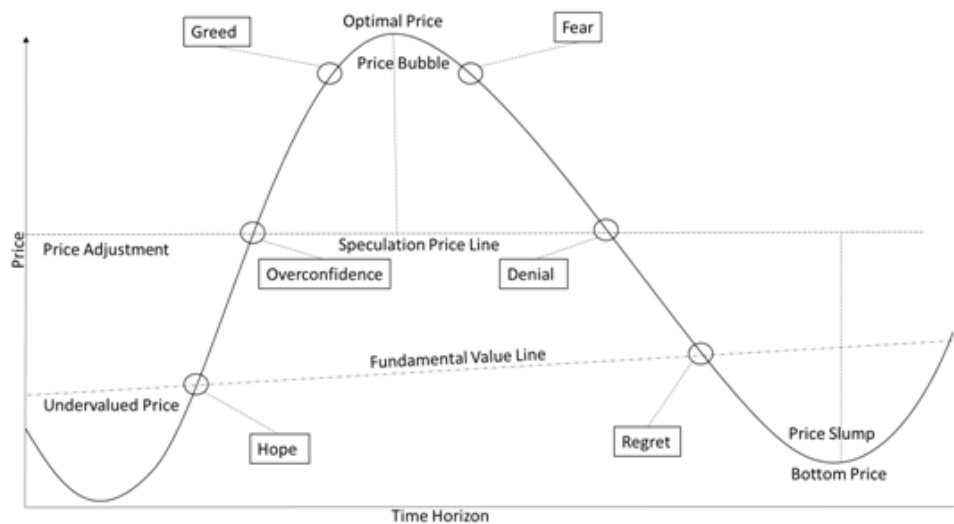
Figure 4. *The Financial Cycle of Emotions*

As argued by (Ackert, Church & Deaves, 2003), behavioural economics has mainly concentrated on cognitive biases. In contrast, emotional biases often refer to the inability of an individual to separate emotions from the decision-making process. As stated by (Ackert, Church & Deaves, 2003), there is an agreement on the states of emotions: anger, hatred, guilt, regret, fear, pride, elation, joy and love. Moreover, as exemplified by (Ackert, Church & Deaves, 2003), emotional biases can significantly affect the decision-making process; furthermore, they can enhance the market participant's ability to make rational decisions. There are many emotional biases; however, the fundamental biases concerning our model are as illustrated by Figure 4.

1. Hope refers to the tendency to feel that the ultimate goal is achievable or the event will transpire to the best.
2. Overconfidence refers to the tendency to overweigh the subjective confidence relative to the objective accuracy of the judgement. In contrast, underconfidence is to underweigh the subjective confidence

relative to the objective accuracy of the decision. Although overconfidence is common, it is not universal (Griffin & Tversky, 1992).

3.   Denial refers to the tendency to repudiation or disavowal of aspects of external realitythe individual does not want to know about to diminish or avoid the painful effects associated with that reality (Auchincloss & Samberg, 2012).

4.   Regret is the tendency to harbour negative feelings as a result of comparing the real-world outcomes or state of events with those of an idealised world or an alternative better option. However, as the old quote says:

"Fear is only Temporary; Regret lasts Forever."

Intriguingly, of all the emotional states, two of the most prominently linked are the opposites scale emotions of fear and greed. As put by Bertrand Russell[3] and Erich Fromm[4] respectively:

"Neither a man nor a crowd nor a nation can be trusted to act humanly or think sanely under the influence of fear."
"Greed is a bottomless pit which exhausts the person in an endless effort to satisfy the need without ever reaching satisfaction."

As explained by (Lopes, 1987) and (Shefrin & Statman, 2000), fear is determined by an overweighing of the worst-case scenario probabilities relative to the best-case scenario; while greed is derived by an overweighing of the best-case scenario probabilities corresponding to the worst-case scenario.

An essential element in any pricing uncertainty model over time is that price changes, in our model, we have theoretically divided the price changes into three areas, as illustrated by Figure 4:

- Undervalued Price
  Below the fundamental value line, the price as determined by all the fundamental information of the asset as dictated by the Efficient Market Hypothesis, see (Fama, 1965) and (Malkiel, 1962).
- Price Adjustment
  The problem is that the price of any asset can deviate from the fundamental value by a significant amount over the short to long run. Essentially, as hinted by (De Bondt, 2000), the overreaction hypothesis states that sometimes market participants tend to disproportionately react to information (fundamentals and news) causing a temporarily and dramatic deviation from the fundamental value. Usually, the price does revert to the fundamental value within a short-medium period as market participants digest the information.

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[3] Russell, B., (1950). *Unpopular Esasays*. NewYork, New York, USA: Simon and Schuster
[4] Fromm, E., (1941). *Escape from Freedom*. NewYork, New York, USA: Farrar & Rinehart

- Price Bubble

  Essentially, as hinted by (Barlevy, 2007), the popular notion is bubbles are initiated by rapid upwards pressures on the price of a particular type of asset or index in a short interval of time, eventually causing downward pressures to correct the price or more dangerously a collapse in the price. In simple terms, as hinted by (Blanchard & Watson, 1982), a popular notion defines a bubble as a significant price deviation from the fundamental value that is unjustified by the information available at the time.

Conversely, an alternative argument is that the type and intensity of uncertainty dictates the actions of humans; in which case, there is a need to identify the uncertainty. Generally, uncertainty is when a person cannot assign a probability to an event or action, making any decision difficult. However, if this is the case, then any event or activity may be regarded as difficult. The difference is in the type and intensity, events such as Covid-19 and Brexit were on a different platform to the uncertainty seen in "normal" market conditions. There are two types of uncertainty which are of interest here:

- Black swan effect, an unpredictable event with significant consequences that in hindsight could have been predictable (Taleb, 2008)
- Knightian uncertainty, a condition where the probabilities of a given situation cannot be determined and thus cannot be assigned to the asset (Knight, 1921).

Further, during an event that invokes extreme uncertainty, the ambiguity on the financial market is likely to lead to the Ellsberg paradox. (Ellsberg, 1961) identified that humans tend to reject unknown in favour of known risks, even though the ambiguous option could lead to more substantial earnings.

There are several assumptions influencing the model. The first assumption, as shown by Figure 1; the time-event conjuncture dictates that the impact of any event on market participants action diminishes with time. As suggested by (Tversky & Kahneman, 1973), the availability heuristic dictates that humans only focus on the relevant information regarding the probabilities of events during the decision making process. Moreover, they often concentrate on the most recent developments; thus meaning that as events become older, they become less relevant to the decision-making process. Furthermore, as hinted by (Smales, 2015), the impact of news on investor sentiments diminishes over time.

Additionally, since volatility is essentially the reaction of market participants to events; thus, another crucial factor is the distinction between volatility over the long and short-run. As advocated by (Pastor & Stambaugh, 2012) and (Engle & Lee, 1999), this means that market participants react significantly more in the short run than the long-run. Therefore, essentially hinting that the time-event conjuncture dictates as time moves forwards, the importance of an event diminishes as the epicentre for the decision making process. A new epicentre arises replacing the existing one.

The second assumption is that all significant crises impact the economic factors as illustrated by Figure 1.There is evidence from several research papers that all major events have an impact on the economy of a country. According to (Feldstein, 2009) and (Taylor, 2009), the global financial crisis had a significanteffect on the economy. Moreover, as stated by (Genschel & Jachtenfuchs, 2018) and (Jones, Kelemen & Meunier, 2016), the eurocrises had a significant impact on the economies of the Eurozone. Additionally, as stated by (Fakhry *et al.,* 2018), the Tohoku earthquake of 2011 had a substantial effect on the Japanese economy. Further, Brexit is likely to have a considerable impact on the UK's economy as suggested by (Levell *et al.,* 2018) and (Hantzsche, Kara & Young, 2018). Lastly, as we will see later, there is mounting evidence that the Covid-19 pandemic is having a significant impact on the economy.

The third assumption is probably the critical factor underpinning the model; according to (Mallard, 2016), many behavioural economics models separate between bounded rationalityas defined by (Simon, 1972) and the psychology of the actors as derived by (Kahneman & Tversky, 1979). We argue while this separation is perfectly reasonable, it does tend to secede between the reasoning of psychology and the elegant mathematical backing of bounded rationality.We argue that we need both treatments to understand the behaviour of actors in the global financial market.

A vital factor is the concept of the fundamental price influencing the efficient market hypothesis. Since it is the actions of market participants that move the price; hence, the fundamental price is really the point of stability between the over and under reactions to the event or information. Conversely, the fourth assumption is themodel dictatesthat the overall market price is the balanced reaction of the market participants. As hinted in Figure 1, at the primary level, the market price is determined by the reactions of the market participants. Hence, the price is the scale of the over and under reactions to any event or information. Thus, depending on the scale, the price could be stable meaning that it is at the fundamental value or could lead to an overall overvaluation/undervaluation in the price.The overreaction/underreaction scalein Figure 1 is the s*table market hypothesis* which dictates that the reactions of the actors in the market determine the price of all assets.

An essential factor in Figure 1 is the position of the stable market hypothesis (SMH), which dictates that the SMH is determining by the emotional and cognitive elements of the decision-making process. The fact that it is at the mouth of the bottom tier of our model is suggestive that many internal and external factors influence the SMH. Theoretically, market participants are influenced by the generalised context of the market at any given time; this has been proven by numerous events and actions of external and internal actors over time. The latest is Covid-19 and the following activities of the government and public; which impacted on the behaviour of market participants as hinted by (Albulescu, 2020), (Baker *et al.,* 2020a), (Corbet, Larkin & Lucey, 2020), (Ramelli & Wagner, 2020) and

(Zhang, Hu & Ji, 2020). The SMH is derived from a simple top-level equation as illustrated by Figure 1, which simply put is Equation 1.

$$RS_T = SS_{O,T} - SS_{U,T} \rightarrow 0 \qquad (1)$$

Condition 1: $\qquad\qquad RS_T \gg 0$, an overreaction

Condition 2: $\qquad\qquad RS_T \ll 0$, an underreaction

Equation 1 simply states that the reaction of market participants in any given time is the deviation between the overreaction and underreaction to a given event or information depending on the emotional and cognitive behaviour. Thus, suggesting that as this deviation approaches zero, the price approaches the fundamental value at which the market is regarded as stable. However, if the market deviation is significantly negative or positive,meaning the market price is diverging from the fundamental value. Hence,the market is considered to be either underreactive or overreactive, respectively.

3. A review of Covid-19

In a BBC 2 Horizon Special on the Covid-19 shown on Tuesday, 19 May 2020 at 21:00; Dr Chris van Tulleken pointed to several studies done as late as 2018 about the potential impact of a new coronavirus pandemic. These studies, such as (Afelt, Frutos & Devaux, 2018) and (Bailey *et al.*, 2018), were warning of a new coronavirus pandemic with an epicentre of Eastern Asia. As stated by (Afelt, Frutos & Devaux, 2018, p.1) "*The risk of emergence of a novel bat-CoV disease can therefore be envisioned*". Furthermore, (Bailey *et al.*, 2018, p.1), states "*During the last two decades, scientists have grown increasingly aware that viruses are emerging from the human–animal interface*".Moreover, as illustrated by Figure 5, the predicted location of the new coronavirus was central China based on historical cases. (Bailey *et al.*, 2018) warn that the complicated nature of these viruses requires coordination between all stakeholders. According to (Afelt, Frutos & Devaux, 2018), the increasing viral risk is not the result of a significant change in the biological problem; instead, a change in the environmental factors. Of which, the paramount consideration is deforestation in Asia, with an approximate 30% loss in forest area, according to (Afelt, Frutos & Devaux, 2018, p.2). Thus highlighting the issue, coronaviruses have a significantly increasing chance of spreading to humans in areas of reducing forests.
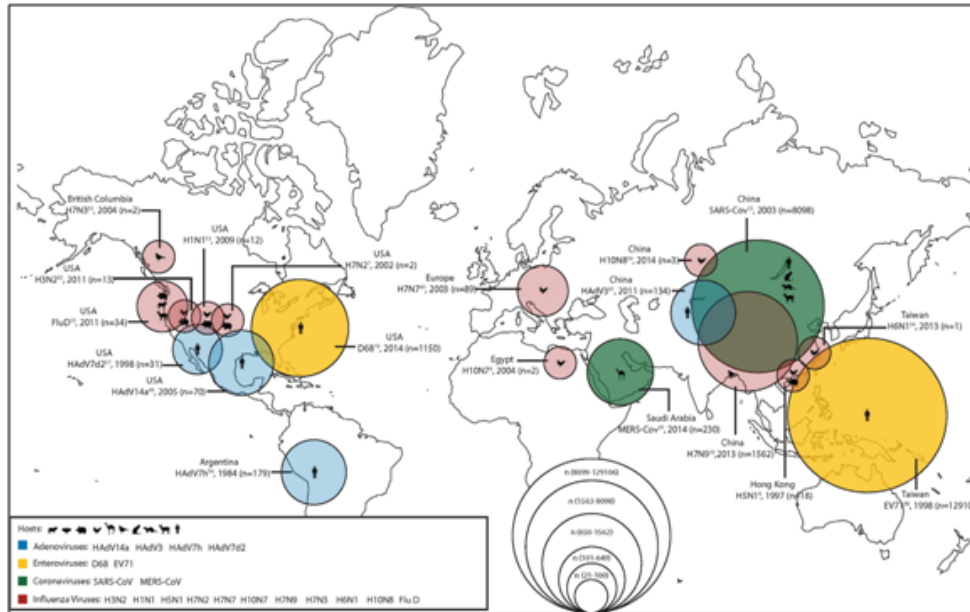
Figure 5. *The Geographical of the Viruses (Bailey et al., 2018, p.2)*

According to (Afelt, Frutos & Devaux, 2018), a large proportion of the variants of coronaviruses start life in bats. However, with the possible exception of the Australian Bat Lyssavirus and Duvanhage virus; there is no clear, direct virus link between bats and humans. Thus, as stated by (Afelt, Frutos & Devaux, 2018), there is a high probability that the connection is via another animal. The increased deforestation activity is impacting on the landscape of the bats, which increases the chance of viruses jumping from bats to other species. Moreover, as hinted by (Afelt, Frutos & Devaux, 2018), since deforestation brings animals and humans into connection; this increases the chance of species to human transmission of the coronavirus.

As stated by (Bailey *et al.,* 2018), coronaviruses are single-stranded ribonucleic acid viruses with large genome in which mutation are prevalent. According to (Bailey *et al.,* 2018), there are six main variants of coronavirus, split into two effects: mild upper respiratory tract infections and severe acute respiratory syndrome (aka SARS). The Covid-19 is a member of the second group, SARS. According to (Bailey *et al.,* 2018), the SARS variant emerged from the Guangdong Province, China, in 2003. However, according to the WHO, the total number of cases worldwide was 8,098 with 774 deaths. According to (Bailey *et al.,* 2018) and as indicated earlier, the SARS originally came from bats; however, the transmissions to humans was from other animals. Conversely, although there has been research to find a vaccine and, according to (Bailey *et al.,* 2018), initial optimism pointed to a vaccine being ready for human clinical trials by 2017; yet there has been limited progress.
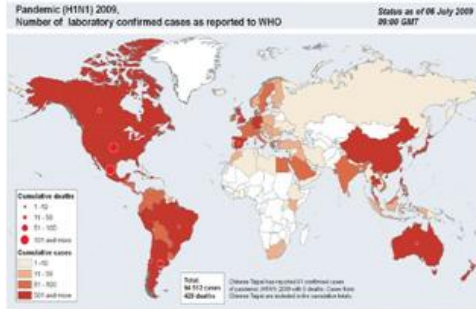
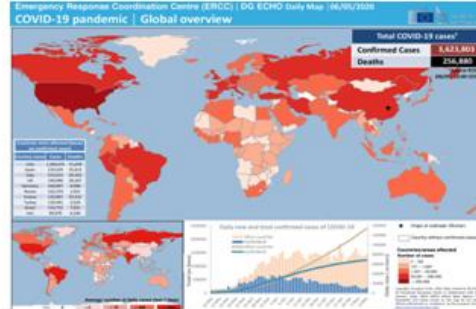**Figure 6.** *The Swine Flu (2009) Pandemic Global Map*

Figure 7. *The Covid-19 Pandemic Global Map*

The Covid-19 is the first pandemic to be genuinely global in over 100years. The keyword being global, of course, there have been pandemics viruses before in the 21st century but none on this global scale. As illustrated by Figure 6 and Figure 7, the Swine flu pandemic was globally insignificant in comparison to the current Covid-19. Furthermore, the Swine Flu pandemic of 2009 had an R0 between 1.4 and 1.6; the current Covid-19 pandemic has an R0 of 2.0 to 2.5, according to (Coburn, Wagner & Blower, 2009) and (Kucharski *et al.*, 2020) respectively.
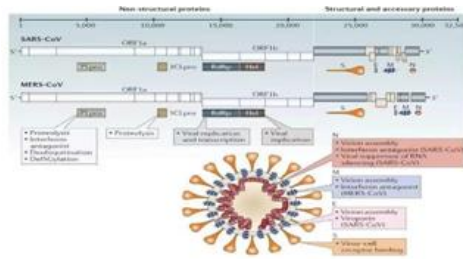
Figure 8. *The Basic Structure of the Coronavirus (Zumla et al., 2016, p.330)*
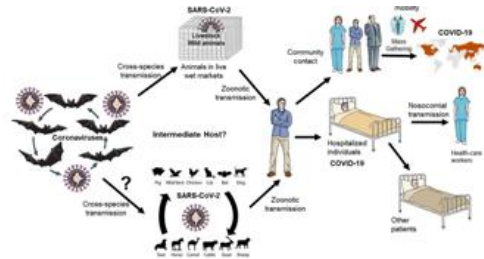

Figure 9. *Nature of Covid-19 (El Zowalaty and Järhult, 2020, p.4)*

The Covid-19 is a variant of the SARS-CoV meaning its basic structures is as illustrated by Figure 8. As Figure 9 shows, Covid-19 is a high infectious zoonotic virus variant; thus, it is an animal to human transmittable virus. As described by (Zumla *et al.*, 2016), the basic structure contains four main parts or proteins: spike glycoprotein (S), envelope protein (E), membrane protein (M) and nucleocapsid protein (N). According to (Zumla *et al.*, 2016), the virus enters the body thru the respiratory system and into the lungs; once in the lungs, it takes over the cells. This invasion develops issues with the respiratory system workings, hence leading to the symptoms illustrated by Figure 10 and described by (Rothan & Byrareddy, 2020) and (Sohrabi *et al.*, 2020) including dry cough, fever and diarrhoea.
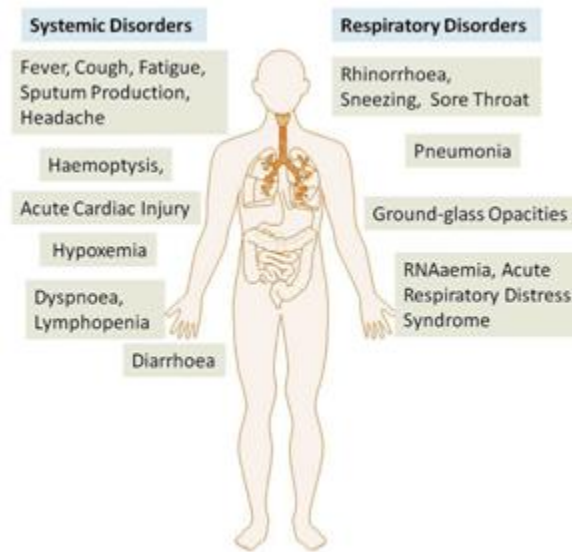
Figure 10. *The Symptoms of Covid-19 (Rothan & Byrareddy, 2020, p.2)*

The danger is that Coronaviruses are highly reiterated viruses, hence the likelihood of a second wave during the Autumn/Winter of 2020/2021 is high. As Dr Ranieri Guerra, WHO assistant director-general for strategic initiatives argues on 26 June 2020: "*The comparison is with the Spanish Flu, which behaved exactly like Covid: it went down in the summer and fiercely resumed in September and October, creating 50 million deaths during the second wave.*" Therefore, the real impact of Covid-19 will not be known until we developed an effective vaccine to stop the spread of the virus.

A Review of the UK's Covid-19 Response

As argued by (Hale *et al.,* 2020), the governments responses have varied substantially in the adoption and pace. However, the UK's Covid-19 response was to all observers is a "reactive" retort as identified by several studies such as (Cowper, 2020), (Hunter, 2020) and (Watkins, 2020). Moreover, as stated by (Cowper, 2020), many criticised the UK's government for being slow to respond to the Covid-19 pandemic. Additionally, according to (Cowper, 2020), the official Covid-19 response was mix in the early stages of the pandemic. Furthermore, as hinted by (Cowper, 2020), the lack of communication from the UK's government during the early stages was glaring, partially due to a mistrust towards the media since the 2019 general election. However, one key element during the Covid-19 pandemic was the change in the general public perspective towards "experts", as hinted by (Cowper, 2020). Conversely, as illustrated by Figure 11 and Figure 12, the UK had the highest total of Covid-19 cases and deaths amongst Europe. So, what happened?

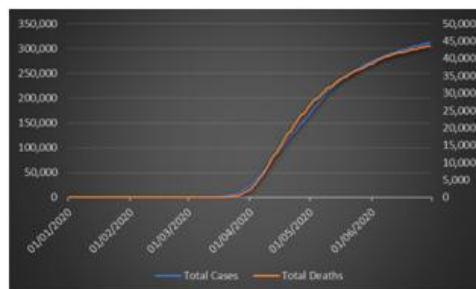**Figure 11.** *European Map Chart of Total Covid-19 Cases*
Source: European Centre for Disease Prevention and Control, Dated: 30/06/2020

Figure 12. *European Map Chart of Total Covid-19 Deaths*
Source: European Centre for Disease Prevention and Control, Dated: 30/06/2020

According to (Hale *et al.*, 2020), the UK's government was the third slowest to respond, among the observed European countries. Damningly, according to the statistics on government response stringency index by the Blavatnik School of Government, University of Oxford; the UK was the slowest to implement stringent policies. Furthermore, that response came after the number of confirmed cases has reached 6,550 with 889 deaths on 23 March 2020, which means that the UK's government reacted stringently 17 days after the first death as illustrated by Figure 13 and Figure 14.

Figure 13. *UK Total Covid-19 Cases and Deaths*, **Source:** European Centre for Disease Prevention and Control, Dated: 30/06/2020

Figure 14. *UK Covid-19 Government Stringency Index and calculated 7-day R-number*,
Sources: Oxford COVID-19 Government Response Tracker (Blavatink School of Government) and European Centre for Disease Prevention and Control, Dated: 30/06/2020

As hinted by (Hunter, 2020), the UK's response in the early stages of the Covid-19 pandemic was a little too late. Moreover, as identified by (Hunter, 2020), in the steps of the government response, there was no appetite for banning mass gathering. Many sporting events continued unhindered; it was left to the football authorities to postpone the matches until further notice. As stated by (Hunter, 2020), otherwise it was business as usual, despite the warnings from the medical profession as far back as the initial publication of data from China in January. The inaction was utterly out of step with almost every other European country; thus, according to (Hunter, 2020, p.1), the British government policy amounted to a "Keep Calm and Carry On" approach. This approach was believed to have come from the

advice of a group of behaviourist scientists. However, as noted by (Hunter, 2020), it is thought that none of the government officials bothered asking does this advice account for a highly infectious virus.

As stated by (Mahase, 2020), the UK's government changed tactics when a study by Imperial College London[5] showed that Intensive Care Unit requirements were approximately twice as initially thought under current government containment policies. The containment policy would have put enormous constraints on the ability of the NHS to operate and resulted in about 260,000 deaths. The study compared the government's containment policy with a second policy involving social distancing of the entire population and tougher home isolation; the crucial factor is even under the second policy, the impact would still be far worst than expected, the study found. So in a reversal of policy, the government began a policy of social distancing and closed schools and universities by mid-March.

According to (Iacobucci, 2020) and (Thornton, 2020), the UK's government implemented a complete lockdown policy on 23 March 2020. As noted by (Iacobucci, 2020), most doctors and scientists supported the lockdown policy as a crucial step to saving lives. In announcing the procedure, the prime monster said the population must stay at home unless they work to an essential service, shop for essentials, exercise twice a day and access medical care. Also announcing that the closure of non-essential shops; following on from the announcement that gyms, restaurants and bars are to close for the foreseeable future in the previous week As alluded by (Thornton, 2020), the impact on the NHS of the lockdown was positive.

The issue at the heart of the dilemma facing the UK's government is that the first option, herd immunity, would cost lives and the second option, lockdown, would be costly for the economy as suggested by (Sibony, 2020). We will go into the economic facts in the next sub-section; however, according to (Sibony, 2020), the financial cost would be roughly a three base point reduction in the GDP per month. However, this would pale into insignificant on a moral stand against the impact on the NHS and death rate, as reported earlier by the Imperial College London study. As hinted by (Sibony, 2020), in the absence of a medical treatment, any government has only one option to slow down the Covid-19 progression, which is changing the everyday behaviour of the population. Yet changing the daily routine is a tall order, especially in a fully-fledged democracy where freedom of movement is a fundamental right, such as the UK. Yet according to an opinion poll by Opinium for The Observer on 3 May 2020, 4 in 5 thought the lockdown should continue. Furthermore, according to polls conducted by Deltapoll and Ipsos MORI in late April, 66 per cent of the general public believed that the lockdown policy should have been earlier.

Continuing, according to (Cowper, 2020), the support among the general public for the government's response during the Covid-19 was not favourable. As indicated by an opinion poll in the third week of February

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[5] the MRC Centre for Global Infectious Disease Analysis

showed a drop from 63% to 50% approval for the government Covid-19 policies. Moreover, a poll by Opinium in the Observer indicates that the general public believes only the US has done worse than the UK during the Covid-19 pandemic.

Of course, according to (Brodeur *et al., 2020*), there are other costs to consider other than the economic: governmental trust, educational disruption and population well-being. (Brodeur *et al., 2020*) analysed the welfare of nine western European countries and US states using data from Google Trend pre and ex lockdown, they also used the same analysis over the same period in 2019 to account for seasonal changes. They found people's mental health may have been severely affected by the lockdown. The result shows a substantial increase in searches with the words boredom and worry, which does not decrease with time. However, according to (Brodeur *et al., 2020*), the effect on the well-being depends on the timing of the lockdown. The countries, including the UK, which entered lockdown at a later date experienced a positive impact on the well being. However, the countries which entered lockdown early experienced a negative effect on the well being. Therefore, negativity seems to increase with time.

4. A Review of the economic factors influencing the UK's financial market during the Covid-19 pandemic

Firstly, we need to review the impact of Covid-19 on the UK's economy. Since, as stated by (Chen, Roll & Ross, 1986) and (Birz & Lott, 2011), financial markets are influenced by economic factors and news. Moreover, as hinted by (Baker *et al., 2020a*) and (Anoushiravani *et al., 2020*), the Covid-19 pandemic is highly likely to have an impact on the economy. Hence, we need to understand this effect to appreciate the implications of Covid-19 on the financial market fully.

Before we review the impact of Covid-19, we need to address the elephant in the room: the potential impact of Brexit on the UK's economy. In the past few years, the big question has been what are the consequences of Brexit on the UK's economy. Moreover, the impact depends on whether there is a trade deal or not. According to (Hantzsche, Kara & Young, 2018), the proposed agreement of Mrs May's government would have cost the UK 3.0 per cent in GDP/head by 2030 relative to the UK staying in the EU. The deal proposed by the EU, which included the backstop would have cost the UK 1.9 per cent in GDP/head by 2030 against staying. However, (Levell *et al., 2018*) differ slightly with GDP/head loss of 1.7% in the long run against staying for Mrs May's deal. According to (Bevington *et al., 2019*), Mr Johnson's government deal would mean the UK would be 0.8 per cent worse off in terms of GDP/head than Mrs May's deal. The fallout from the Covid-19 pandemic comes against this economic backdrop, which partly explains the somewhat mixed and delayed reaction of the UK's government to the pandemic.
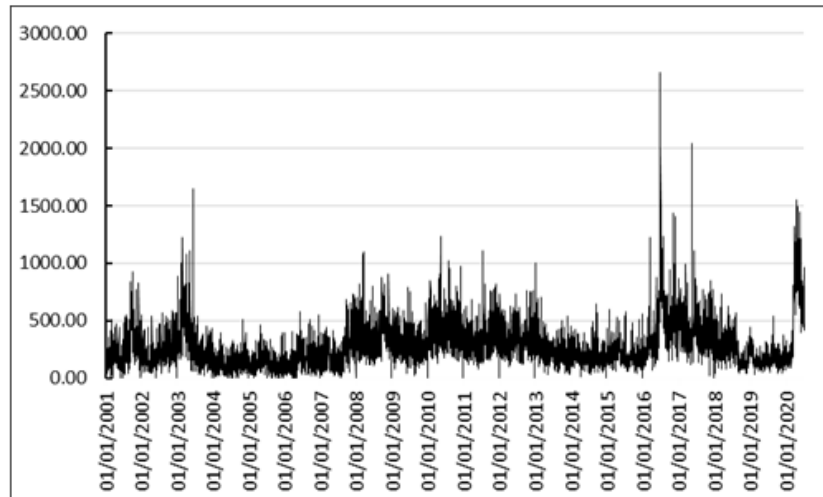
Figure 15. *Daily Economic Policy Uncertainty in the UK*[6]

So how did a health issue morph into an economic crisis? According to (Ozili & Arun, 2020), the answer lies in two pivotal factors thru-which coronavirus stifle economic activity. Firstly, to prevent the virus from spreading, a lockdown policy had to be enforced. Secondly, the exponential rate of infection heightened uncertainty. As illustrated by Figure 15, the levels of economic policy uncertainty during the Covid-19 pandemic reached over 1,500; a scale only witnessed on three previous occasions during the Brexit and war on terror episodes. This level of uncertainty displays the real impact of the Covid-19 pandemic on the UK's economic policy. As implied by (Baker *et al.*, 2020b), during the Covid-19 pandemic, more than half of the loss in GDP is likely to be due to Covid-induced uncertainty. Moreover, as stated by (Fernandes, 2020), the danger is in comparing the Covid-19-induced recession to other recessions in the post-war era; the economic downturn is in essence a double shock to demand and supply. Additionally, according to (Fernandes, 2020), Covid-19 could potentially be the most significant impact on the global economy.

Furthermore, as argued by (Ozili & Arun, 2020), the drivers of the negative effect of Covid-19 on the global economy are fear and uncertainty. Conversely, according to (Wren-Lewis, 2020), the most significant impact on GDP is likely to come due to fear forcing many people to reduce social consumption. Therefore, hinting at the lockdown policies being a substantial hit on the economy. Furthermore, as implied by (Wren-Lewis, 2020), the worry is that fear does not deviate easily.

[6] Obtained from [Retrieved from]. on 31st May 2020
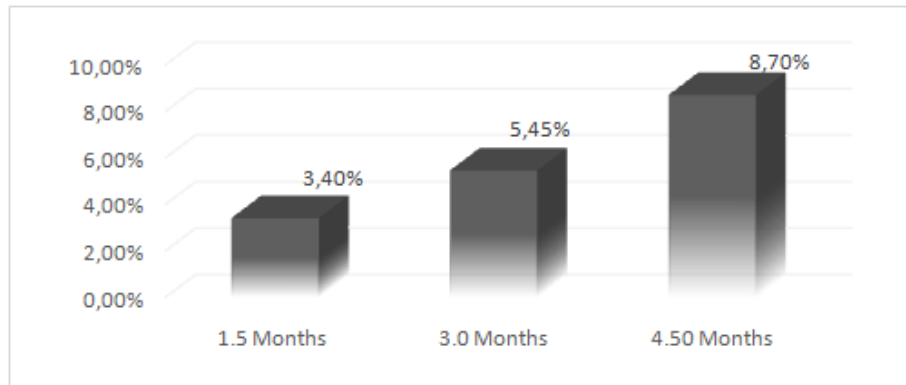
Figure 16. *Impact of lockdown policy during Covid-19*
Source: (Fernandes, 2020)

According to (Fernandes, 2020), a global recession is almost inevitable; the IMF and OECD forecast a 0.1 and 2.9 per cent loss in GDP, respectively. Yet, as suggested by (Fernandes, 2020), both these forecasts underestimate the impact. (Fernandes, 2020) alludes for varying effects depending on the government policies. For the UK, the consequences is a step ladder varying with the length of the lockdown as illustrated by Figure 16. However, according to (McKibbin & Fernando, 2020), the factors influencing the impact are the severity of the Covid-19 (low, medium or high) and nature of the shock (temporary or permanent). Given that the Covid-19 is now a pandemic, we will only review scenarios 4 to 7 of (McKibbin & Fernando, 2020)[7]. Conversely, the cost to the UK's GDP by Covid-19 as estimated by (McKibbin and& Fernando, 2020) ranges from 1.2 to 6.0 per cent. As illustrated by Figure 17, the UK's GDP could be affected by 6.0 per cent in a highly severe infection rate. Conversely, as of writing the paper, the UK had the worst infection rate.
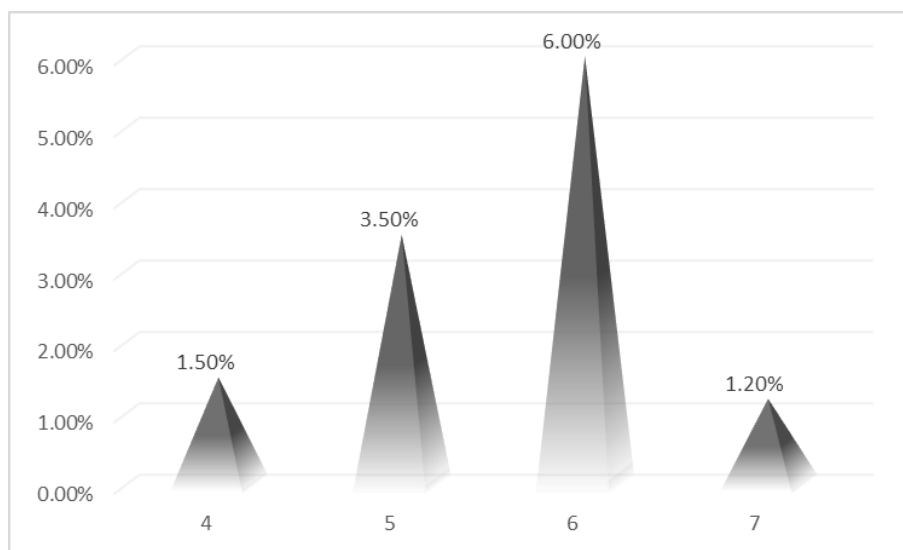
Figure 17. *Covid-19 severity levels impact on GDP*
Source: (McKibbin & Fernando, 2020)

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[7] Scenarios: 4 (Low, Temporary), 5 (Medium, Temporary), 6 (High, Temporary) and 7 (Low, Permanent)

In a weekly report by Price Waterhouse Cooper[8] on 27 May 2020, the impact on GDP was forecast to be -7.1 to –13 per cent. Towards the end of 2021, GDP will only be 93.0 - 98.5 per cent of the pre-Covid-19 trend. Furthermore, the budget deficit in 2020/2021 is forecasted to be around 15 – 22 per cent of GDP falling to 5 - 10 per cent of GDP during the fiscal year 2021/2022. According to the report, the macroeconomics data paints an economic picture previously seen during the global financial crisis of 2007/2009. Additionally, a report by the Office for National Statistics in the UK on the impact of Covid-19 on the economy[9] backs this trend pointing to a 5.8% fall in GDP during March 2020, the most significant monthly fall.
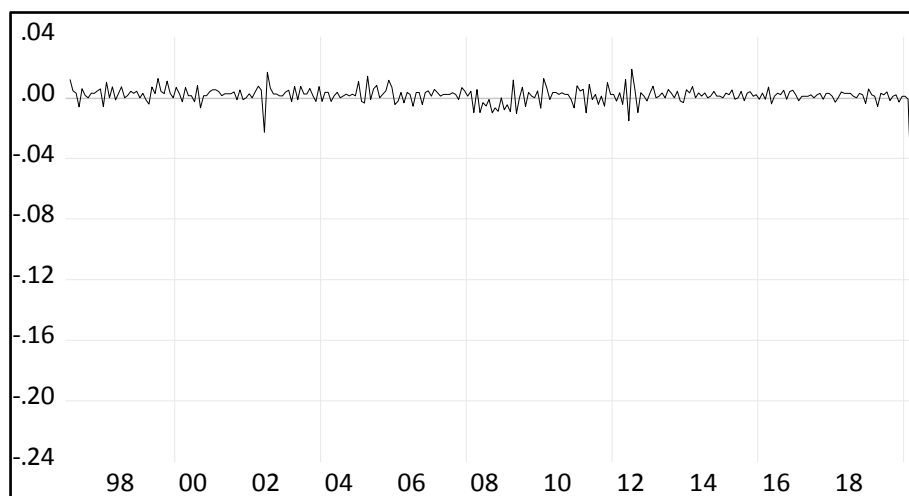

Figure 18. *UK Monthly GDP Index Change (02/1997-04/2020)*

On 12 June 2020, the Office for National Statistics in the UK reported the monthly GDP index to be at 78.9 for April 2020, a fall of 20.38% on the previous month. Moreover, March 2020 saw a fall of 5.89%; as illustrated by Figure 18, even the March fall was worse than any on record. These GDP statistics point to the impact being much worse than the worst-case scenario predicted by many economic organisations and economists. Furthermore, the macroeconomics data seem to be hinting at a worst impact on the UK's economy than the global financial crisis which shrank the economy by 5.92% during the period between May 2008 and March 2009. It says a lot when you consider that in just two months during the pandemic the economy has shrunk by 25.07%. A look at Table 1 illustrates the wide-ranging effect of Covid-19 on the UK's economy. Apart from the agricultural sector, the negative impact is into double-figure.

[8]COVID-19 UK Economic Update, Source: [Retrieved from].
[9]Coronavirus and the impact on output in the UK economy: March 2020. Source [Retrieved from].

Table 1. *Monthly Change in GDP Components Growth*

Components	February 2020	March 2020	April 2020
Index of Services	0.0%	-6.2%	-19.0%
Index of Production	-0.1%	-4.2%	-20.3%
Manufacturing	0.3%	-4.6%	-24.3%
Construction	-2.1%	-5.9%	-40.1%
Agriculture	-0.1%	-0.2%	-5.5%

4.1. A Review of the UK Economic Policy Response during Covid-19

The impact of fiscal and monetary policies on the financial markets has been studied by many in recent years due to the global financial crises with varying results. As (Mishkin, 2009) hints, many have argued that conventional monetary policy does not work duringsignificant economic crises. However, the keyword here is conventional; according to (Blinder, 2010), a mixture of unconventional monetary policies do work in providing liquidity and thus reducing risks. During the Covid-19 pandemic, the Bank of England went with a combination of conventional and unconventional monetary policies. The Bank of England in the role of regulator "advised" banks to forgo their dividends and bonuses policies during the Covid-19 pandemic. As reported by the Bank of England, there were several monetary policy responses to the Covid-19 economic impact:

- A reduction of the Bank Rate from 0.75% to 0.25%
- Maintaining the £435 billion quantitative easing policy
- Introducing a new funding scheme for small and medium-size firms thru commercial bank
- Cancellation of 2020 annual stress testing regulation to assist major market participants
- Postponing or adapting of several supervisory programs to enable financial institutions to focus on the implications of the Covid-19 pandemic

As highlighted by (Fakhry, 2018), at the heart of the argument on fiscal stimulus policies that have been raging for ages are two related issues: cost and impact. A key factor highlighted by the recent financial crisis is that the fiscalstimulus policies are costly. As (Tobin, 1971, p.91) states:

> "How is it possible that society can merely by the device of incurring debt to itself can deceive itself into believing that it is wealthier? Do not the additional taxes which are necessary to carry the interest charges reduce the value of other components of private wealth?"

Hence, a key argument is in the long run; the burden of debt is likely to be exceedingly high. However, as (Keynes, 1923, p.80) argues:

> "But this long run is a misleading guide to current affairs. In the long run we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us that when the storm is long past the ocean is flat again."

Keynes was hinting that the benefits of the short-run impact of a stimulus policy far outweigh the costs in the long run, if the economy is in such a dire state. In a pandemic where the infectious rate is high, and no

medical cure is available; the government had no options but to enact the health policies described earlier at a massive cost to the economy. According to the Centre for Regulatory Strategy at Deloitte[10], the response of Her Majesty's Treasury consisted of the following fiscal policies:

- Covid-19 Business Interruption Loan Scheme for small to large businesses
- Statutory sick pay (SSP) for SMEs (allow SMEs to reclaim SSP for Covid-19 affected employees)
- Covid-19 extension and enhancement for Time to Pay arrangements (allows UK businesses time and flexibility on taxes due)
- Support for businesses that pay little to no business rates
- Covid Corporate Financing Facility
- Grants for retail, hospitality and leisure businesses
- Covid-19 Job Retention Scheme (pays up to 80% to a maximum of £2,500 of employee salary furloughed due to Covid-19 policies)
- Rate reliefs for all property occupiers in the retail, leisure and hospitality business sector
- Deferral of income tax and VAT payments
- Self-employed income support
- Bounce back loan scheme

These government fiscal stimulus policies in conjunction with lower fiscal revenues will mean a significant impact on the deficit and inevitably debt of the UK's government. The elephant in the room is the upcoming economic impact of Brexit in the next few years.

4.2. A Review of the Covid-19 Impact on Consumers

As advocated by (Leland, 1968) and (Sandmo, 1970) amongstmany others, the precautionary savings theory dictates that as uncertainty regarding income increases; the household reacts by increasing savings and decreasing consumption. However, there is an argument put forward by (Malley & Moutos, 1996), that precautionary saving is also dictated by unemployment, meaning any rise in the unemployment rate leads to an increase in savings. Moreover, a key factor to consider is the possible impact of a decrease in personal net wealth due to a loss in the value of investments or property. This decrease in personal wealth has the effect of raising loss aversion and hence further increasing precautionary savings.

As (Spilimbergo et al., 2011) and (Aizenman & Noy, 2015) indicate, there was evidence of precautionary savings during the recent global financial crises. Further, as highlighted by (Li, 2020) and (Abay, Tafere & Woldemichael, 2020), the impact of the Covid-19 pandemic on the economy is partly due to the lockdown policies but also precautionary savings on the household side. Conversely, according to a weekly report by PriceWaterhouseCooper on the impact of Covid-19 on the UK's economy[11], there are three factors impacting consumers:

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[10]Source: [Retrieved from].
[11] [Retrieved from]. on 4th June 2020

- Lockdown policy
- Increase in unemployment
- Increase in precautionary savings
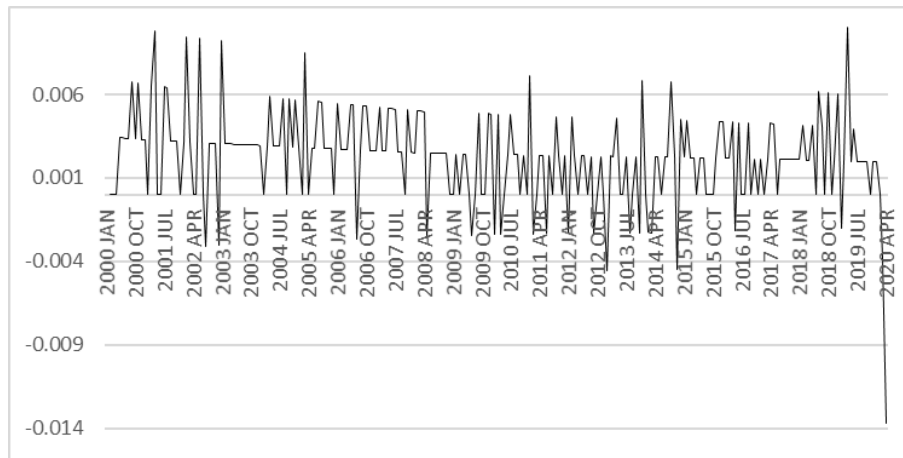
Figure 19. *UK Average Weekly Regular Earnings - Seasonally Adjusted*
Source: ONS.

According to (Keynes, 1936), consumption increases with disposable income, thus meaning that consumption also decreases with disposable income. However, as argued by (Friedman, 1957), consumption does not merely depend on current disposable income, consumers also account for expected future revenue. Additionally, as highlighted by (Friedman, 1957), consumption is not only determined by the current disposable income but also by other assets, such as: physical (property), financial (equity and bonds) and human (education and experience). Thus meaning, as (Arellano, Blundell & Bonhomme, 2017) and (Jappelli & Pistaferri, 2010), hints any income shock would impact consumption. Hence, as (Leland, 1968) and (Sandmo, 1970) argue, the precautionary saving theory dictates that during highly uncertain times where future income or wealth could be negatively affected, or unemployment is a rising factor; consumers tend to save more. Therefore, reducing their expenditure. As illustrated by Figure 19 and the next section, Covid-19 had a double negative impact of heightened income uncertainty and reduced financial assets values which affected the consumers' wealth
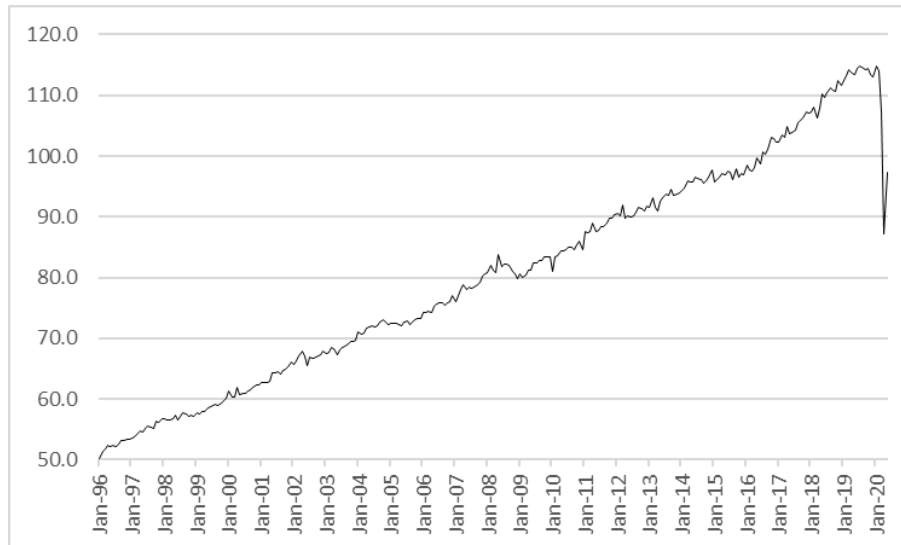
Figure 20. *UK Retail Sales Volume - Seasonally Adjusted*
Source: ONS.

The reduction in consumption due to the Covid-19 pandemic meant a decrease in retail sales. According to the ONS, retail sales fell from an index of 114.00 in February 2020 to 87.1 in April 2020, a reduction of 23.6%. Additionally, as illustrated by Figure 20, this reduction far greater and intense than any other since record began. The double impact of precautionary savings and the lockdown policy during the Covid-19 pandemic affected the retailers. And although there was an improvement in May 2020 as the effect began to ease, yet many businesses may go into administration over the next fewmonths; which may feedback into the precautionary savings theory. This feedback effect could trigger a downwards spiralwith the added impact of Brexit during the next few months.

Even without a second wave of the Covid-19, the global economic status is dire. The problem is that many organisations have suffered a massive impact on their financial situation during the lockdown. Therefore, many may not be able to operate as before the Covid-18 pandemic. Moreover, many organisations may file for bankruptcy. This situation would have the effect of increasing unemployment; consequently, increasing the consumer income and wealth uncertainty and hiking the precautionary saving leading to a reduction in consumption. Therefore, leading to a vicious downwards economic spiral without accounting for the Brexit impact.

5. A review of the Covid-19 impact on the equity market

According to (Ramelli & Wagner, 2020), infectious diseases were ranked the tenth worst impact in the Global Risk Report by the World Economic Forum published on 15 January 2020 and were considered quite unlikely. Most investors were concerned with the traditional risk factors plus the environment. Yet, just a few months later, Covid-19 was characterised as a

global pandemic and hence realisation of the severe worldwide economic consequences. Thus, highlighting the unexpected impact of the Covid-19 pandemic on the global financial markets. As highlighted by (Ramelli & Wagner, 2020), under a global pandemic with a high infectious rate; both policy responses and individual behaviours were unknown factors. Additionally, as hinted by (Ramelli & Wagner, 2020), the question is whether the combination of ongoing policy intervention and changing individual behaviour will stabilise the financial market or make it increasingly volatile. At the heart of this issue is the fact that market participants will be wary of any evidence of a resurgence in the Covid-19 pandemic.

Conversely, as argued by (Yarovaya, Matkovskyy & Jalan, 2020), the nature of the Covid-19 crisis is debatable. From a purely pandemic view, Covid-19 could be regarded as a black swan event; there has been no health event that had the same global impact on the economy and financial markets. Moreover, (Baker *et al.,* 2020a) found that previous infectious disease outbreaks, even the Spanish Flu pandemic of 1918-1920, which killed an estimated 2% of the global population, had little impact on market volatility. However, the 1957 influenza pandemic, which killed between 1 and 2 million globally, did affect the US equity market with the Dow Jones registering a fall of 15% during the second half of 1957. Although, some of the impact of the 1957 influenza pandemic on the equity market may be attributed to other events. In sharp contrast to the effect of Covid-19 on the equity market; according to (Baker *et al.,* 2020a), the US equity market registered 22 Covid-19 related hikes in volatility between 24 February 2020 and 24 March 2020. Nevertheless, as argued by (Yarovaya, Matkovskyy & Jalan, 2020), from a crisis view, there have been many events which had triggered similar global effects on the economy and financial markets (e.g. 1929 Wall Street crash and 2008 financial crisis). However, as stated by (Baker *et al.,* 2020a), the Covid-19 surge in volatility is the third-highest on observation, higher than the great depression of the early 1930s and global financial crisis of the late 2000s. As hinted by (Baker *et al.,* 2020a), there are three main contributory factors:

- Severity and infectious of the Covid-19 pandemic
- News and information regarding Covid-19 pandemic is much more abundant and regular in comparison with the Spanish Flu pandemic
- The global economy is more interconnected than under previous global pandemics

According to (Ali, Alam & Rizvi, 2020). the changing impact on the global financial market is highlighted by the transformation from an epidemic to a pandemic. The spread of Covid-19 from China to the US via Europe meant an increasingly volatile global financial market. As hinted by (Ali, Alam & Rizvi, 2020), unlike China, the global markets were increasingly conscious of the spread of Covid-19, and it's impact on the worldwide economy. Moreover, according to (Ashraf, 2020), the highly volatile global financial market owe just as much to international governments responses, both healthwise and economical, as to the Covid-

19 announcements. However, the effect of Covid-19 announcements deviate with the type, the market perception to the number of deaths recorded is not as significant as the number of new cases. Moreover, this perception tends to vary with time andeconomic projection.

Additionally, as illustrated by (Zhang, Hu & Ji, 2020), Covid-19 had a strong influenced on equity markets. As suggested by (Zhang, Hu & Ji, 2020), long-term expectations cannot explain such a strong impact; it is almost sure that emotional factors played a critical role during the Covid-19 effect on the financial markets. The initial sentimental response by market participants to the global Covid-19 outbreak would generate an amplification effect thru social and news media which would cause extreme downwards pressures on the pricing of financial assets. The announcement on 11 March 2020 by the WHO, officially declaring Covid-19 as a pandemic had a significant impact on market participants behaviours and hence the global financial market.Furthermore, as stated by (Albulescu, 2020) and (Liu *et al.*, 2020), the relationship between the emotion of fear and the Covid-19 statistic announcements was the driving force in the global financial market. There is a positive correlation between the death ratio and the VIX. Additionally, an increase in the number of affected countries leads to a rise in financial volatility. Thus, hinting at fear being linked with the impact of the pandemic on an international level.
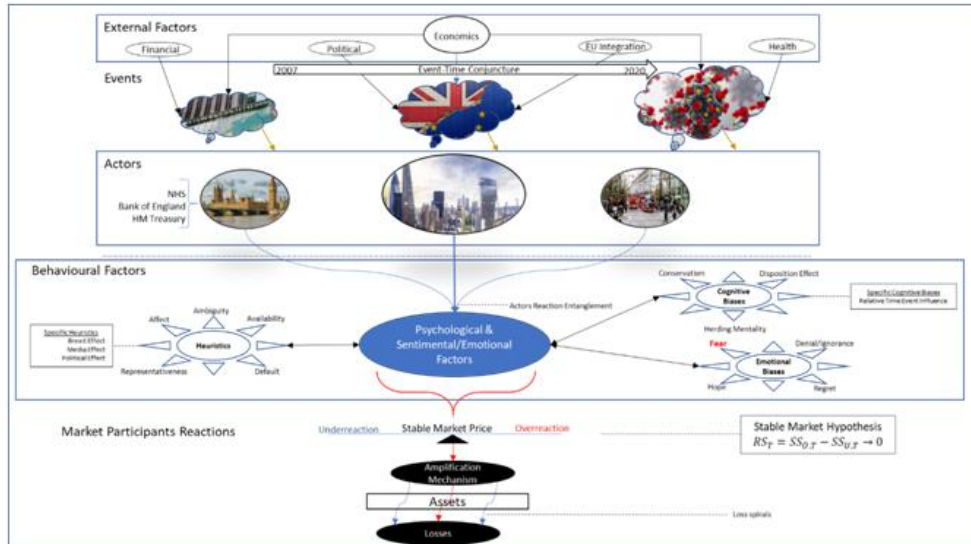

Figure 21. *The Covid-19 Uncertainty Behavioural Factor Model*

The general uncertainty behavioural factor modelcould be extended to demonstrate the Covid-19 pandemic effect on the UK's financial market, as illustrated by Figure 21 The impact of the actors and external factors have been discussed in the previous sections; hence in this section, we will concentrate on the behavioural factors influencing the market participants' reactions during the Covid-19 pandemic. Thus, as illustrated by Figure 21, the model dictates that the final two layers describe the behavioural factors and reactions of the market participants. As illuminated by Figure 21 in

explaining the behavioural factors, we need to understand the heuristics and biases influencing the emotional and cognitive aspects of the decision-making process during the Covid-19 pandemic. Conversely, the influencing factor in the Covid-19 pandemic is the rarity of such an event, as (Yarovaya, Matkovskyy & Jalan, 2020) and (Baker *et al.*, 2020a) highlight, which makes rational decisions increasingly tricky. Hence, the need for heuristics to make investment decision.

A critical factor during the Covid-19 pandemic is the market participants perspective on losses and their reactions. Part of the explanation relies on the prospect theory of (Tversky & Kahneman, 1992). It is worth noting that the prospect theory dictates that market participants are more sensitive to losses than to gains of similar magnitudes. However, a significant behavioural effect influencing the prospect theory come into play during the Covid-19 pandemic crisis: certainty. During the Covid-19 pandemic crisis, it is plausible to assume that market participants tended to increasingly underweighuncertainty, hinting at disinvestment in assets effected by the pandemic crisis. As noted previously, the prospect theory relies on several fundamental behavioural traits which came into play during the Covid-19 pandemic crisis:

- Reference dependence

    It is safe to assume that many market participants used the price before the initial date of the pandemic as the reference price. So they evaluated their losses based on a pre-pandemic reference point; the argument is that the pandemic crisis changed the environment. Therefore, the reference point no longer existed. Assuming that many may have invested in a lower price than the reference point, thus they could have made a profit during the Covid-19 pandemic crisis. However, this would have been a loss in their eyes because of the reference point.

- Endowment effect

    Many market participants exhibited an illusion of control bias which meant they demanded more than they wanted to pay mainly due to the high reference point. During the Covid-19 pandemic crisis, the danger was that such behaviour would lead to losses.

- Loss Aversion

    During the early parts of the Covid-19 pandemic, market participants were reacting to the number of countries infected by the virus, as stated by (Albulescu, 2020). As the pandemic spread globally, market participants became increasingly loss averse; hence, market prices began to fall.

Moreover, the policies enacted by global governments to slow down the spread of the virus meant that macroeconomics indicators and assets' fundamentals were weakened. This weakening doubled the impact on the financial markets leading to an increase in loss aversion. However, as Figure 21 and (Zhang, Hu & Ji, 2020) illustrates this increase in loss aversion led to the amplification mechanism, which simply dictates that when faced with losses on a holding position, market participants tend to

sell the other assets in the hope that they could cover their losses. Thus leading to further losses and hence the loss spiral meaning financial assets which were unaffected by the Covid-19 crisis were now affected.

The Impacts of Cognitive Behavioural Factors during the Covid-19 Pandemic

It must be noted that heuristics are cognitive techniques used by many to simplify the daily workload. As hinted by Figure 21, there are several heuristics which could explain the behaviour of the market participants during the Covid-19 pandemic:

- Affect

   As we have maintained throughout, the Covid-19 pandemic had a psychological effect on many. Conversely, this effect was evidenced throughout the period; we suspect that many market participants may have been affected byemotional issues. Moreover, the impact of the affect heuristic could explain the irrational pricing of some equities throughout the crisis. Hence, as hinted by (Albulescu, 2020) and (Zhang, Hu & Ji, 2020), the sentimental feelings towards the Covid-19 pandemic affected the pricing and volatility of the asset.

- Ambiguity

   As hinted by (Ramelli & Wagner, 2020), there were a lot of unknown factors influencing the global financial markets during the Covid-19 pandemic. Key among these unknown factors are:

   - The precise structure of the Severe Acute Respiratory Syndrom Coronavirus 2, making it challenging to be optimistic about a vaccine or drug to control it.
   - The true extent of the global infection rate
   - The impact of the Covid-19 pandemic on governmental policies and individual behaviours
   - The true extent of the impact of Covid-19 policies, such as lockdown, on the economy and organisations' finances

   Hence, market participants may have displayed ambiguity aversion during the pandemic. This display of ambiguity aversion was highlighted by the significant drop in share prices of many fundamentally strong companies in the early days of the impact. A critical factor to the continued market participant's behaviours is the ambiguity regarding the possible resurgence of the virus.

- Availability

   In the absence of any recent global pandemics, many people will rely on the memory of events which had a similar effect in comparison. The critical factor when it comes to pandemics is that many people remember seeing the deaths in past pandemics events such as the 2009 H1N1 pandemics; however, very few remember the actual facts. Another crucial factor is that many will recall hearing about historical pandemics events such as the Spanish Flu of the late 1910s, a variant of the H1N1 virus, and more recently 1957 influenza, a variant of the H2N2 virus. These two factors

would affect the perspective of the people view on the Covid-19 pandemic.

Moreover, another factor of note is that impact of recent uncertain events on the economy. The recent global financial crises had a significant effect on the worldwide economy; many people will tend to relate the economic impact of the global financial crisis to the Covid-19 pandemic. Furthermore, the prospective impact of the ongoing Brexit process, as highlighted earlier, will be fresh on the minds of many.

- Default

Many market participants usually have two alternating defaults: during economics upturns where markets exhibit bullish conditions, the default setting is often set to buying risky high return assets. However, during economic downturns such as the Covid-19 pandemic, the default setting is usually set to selling risky assets in favour of safe-havens. During the Covid-19 pandemic, the mindset of the market participants may have been set to a negative default setting, which means that market participants were neglecting fundamentally strong assets in favour of safe-haven assets just because they were perceived as risky during these unprecedented times.

- Representativeness

As stated previously, the elephant in the room was the potential impact of Brexit on the UK's economy. During the early parts of the Covid-19 pandemic, market participants were focused on the Brexit implications, disregarding the effects of the pandemic on the economy and fundamental information. So it was not surprising that the pricing of financial assets followed the trend of the Brexit process rather than the pandemic. It was not until after Covid-19 was declared a pandemic by the WHO, and the UK's government was forced to take more stringent measures to slow down the infectious rate, that market participants began to consider the impact of the Covid-19 pandemic more seriously.

As pointed by Figure 21 we introduce three new heuristics to explain the reaction ofmarket participants during the Covid-19 pandemic.

- Political effect is the tendency for actions or inactions of policymakers to influence the decision-making process of the market participants.

The policy effect dictates the action or inaction of policymakers has the potential of hiking fear among market participants. As illustrated previously, during the early stages of the pandemic, the limited actions or practically inaction of the UK's government amounted to a "Keep Calm and Carry On" approach. This approach may have been the explanation for the behaviour ofmarket participants during the early stages of the pandemic. However, as the UK's government began to put into action policies that would stop the spread of the virus, the actions of the government

heightened the fear levels. Mainly due to the impact of such policies on the economy. However, there is another factor in play; the dramatic government change of plan had the effect of inducing fears that the government got its policies badly wrong and may have underestimated the impact. Hence this factor may have raised the fear levels of the market participants.

Another critical factor is the Bank of England pressurising the banks to delay or stop the payments of dividends to shareholders, hence giving the impression that the banks may have capital issues during the pandemic. Moreover, it also reflects the idea that the Bank of England thinks the economy will be severely affected, given the "*advice*" that the banks should use the capital to help the economy. Thus, making market participants fearful of investing in assets with a strong affinity to the UK's economy.

A possible reactive impactoften associated with political association effect is many people tend to link different policies, e.g. economic, with distinct political parties. In term of this research, the critical link is the Conservatives party with Brexit and economic prudence and stringency. Both linkages were central to the Conservatives winning the last four general elections.

Hence, there is a strong argument for both linkages; yet as the Covid-19 pandemic has illustrated, there are no political associations when it comes to a significant economic crisis. However, Brexit had been the key policy for the Conservatives since the EU referendum of 2016. Hence, any u-turn or delay will signal a massive backlash from the population. Bearing this in mind, the market participants are pricing for a possible double impact of a second surge in the Covid-19 pandemic and the economic fallout from Brexit. This dual impact on the economy has the potential to lead to further austerity fiscal policy in the future since any Conservative government would want to preserve their economic integrity above all else.Given the association with economic prudence and the fact that the Conservatives have just recently being voted in with a vast majority, market participants are likelypricing any future austerity fiscal policies into the price of the assets. Hence, essentially meaning that the political effect heuristic plays a significant role in the behaviour of market participants.

- Media Effect is the tendency to associate extreme events with TV programmes or films.

One possible explanation for the emotional and cognitive behaviour is the effect of past movies and TV programmes with epidemic/pandemic content. Over the years, it has been demonstrated that the content of media such as films or tv shows can influence behaviour. Many people link certain events to movies or tv programmes to help them "understand the facts".

Given that the Covid-19 pandemic is regarded as a Black Swan event; there is no real event that people, generally, andmarket

participants, in particular, can easily relate to the Covid-19 pandemic. Therefore, a possible explanation is that many people were comparing the Covid-19 pandemic to a movie or TV show. Additionally, the media links to historical events such as the 1918 Spanish Fluand 1957 influenza pandemics would have affected many. The media effect heuristic may have translated into the initial impact on the global financial markets as Covid-19 was declared a pandemic. The reality would slowly replace the media effect heuristic as the information on the pandemic and governments reaction filtered into the markets.

- Brexit Effectis the tendency to concentrate on Britain's exit of the EU disregarding all other information or events.

Partly due to the affinity of Brexit in terms of the event-time conjuncture but mainly due to the amplified effect on all aspects of British lives, economics and politics; Brexit has a significant impact on the decision making process of market participants. Brexit is the most significant change in the economics and political arenas since the UK originally joined the EU in 1973. The irony is that both these historic and momentous events involved the EU.

As highlighted earlier, the economic impact of Brexit is unknown with a range of -3% to -4% of GDP relative to staying in the EU, according to the latest statistics from (Hantzsche & Young, 2020). The potential economic impact of Brexit was the critical factor in the decision-making process during the early and later stages of the Covid-19 pandemic in the UK. The Covid-19 pandemic amplified the issues facing the UK's economy in both the short and long runs, which led to the market participants pricing the uncertainties and risks into the assets with the most affinity to the UK's economy. This double impact of Brexit and Covid-19 pandemic on the economy may have had a significant effect on the market participants view of some financial assets in the UK.

- Mutate

Generally, a bias is a disproportionate probability placed in favour or against an investment clouding the judgement of market participants. The cognitive bias limits the market participant's ability to deal with the information rationally. Figure 21 hints at market participants being critically affected byfourcognitive biases during the Covid-19 pandemic:

- Conservatism

To be fair, it could be said that during the early months of the Covid-19 pandemic most people, let alone market participants, were unaware of the potential impact of the virus. It was not until the Covid-19 pandemic reached Europe in late February early March that most people began to pay attention to the pandemic. The 11 March 2020 WHO declaration promoting Covid-19 to pandemic status could be regarded as the critical moment in the awareness of the potential impact. However, the fact that the virus had already

infected more than 80,000 globally and was spreading fast across the world by 29 February 2020 plus a vaccine was not likely for another 2 years, probably should have alerted the market participants of the potential impact. Furthermore, the evidence from China and many others in Asia of the economic effect of the Covid-19 pandemic should have also alerted the market participants of the economic crisis associated with the pandemic. Yet the FTSE 100 remained over 7,000 until 26 February 2020. This evidence seems to be pointing at market participants displaying conservatism behaviour in the pricing of assets. However, a possible explanation could be the reduction in uncertainty surrounding Brexit at the time, which could have stabilised the equity market.

An alternative view on the conservatism bias during the Covid-19 pandemic was the low price adjustments of shares with sound fundamentals. An influential factor underlining this view was the significant impact on the general economics of the country, as highlighted earlier. Like any other significant economic crisis, the Covid-19 pandemic could have created downward pressures on the company due to the general economic status, even though the company's fundamentals were sound.

- Disposition effect

As market participants became increasingly aware of the pandemic effect on the economy and hence financial markets, they became increasingly loss averse. During uncertain periods, such as the Covid-19 pandemic, it is common practice for market participants to sell winning shares too early and hold on to losing shares too long in the hope of maybe regaining their money. Another explanation is that the Covid-19 pandemic had a significant impact on the economy and financial positions of many companies, which had the effect of market participants assuming that most companies would be affected. This fear would get amplified to many financially healthy and winning shares.

- Herd mentality

It must be noted that in the animal kingdom, an attack by a wolve or big cat would generate such a forward momentum that the herd don't know when to stop and fail to spot the cliff, hence fall to their death. In the absence of any real information and certainty on the impact of the Covid-19 pandemic, market participants were exhibiting this kind of herd mentality. They were seemingly so scared of the effect of the Covid-19 pandemic that they failed to spot the proverbial cliff and hence the prices of financial assets simply collapsed. This behaviour was confounded by the misinformation and inadequate actions of most national policymakers in the early stages of the pandemic. Furthermore, the economic impact of the Covid-19 pandemic in addition to the potential effect of Brexit was a drag on the equity market.

- Relative Time Event Influence bias is the tendency to let the most recent past event or information cloud a judgement.

The relative time event influence bias is an extension of the availability heuristic, which dictates that people rely heavily on events from memory. The relative time event influence bias contends that generally, people tend to remember and thus be influenced by the most recent events or information. The bias dictates that as time moves forward, the influence of the event or information slowly diminishes as another critical event or information replaces it.

The relative time event influence bias had a double impact on the market participants during the Covid-19 pandemic. Firstly, the most recent event was Brexit, which added more emphasis on the Brexit effect heuristic. Although the financial crisis had a more significant impact on the economy than the Brexit process, yet its influence on the decision-making process of the general public and more precisely on the market participants was waning. The issue is the potential impact of Brexit on the economy, which continues to play a significant role during the Covid-19 pandemic.

The second factor of importance is the role of information during the pandemic. Since the relative time event influence bias dictates that as time moves forwards, the influence of information diminishes as new information comes to light. Thus fast-moving details and policy reaction during the Covid-19 pandemic added to the uncertainty due to the quick turnover of information.

The Effects of Emotional Behavioural Factors during the Covid-19 Pandemic

It is difficult to analyze such an event from a purely cognitive perspective; when the Covid-19 pandemic was an emotionally charged event. Hence, the affect heuristic may have influenced market participants during the pandemic, so there is a requirement to understand the emotional issues underpinning the decision-making process during this crisis. Contrasting with cognitive biases, emotional biases refer to the inability of market participants to separate emotions from investment decisions; thus effecting the market participant's ability to make rational decisions. As illustrated by Figure 22, the Covid-19 pandemic inversed the financial cycle of emotion, meaning emotions were on a downwards trends with the price after the initial impact. From the optimal Covid-19 break-line, 31st December 2019, the cycle of emotions was depressed, illustrating the effects of the Covid-19 pandemic on the global financial market. The problem was many, including governments, underestimated the severity of the pandemic and thus the global economic consequences. Moreover, it was only when the pandemic reached Europe that many market participants became aware of the seriousness of the Covid-19 induced crisis.
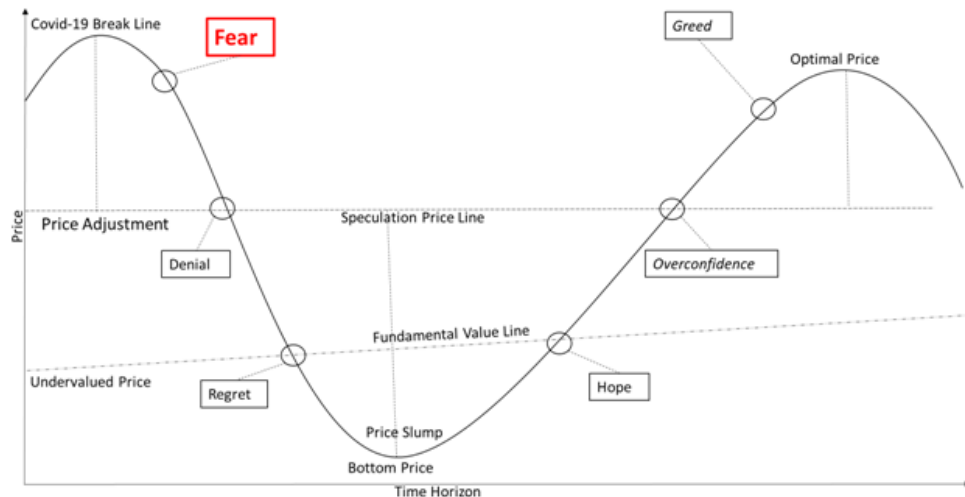
Figure 22. *The Covid-19 Financial Cycle of Emotions*

Conversely, the market participants were affected by sentimental issues as well as the fear that the pandemic would affect their investments. Remember that generally, market participants do not act rationally when they cannot separate emotions from investment decisions. Furthermore, as maintained throughout, the impact of the pandemic on the global financial markets was confounded by the inadequacy of the governments' actions and mixed communications. Also, the lack of knowledge on the virus and global pandemic heightened the fear levels. Moreover, the impact on the economy from the health policies enacted to prevent the virus from spreading further was not truly known. These issues led to negative emotion behaviours by market participants in the aftermath of the pandemic, which are reflected in Figure 22 Critically, both the uncertainty behavioural factor model and the financial cycle of emotions as illustrated by Figure 21 and Figure 22 point to fear being the primarily emotional factor during the Covid-19 pandemic. However, we must not understate the role of the other emotions during the pandemic; thus, we will discuss all the emotional biases mentioned in Figure 21 and Figure 22:

- Fear

     According to (Albulescu, 2020) and (Liu *et al.,* 2020), the primarily emotional bias during the Covid-19 pandemic was fear and its related emotions. Therefore, although other emotions played a critical role in the behaviour of market participants during the pandemic, we will emphasise the role of fear.Fear is the one contiguous emotion that makes a person or group act irrationally, as so elegantly put by Bertrand Russell:

"Neither a man nor a crowd nor a nation can be trusted to act humanly or think sanely under the influence of fear."

     In truth, this elegant quote by Bertrand Russell strikes at the heart of the influence fear had on all levels of society, including market participants, during the Covid-19 pandemic. A fundamental

property of fear is like the virus; it is infectious. Therefore, once a group within society have it, it will spread to other groups.

During the Covid-19 pandemic, fear was initiated by members of the general population getting or knowing someone that has been infected. Another channel for fear amongst the general population is the media effect cognitive bias or the impact of the news. The UK was one of the last countries to be infected by the virus; however, the news of the impact the pandemic was having on other countries, especiallywithin Europe, did raise concerns amongst the general population. Moreover, the increased infections within the UK towards the middle of March had the impact of hiking the fear levels amongst the UK's population. As the government reacted to the pandemic, the fear spread to other issues; key amongst those issues was the economy and more specifically, the employment situation. As highlighted previously, the lockdown policy introduced by the government to control the virus infections, bought about an increase in job insecurity. It is a known fact that when people are faced with a heightened level of fear about their jobs, they tend to cut down on consumption. Consequently, leading to a feedback effect with the lack of expenditure hitting the organisations relying on the flow of cash, leading to an increase in job insecurity. Therefore, the pandemic had a double effect on the fear levels amongst the general population: economic and health.

Abraham Lincoln is quoted as saying:

"Democracy is the government of the people, by the people, for the people."

In short, the last two statements state any government must serve its people to the best of its ability based on the circumstances at the time or face being elected out. Therein lays the problem faced by many governments, the pandemic represented a catch-22 situation in that to limit the number of infections; governments had to turn to policies that would harm the economy. However, to prevent the pandemic from causing any severe damage to the economy, they needed to phase out the policies quickly. The fear for most governments during the Covid-19 pandemic was that both the health issue and economic indicators were dire.

As highlighted previously, the UK's government delayed taking action until 23 March 2020. A possible explanation was that the government feared a any early response would be seen by many as unnecessary given the lack of information. An additional reason is the damage the policy will do to the economy. Once the study by Imperial College London was published stating that containment policy would put enormous constraints on the NHS and result in 260,000 deaths, the government quickly changed its policy. The fear of a possible backlash from the public over the NHSand more

importantly, the number of deaths, far outweighed the potential impact on the economy.

Conversely, the fear of the potential impact of the pandemic on the economy bought several fiscal stimulus policies to reduce the consequences of the lockdown policy. These policies included multibillion pounds aids for companies to prevent mass unemployment. The problem is these government fiscal stimulus policies in conjunction with lower fiscal revenue will mean a significant impact on the deficit and inevitably debt of the UK's government. The white elephant in the room is the upcoming additional economic impact of Brexit in the next few years. So, it is essential for the UK's government that the policies of the Covid-19 pandemic do not overly harm the economy during a time of added uncertainties.

During the Covid-19 pandemic, fear and its related emotions were crucial attributes in understanding the behaviour of market participants. As hinted by (Albulescu, 2020), the fear levels rose in conjunction with the number of countries infected. Further, the assumption is that market participants were reacting with distance; thus meaning that the nearer the Covid-19 pandemic got to the UK, the higher the fear levels were. In essence, as hinted earlier, it was not until the pandemic reached Europe that most people began to take note; the change in the FTSE 100 trend reflected this upturn as we entered March 2020. The WHO's announcement on 11 March 2020 confirming the Covid-19 as a pandemic created a panic, the FTSE 100 loss 12.2% in the aftermath. Hence it could be characterised as a massive overreaction from the market participants, given that most people knew that Covid-19 was a pandemic by then. The key to understanding this panic is not in the upgrade to pandemic status, but the impact on the economy and financial status of organisations. The official status of the Covid-19 as a pandemic bought home the fear that most market participants had of a significant adverse effect on the economy and hence the financial state of the publicly listed organisations. Moreover, the fear of subsequent waves of the virus is continuously being played out in the mind of investors which makes it even more challenging to stabilize the market. Another crucial factor in play is the impact of Brexit on the economy, especially since a deal has not yet been agreed, with the UK expected to formally leave the EU on 31 December 2020 in the mid of a possible second/third wave of the covid-19 pandemic.

- Denial or ignorance

The difference between denial and ignorance is knowledge or information; whereas denial is the rejection, ignorance is the lack thereof. Therein lays the conundrum, was the Covid-19induced crisis the result of existing information or lack thereof on the virus and impact of a pandemic.The evidence from (Afelt, Frutos &

Devaux, 2018) and (Bailey *et al.*, 2018) seem to suggest that there were warnings of the potential impact of a new coronavirus pandemic. Moreover, many have criticised the government for the lack of actions and communication, as hinted by (Cowper, 2020) and (Hunter, 2020). Conversely, as implied by (Baker *et al.*, 2020a) and (Anoushiravani *et al.*, 2020), the Covid-19 pandemic was likely to have a significant impact on the economy. In truth, the evidence was there from the start as to the pandemic and its effects.

Furthermore, the UK was one of the last countries to be infected by the virus. Hence, there was prior knowledge of the virus and its impact on society and the economy. Thus, leading to the accusation of market participants rejecting the existing knowledge and living in denial. However, the truth may be a bit of ignorance and denial.

- Regret

The emotion of regret is the sorrow of a result based on a decision taken in the past. The impact of the Covid-19 pandemic is based on the inaction of many on the information available at the time. As has been established previously, market participants were in denial or simply ignorance of the information on the Covid-19 pandemic and its economic effect. Thus to a certain extent, the losses were avoidable; this would lead to market participants regretting the rejection of the available information at the time.

However, regret is a double-edged sword with the capacity to hit at a later stage in the crisis. Hence, many market participants would have regretted the decision not to take the opportunity to invest in fundamentally strong financial assets at the low price induced by the pandemic. In other words, some market participants may have regretted not heeding the information at the time. Still, others had regretted not taking the opportunity to invest when the price was low due to the pandemic

- Hope

Every crisis reaches a point where market participants have raised hopes of the impact waning. During the Covid-19 pandemic, market participants raise hope due to the reduction in the number of new cases or countries infected. Another factor is the advancement of a new treatment which would help reduce the impact of the virus. With many competing organisations working on a possible cure, the likelihood is there have and will continue to be a lot of false down hopes. Conversely, the information does not imply these organisations are lying, but the treatment is not as advanced as reported by the news or politicians. In most cases, the report of a drug or inject that contains the virus is just to state that a possible cure has been found; however, the actual treatment is at the initial stage of testing. For listed pharmacy organisations, the release of such information could have a positive impact on the share price.

There is another factor playing a role in the raising of hope during the Covid-19 pandemic; the impact on the country or organisation

may not have been worst than first feared. So the market participants re-evaluate the effect, which raises their hopes. One critical factor to note, the hope displayed by the investors is temporary. Until there is a final cure which can be used; as will be illustrated later, the fear will always be of a potentially devastating subsequent waves, especially in the winter.

- Overconfident and Greed

Generally, overconfident occurs following the realisation of the harboured hopes. During any crisis, the hope is to find a working solution for the influencing issue. Thus, the Covid-19 pandemic was always going to be about a successful anti-viral vaccine and a massive global reduction in the fatality/infection rates. The realisation of this hope would generate a boost in confidence that would, over time, merge into overconfident that the crisis is over. Hence, market participants would become increasingly risk-loving due to the confidence gained in overcoming the Covid-19 crisis.

Moreover, this confidence would generate a view among some market participants that the markets have not changed. Thus, making market participants believe that they could achieve the optimal price prior to the crisis. Therefore, many market participants would display the behaviour traits of greed. However, three critical factors are overlooked:

- In the aftermath of the Covid-19 pandemic, the world had changed. A generally pessimistic view of the future is held by many. Moreover, the Covid-19 pandemic had inevitably changed the behaviour of many. This behaviour change will be difficult to reverse. Hence, as we have alluded previously, the economy and financial market will be affected for an extended period. Thus, meaning that the optimal price of some financial assets will be much lower than before the pandemic. This factor was in play in the aftermath of the global financial crisis and to a lesser extent during the on-going Brexit process.

- As alluded by the WHO, the danger is many people will be overconfident that the pandemic is over when a successful vaccine is announced. On 3rd August 2020, the WHO warned *"there's no silver bullet at the moment, and there might never be."* Taking into account the fear that like many related epidemics and pandemics of the past, there may be several highly infectious waves. Also, as highlighted previously; the covid-19 pandemic may not be the last due to the permanent changes that have affected the relationship between man and animals.

Mainly due to these factors and the inevitable Brexit impact on the UK's economy and some organisations, this overconfident and following greed may be ill-placed.

The Reactions of Market Participants during the Covid-19 Pandemic

During the early stages of the Covid-19 pandemic, the reaction of market participants in the FTSE 100 was mixed. At the forefront of uncertainty was the impact of Brexit, a new Conservative government has just been elected with the promise of implementing Brexit deal or no deal. The markets were worried about a no-deal Brexit impacts on the economy. According to (Bevington *et al.,* 2019), relative to staying in the EU, the effect on GDP per capita is -3.5% for a no-deal Brexit with a WTO agreement. However, according to (Hantzsche, Kara & Young, 2018) and (Levell *et al.,* 2018), the impact could be as much as 3.7% or 3.3% respectively. Irrespective of the actual figure, the uncertain economic foundation presented a challenging backdrop for the market participants throughout the Covid-19 pandemic observed period.

As hinted by (Huo & Qiu, 2020) and (Phan & Narayan, 2020), there was an overreaction by market participants during the Covid-19 pandemic. It is common practice to assume that market participants overreact to any crisis and to a certain extent, this is true. However, the reactions depend on the stage of the crisis; during the early stages of the Covid-19 pandemic, as market participants' fear levels were increasing, there appeared to be a stake of denial or ignorance amongst the market participants. It is assumed that this stake led to market participants underreacting to the information surrounding the pandemic. As the Covid-19 pandemic reached Europe, market participants began to learn about the impact of the pandemic on the economy and hence the financial status of many listed organisations increasing the fear levels. Thus, when the announcements by the UK's government regarding the lockdown policy and the WHO confirming the pandemic status were made, the market participants fear levels were at heightened levels. Therefore, ensuring a panic in the FTSE 100 as market participants overreacted to the combined impact of both these announcements. As hinted by (De Bondt, 2000), an overreaction is the disproportionate action to an event or information (fundamental or news) by the market participants causing a temporarily and dramatic deviation from the fundamental value. The fact that the market participants in the UK already knew that Covid-19 was a pandemic and that a lockdown policy with its impact on the economy was the only option available that would help avert a health disaster points to an overreaction to the announcements.

The Covid-19 pandemic crisis was a lesson in the amplification mechanism and its effect on the loss spiral. Figure 23 illustrates how the pandemic affected the entire UK equity market. By early March, the impact of the Covid-19 pandemic had reached Europe; thus, market participants were able to extrapolate the potential impact on the UK. However, market participants were in stale status due to the actions of the government as hinted earlier; therefore leading to an underreaction in the equity market. Furthermore, the market participants were in a state of denial or ignorance regarding the Covid-19 pandemic and its effect on the economy and financial market.
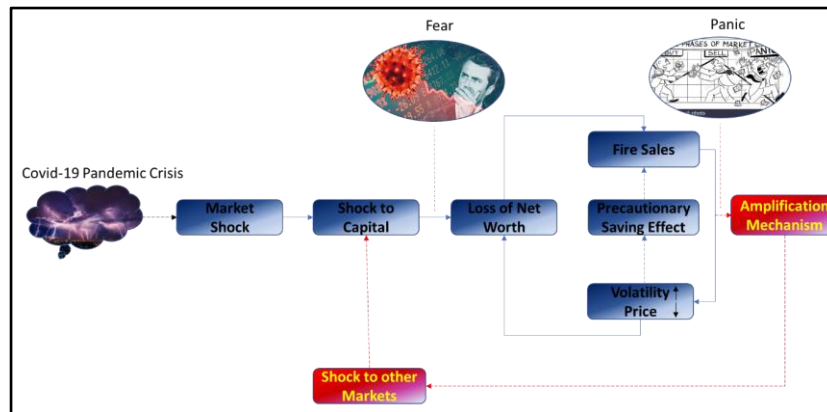
Figure 23. *Loss Spiral and Amplification Mechanism*

The change came as the government heeding the advice of a medical study by Imperial College London opted for an increasingly stringent policy to counter the impact of the virus. Thus, leading to an upturn in the fear levels as market participants reevaluated the effect of the pandemic on the economy and many listed companies balance sheets. Additionally, as highlighted earlier, the statements of the Bank of England impacted on the financial sector, and hence the economy increasing the fear levels still further. The market participants began to sell the financial stocks and the stocks with the highest affinity to the economy leading to the loss spiral as in Figure 23. The announcement by the WHO upgrading Covid-19 to pandemic status gave rise to a panic and thus, as illustrated by Figure 23, the amplification mechanism with the overreactions of market participants spilling over to other more secure assets. As highlighted previously, the critical factor was that many market participants knew the impact from other European countries on the economy and financial markets already. Moreover, the pandemic status of Covid-19 was a giving. Yet the market participants panicked pointing to an overreaction to the information and events during the later stages of the Covid-19 pandemic crisis.

The panic led to a loss spiral and amplification mechanism; the amplification mechanism dictates that during the Covid-19 pandemic, market participants already fearful of the impact on the economy from the evidence of the other European states were selling their perceived risky assets. The announcements by the Bank of England in mid-March only initiated the amplification mechanism, which gave rise to the loss spiral extending to the financial sector. The UK's government announcements of changes in policies to increasingly stringent policies to tackle the spread of the virus further exaggerated the amplification mechanism which spread to the risky assets with direct affiliation to the economy, e. g. the retail sector or travel sector. The upgrading of Covid-19 to pandemic status by the WHO compounded the amplification mechanism and led to the final panic, which exaggerated the loss spiral.

As noted by (Barberis, 2013a), an added complication is the effect of the loss and ambiguity aversions on the amplification mechanism and inevitably the loss spiral. Part of the explanation is the competence

hypothesis of (Heath & Tversky, 1991). The competence hypothesis dictates that the level of competence at analysing the situation determines whether the person is ambiguity averse or seeking. The premise maintains that the initial economic indicators during the Covid-19 pandemic made the market participants less competent in analysing the risk presented by the pandemic. Thereby increasing the ambiguity aversion of the market participants, leading to a reduction in their holding of risky assets, therefore further reducing the price of these assets.

The other explanation relies on the loss aversion role, according to (Kahneman & Tversky, 1979), this observes that the initial evidence of the implications of the Covid-19 pandemic on the economy made market participants increasingly loss avert leading to the selling of risky assets associated with the UK's economy. The announcements by the UK's government of increasingly stringent policies push up the loss aversion, therefore selling more risky investments. The final straw which broke the camel's back was the WHO's Covid-19 updated status, which led to the panic. Both the ambiguity and loss aversions emphasized the amplification mechanism.

Figure 24. *FTSE 100 Daily Price*

Conversely, as hinted by (Albulescu, 2020), the fear levels increased with the number of countries infected. Key to the illustration of the fear levels in the market are the price and volatility. A look at Figure 24 and Figure 25 illustrates the impact of fear; since 1984, there have been six events exhibiting fear behaviour. However, Figure 25 points to the announcement by the WHO on 11 March 2020 promoting Covid-19 to pandemic status as the highest volatility level. Moreover, Figure 26 illustrates the loss recorded on the day of these fear events; the Covid-19 announcement marked the worst one-day loss over the entire observation. We assume that any loss over 10% is a panic, hence giving our assumption there were only three one-day panics over the whole observation, with two being associated with a single event, Black Monday, on 19 and 20 October 1987. Although, as stated by Figure 25, the 2007/2008 global financial crisis did register a significant hike in volatility. However, based on our assumption, there was no one-day panics during the global financial crisis.
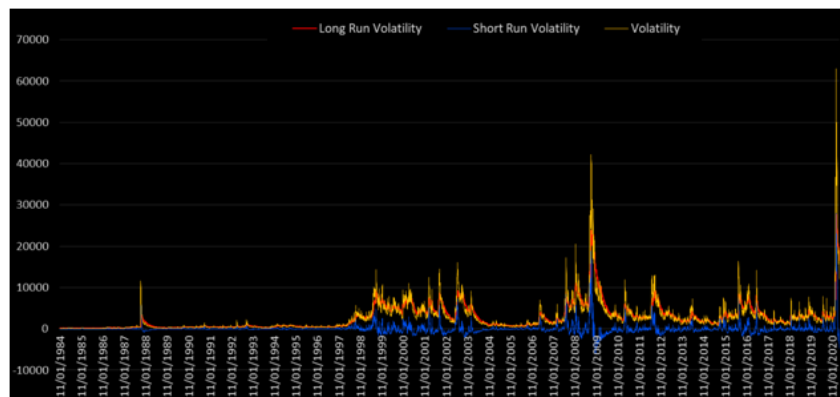
Figure 25. *FTSE 100 Price Volatility (Estimated using Component GARCH)*
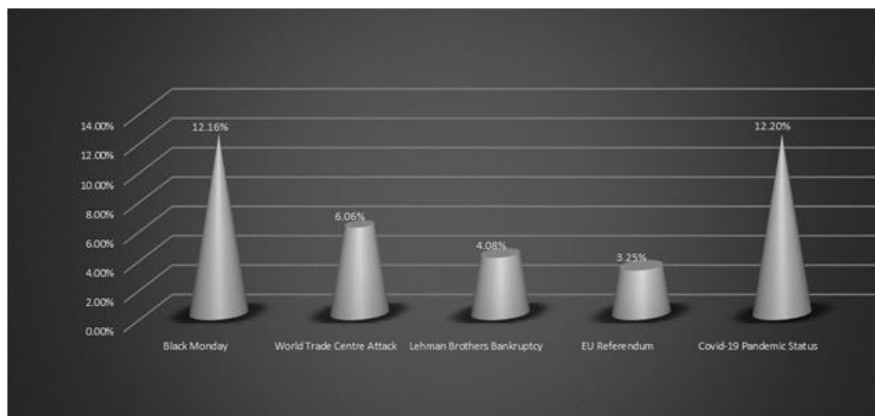
Figure 26. *Major FTSE 100 EventDaily Loss*

The six-month observation of each crisis illustrates the continuation of the fear in the aftermath of the event. As explained by Table 2, except for the Lehman Brothers bankruptcy during the global financial crisis and the initial announcement of the virus by the WHO; the crises hit the low point within the first two months. However, both the initial Covid-19 announcement and Lehman Brothers bankruptcy had long-run uncertainties; moreover, both were, to a certain extent, black swan events. Furthermore, both events had unforeseen effects on the economy. Conversely, the Covid-19 pandemic had the worst impact on the FTSE 100. Remember, we assume that any loss of over 10% could be regarded as a panic. Except for the EU referendum result, all the events had been effected by considerable panic runs. So, another explanation is that there were unforeseen factors which had the impact of extending the panic run. During the Covid-19 pandemic, there were unknown factors such as the impact on the economy which may have extended the panic rum, remember it was not until the pandemic reached Europe that most people appreciated the effect on the health and economy.

Table 2. *Major FTSE 100 Crises 6-month Period Worst Loss*

Crisis	Black Monday	Russian Default	World Trade Centre Attack	Lehman Brothers Bankruptcy	EU Referendum Result	Initial Covid-19 Announcement
Start date	19/10/1987	17/08/1998	11/09/2001	15/09/2008	24/06/2016	31/1/2/2019
Low point	09/11/1987	05/10/1998	21/09/2001	03/03/2009	27//06/2016	23/03/2020
Loss	32.00%	14.97%	11.92%	32.51%	5.62%	33.79%

The review of the FTSE 100 underlines the importance of understanding the market participants' reactions during the Covid-19 pandemic. During the early stages of the pandemic, the reaction was rather mute; this was possibly due to a combination of factors described earlier in this section:

- Ambiguity effect
- Representativeness effect
- Political effect
- Brexit effect

In truth, these factors highlight the significant lack of information regarding the Covid-19 pandemic and its effect on the economy and financial market. Moreover, they point to the impact of Brexit on the financial market in the early stages of the pandemic.

6. Conclusion

In this paper, we introduced a new model of uncertainty behavioural factors to highlight the primary behavioural and external factors influencing any uncertain event. Moreover, the model is a graphical top to bottom illustration of the behavioural factors during an uncertain event. The aim is to provide a top-level view of the external factors, events, actors, cognitive and emotional behaviour factors, and market participants' reactions influencing the uncertainty. We briefly highlighted the key general factors influencing the decision-making process of the market participants during any uncertain event.

Crucially, we used the model to illustrate the Covid-19 pandemic impact on the behaviour of market participants in the FTSE 100 equity market. The effect from the pandemic came from the uncertainty surrounding the virus and implemented policies effects on the economy and balance sheets of publicly listed organisations. Not surprisingly, the lack of actions and mixed communications by the government led to the UK being the worst hit in Europe by the pandemic. The belated actions meant that the total number of deaths and infected cases are 46,526 and 312,289 as of 12th August 2020. However, the economic impact is -18.2% and -20.4% during the first two quarters of 2020 as reported by the ONS on 12th August 2020. So, the essence of the market participants' fear is correct; however, given that most market participants were already anticipating the worst impact and knew that covid-19 was a pandemic, their actions could be characterized as an overreaction. What did not help was the communication and policies mixed up not only by the UK's government but also by the Bank of England during the early stages of the pandemic impact in the UK. The fear levels remain high due to anticipated further

waves of the pandemic added to the effect of a no-deal Brexit on the economy in the next few years.

The model was successful in highlighting the factors and actors as well as the cognitive and emotional behaviours influencing market participants' decisions during the Covid-19 pandemic crisis. We extended the model of heuristics and biases to enable us to explain better the behaviour of market participants during the Covid-19 pandemic. Moreover, the model does present a simple graphical top-level overview of the Covid-19 pandemic crisis. Furthermore, the model did explain the pandemic and highlighted the influence of the Brexit process. Finally, we are sure it could be extended to model any crisis.

The concluding remark is that policymakers should not restrict their policies on the advice of a single group, especially in the adverse environment of apandemic or any other major crisis. Policymakers shouldthink before acting or communicating because the action may be right but could be conceived the wrong way.

References

Abay, K.A., Tafere, K., & Woldemichael, A. (2020). Winners and losers from COVID-19 global evidence from google search. *Policy Research Working Paper*. Washington DC, USA. [Retrieved from].

Ackert, L.F., Church, B.K., & Deaves, R. (2003). Emotion and financial markets. *Federal Reserve Bank of Atlanta Economic Review*, 88(2), 33-41.

Afelt, A., Frutos, R., & Devaux, C. (2018). Bats, coronaviruses, and deforestation: Toward the emergence of novel infectious diseases? *Frontiers in Microbiology*, 9(APR), 1–5. doi. 10.3389/fmicb.2018.00702

Aizenman, J., & Noy, I. (2015). Saving and the long shadow of macroeconomic shocks. *Journal of Macroeconomics*, 46, 147–159. doi. 10.1016/j.jmacro.2015.08.007

Albulescu, C. (2020). Coronavirus and financial volatility: 40 days of fasting and fear. *SSRN Electronic Journal*, pp.1–7. [Retrieved from].

Ali, M., Alam, N., & Rizvi, S.A.R. (2020). Coronavirus (COVID-19) - An epidemic or pandemic for financial markets. *Journal of Behavioral and Experimental Finance*, 27, p.100341. doi. 10.1016/j.jbef.2020.100341

Anoushiravani, A.A., O'Connor, C.M., DiCaprio, M.R., & Iorio, R. (2020). Economic impacts of the COVID-19 Crisis. *Journal of Bone and Joint Surgery*, 102, 937–941. doi. 10.2106/JBJS.20.00557

Arellano, M., Blundell, R., & Bonhomme, S. (2017). Earnings and consumption dynamics: A nonlinear panel data framework. *Econometrica*, 85(3), 693–734. doi. 10.3982/ECTA13795

Ashraf, B.N. (2020). Stock markets' reaction to COVID-19: Cases or fatalities? *Research in International Business and Finance*, 54, p.101249. doi. 10.1016/j.ribaf.2020.101249

Auchincloss, E.L., & Samberg, E. (2012). *Psychoanalytic Terms & Concepts*. New Haven, Connecticut, USA: Yale University Press.

Bailey, E.S., Fieldhouse, J.K., Choi, J.Y., & Gray, G.C. (2018). A mini review of the zoonotic threat potential of influenza viruses, coronaviruses, adenoviruses, and enteroviruses. *Frontiers in Public Health*, 6(April), 1–7. doi. 10.3389/fpubh.2018.00104

Baker, H.K., & Ricciardi, V. (2014). How biases affect investor behaviour? *The European Financial Review*, February-M, 7–10.

Baker, S.R., Bloom, N., Davis, S.J., Kost, K.J., Sammon, M.C., & Tasaneeya, V. (2020a). The unprecedented stock market impact of Covid-19. *NBER Working Paper*. No.26945. doi. 10.3386/w26945

Baker, S.R., Bloom, N., Davis, S.J., & Terry, S.J. (2020b). Covid-induced Economic Uncertainty. *NBER Working Paper*. No.26983. doi. 10.3386/w26983

Barberis, N. (2013a). Psychology and the financial crisis of 2007–2008. *In*: M. Haliassos, (ed.), *Financial Innovation: Too Much or Too Little*. (pp.15-28), Cambridge, Massachusetts: The MIT Press. [Retrieved from].

Barberis, N., Shleifer, A., & Vishny, R. (1998). A model of investor sentiment. *Journal of Financial Economics*, 49(3), 307-343. doi. 10.1016/S0304-405X(98)00027-0

Barberis, N.C. (2013b). Thirty years of prospect theory in economics: A review and assessment. *Journal of Economic Perspectives*, 27(1), 173–196. doi. 10.1257/jep.27.1.173

Barlevy, G. (2007). Economic theory and asset bubbles. *Economic Perspectives*, 31(3), 44–59.

Bevington, M., Huang, H., Menon, A., Portes, J., Rutter, J., & Sampson, T. (2019). *The Economic Impact of Boris Johnson's Brexit Proposals*. Analyses and Briefings. *CEP BREXIT Analysis*. London, UK. [Retrieved from].

Bikhchandani, S., & Sharma, S. (2000). Herd behavior in financial markets. *IMF Staff Papers*, 47(3), 279–310. [Retrieved from].

Birz, G., & Lott, J.R. (2011). The effect of macroeconomic news on stock returns: New evidence from newspaper coverage. *Journal of Banking and Finance*, 35(11), 2791–2800. doi. 10.1016/j.jbankfin.2011.03.006

Blanchard, O., & Watson, M. (1982). Bubbles, rational expectations and financial markets. *NBER Working Paper*. No.0945. doi. 10.3386/w0945

Blinder, A.S. (2010). Quantitative easing: Entrance and exit strategies. *Federal Reserve Bank of St. Louis Review*, 92(6), 465–479.

Brodeur, A., Clark, A.E., Fleche, S., & Powdthavee, N. (2020). COVID-19, Lockdowns and well-being : Evidence from google trends. *Discussion Papers*. [Retrieved from].

Chen, N.-F., Roll, R., & Ross, S. (1986). Economic forces and the stock market. *Journal of Business*, 59(3), 383-403. doi. 10.1086/296344

Coburn, B.J., Wagner, B.G., & Blower, S. (2009). Modeling influenza epidemics and pandemics: Insights into the future of swine flu (H1N1). *BMC Medicine*, 7, 1–8.

Corbet, S., Larkin, C.J., & Lucey, B.M. (2020). The contagion effects of the COVID-19 pandemic: Evidence from gold and cryptocurrencies. *SSRN Electronic Journal*. [Retrieved from].

Cowper, A. (2020). Covid-19: are we getting the communications right? *BMJ*, 368(March), p.m919. doi. 10.1136/bmj.m919

De Bondt, W. (2000). The psychology of underreaction and overreaction in world equity markets. *In*: D.B. Keim & W.T. Ziemba, (eds.), *Security Market Imperfections in World Wide Equity Markets*. (pp.65-89), Cambridge: Cambridge University Press. [Retrieved from].

Edwards, W. (1982). Conservatism in human information processing. *In*: D. Kahneman, P. Slovic and A. Tversky, eds. *Judgment under Uncertainty*. (pp.359-369), Cambridge, UK: Cambridge University Press. [Retrieved from].

Ellsberg, D., 1961. Risk, Ambiguity, and the Savage Axioms. *The Quarterly Journal of Economics*, 75(4), 643-669. doi. 10.2307/1884324

El Zowalaty, M.E., & Järhult, J.D. (2020). From SARS to COVID-19: A previously unknown SARS- related coronavirus (SARS-CoV-2) of pandemic potential infecting humans – Call for a One Health approach. *One Health*, 9(February), p.100124. doi. 10.1016/j.onehlt.2020.100124

Engle, R.F., & Lee, G.G.J. (1999). A long-run and short-run component model of stock return volatility. *In*: R.F. Engle & H. White, (eds.), *Cointegration, Causality and Forecasting—A Festschrift in Honour of Clive W.J. Granger*. (pp.475-497), Oxford, UK: Oxford University Press.

Fakhry, B. (2018). *Impact of the Crises on the Efficiency of the Financial Market*. Istanbul, Turkey: KSP Books.

Fakhry, B., Aktan, B., Masood, O., Tvaronaviciene, M., & Celik, S. (2018). The impact of a recent natural disaster on the Japanese financial markets: Empirical evidence. *Journal of Competitiveness*, 10(2), 56–71. doi. 10.7441/joc.2018.02.04

Fama, E.F. (1965). Random walks in stock market prices. *Financial Analysts Journal*, 21(5), 55–59. doi. 10.2469/faj.v21.n5.55

Feldstein, M. (2009). Rethinking the role of fiscal policy. *American Economic Review*, 99(2), 556–559. doi. 10.1257/aer.99.2.556

Fernandes, N. (2020). Economic effects of coronavirus outbreak (COVID-19) on the world economy. *SSRN Electronic Journal*. [Retrieved from].

Festinger, L. (1962). Cognitive dissonance. *Scientific American*, 207(4), 93–106. doi. 10.1038/scientificamerican1062-93

Finucane, M.L., Alhakami, A., Slovic, P., & Johnson, S.M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*, 13(1), 1–17. doi. 10.1002/(SICI)1099-0771(200001/03)13:1%3C1::AID-BDM333%3E3.0.CO;2-S

Fischhoff, B., & Beyth, R. (1975). 'I knew it would happen' remembered probabilities of once-future things. *Organizational Behavior and Human Performance*, 13(1), 1–16. doi. 10.1016/0030-5073(75)90002-1

Friedman, M. (1957). *A Theory of the Consumption Function*. Princeton, New Jersey, USA: Princeton University Press.

Genschel, P., & Jachtenfuchs, M. (2018). From market integration to core state powers: The Eurozone crisis, the refugee crisis and integration theory. *Journal of Common Market Studies*, 56(1), 178–196. doi. 10.1111/jcms.12654

Gigerenzer, G. (2008). Why heuristics work. *Perspectives on Psychological Science*, 3(1), 20–29. doi. 10.1111/j.1745-6916.2008.00058.x

Griffin, D., & Tversky, A. (1992). The weighing of evidence and the determinants of overconfidence. *Cognitive Psychology*, 24(3), 411–435. doi. 10.1016/0010-0285(92)90013-R

Hale, T., Petherick, A., Phillips, T., & Webster, S. (2020). Variation in government responses to COVID-19. *BSG Working Paper Series*. Oxford, UK. [Retrieved from].

Hantzsche, A., Kara, A., & Young, G. (2018). *The Economic Effects of the Government's Proposed Brexit Deal*. London, UK. [Retrieved from].

Hantzsche, A., & Young, G. (2020). Prospects for the UK economy. *National Institute Economic Review*, 251, F4–F34. doi. 10.1017/nie.2020.11

Heath, C., & Tversky, A. (1991). Preference and belief: Ambiguity and competence in choice under uncertainty. *Journal of Risk and Uncertainty*, 4(1), 5–28. doi. 10.1007/BF00057884

Hunter, D.J. (2020). Covid-19 and the stiff upper lip — The pandemic response in the United Kingdom. *New England Journal of Medicine*, 382(e31). doi. 10.1056/NEJMp2005755

Huo, X., & Qiu, Z. (2020). How does China's stock market react to the announcement of the COVID-19 pandemic lockdown? *Economic and Political Studies*, 0(0), 1–26. doi. 10.1080/20954816.2020.1780695

Iacobucci, G. (2020). Covid-19: UK lockdown is 'crucial' to saving lives, say doctors and scientists. *BMJ (Clinical research ed.)*, 368(March), 1024. doi. 10.1136/bmj.m1204

Jappelli, T., & Pistaferri, L. (2010). The consumption response to income changes. *Annual Review of Economics*, 2(1), 479–506. doi. 10.1146/annurev.economics.050708.142933

Jones, E., Kelemen, R.D., & Meunier, S. (2016). Failing forward? The Euro crisis and the incomplete nature of European integration. *Comparative Political Studies*, 49(7), 1010-1034. doi. 10.1177/0010414015617966

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–292. doi. 10.2307/1914185

Keynes, J.M. (1923). *A Tract on Monetary Reform*. London, UK: Macmillan and Co.

Keynes, J.M. (1936). *The General Theory of Employment, Interest, and Money*. Cham, Switzerland: Springer International Publishing. doi. 10.1007/978-3-319-70344-2

Knight, F.H. (1921). *Risk, Uncertainty, and Profit*. Chicago, Illinois, USA: University of Chicago Press.

Kucharski, A.J., Russell, T.W., Diamond, C., Liu, Y., Edmunds, J., Funk, S., Eggo, R.M., Sun, F., Jit, M., Munday, J.D., Davies, N., Gimma, A., van Zandvoort, K., Gibbs, H., Hellewell, J., Jarvis, C.I., Clifford, S., Quilty, B.J., Bosse, N.I., Abbott, S., Klepac, P., & Flasche, S. (2020). Early dynamics of transmission and control of COVID-19: a mathematical modelling study. *The Lancet Infectious Diseases*, 20(5), 553–558. doi. 10.1016/S1473-3099(20)30144-4

Leland, H.E. (1968). Saving and uncertainty: The precautionary demand for saving. *The Quarterly Journal of Economics*, 82(3), 465–473. doi. 10.2307/1879518

Levell, P., Menon, A., Portes, J. & Sampson, T., 2018. *The Economic Consequences of the Brexit Vote*. Analyses and Briefings. *Cep Brexit Analysis*. London, UK.

Li, K.K. (2020). How does the COVID-19 outbreak affect people's expectation about the macroeconomy? *SSRN Electronic Journal*. [Retrieved from].

Liu, H., Manzoor, A., Wang, C., Zhang, L., & Manzoor, Z. (2020). The COVID-19 outbreak and affected countries stock markets response. *International Journal of Environmental Research and Public Health*, 17(8), 1–19. doi. 10.3390/ijerph17082800

Lopes, L.L. (1987). Between hope and fear: The psychology of risk. *Advances in Experimental Social Psychology*, 20, 255–295. doi. 10.1016/S0065-2601(08)60416-5

Lord, C.G., Ross, L., & Lepper, M.R. (1979). Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology*, 37(11), 2098–2109. doi. 10.1037/0022-3514.37.11.2098

Mahase, E. (2020). Covid-19: UK starts social distancing after new model points to 260 000 potential deaths. *BMJ (Clinical research ed.)*, 368(March), p.m1089. doi. 10.1136/bmj.m1089

Malkiel, B.G. (1962). Expectations, bond prices, and the term structure of interest rates. *The Quarterly Journal of Economics*, 76(2), 197–218. doi. 10.2307/1880816

Mallard, G. (2016). *Bounded Rationality and Behavioural Economics*. Abingdon, UK: Routledge.

Malley, J., & Moutos, T. (1996). Unemployment and consumption. *Oxford Economic Papers*, 48(4), 584–600. doi. 10.1093/oxfordjournals.oep.a028586

McKibbin, W.J., & Fernando, R. (2020). *The Global Macroeconomic Impacts of COVID-19: Seven Scenarios*. *SSRN Electronic Journal*. [Retrieved from].

Miller, D.T., & Ross, M. (1975). Self-serving biases in the attribution of causality: Fact or fiction? *Psychological Bulletin*, 82(2), 213–225. doi. 10.1037/h0076486

Mishkin, F.S. (2009). Is monetary policy effective during financial crises? *American Economic Review*, 99(2), 573–577. doi. 10.1257/aer.99.2.573

Ozili, P.K., & Arun, T. (2020). Spillover of COVID-19: Impact on the Global Economy. *SSRN Electronic Journal*. [Retrieved from].

Pastor, L., & Stambaugh, R.F. (2012). Are stocks really less volatile in the long run? *The Journal of Finance*, 67(2), 431–478. doi. 10.1111/j.1540-6261.2012.01722.x

Phan, D.H.B., & Narayan, P.K. (2020). Country responses and the reaction of the stock market to COVID-19— A preliminary exposition. *Emerging Markets Finance and Trade*, 56(10), 2138–2150. doi. 10.1080/1540496X.2020.1784719

Ramelli, S., & Wagner, A.F. (2020). *Feverish Stock Price Reactions to COVID-19*. Research Paper Series. Zurich, Switzerland.

Rothan, H.A., & Byrareddy, S.N. (2020). The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *Journal of Autoimmunity*, 109(February), 102433. doi. 10.1016/j.jaut.2020.102433

Sandmo, A. (1970). The effect of uncertainty on saving decisions. *The Review of Economic Studies*, 37(3), 353–360. doi. 10.2307/2296725

Shefrin, H., & Statman, M. (1985). The disposition to sell winners too early and ride losers too long: Theory and evidence. *The Journal of Finance*, 40(3), 777–790. doi. 10.1111/j.1540-6261.1985.tb05002.x

Shefrin, H., & Statman, M. (2000). Behavioral portfolio theory. *The Journal of Financial and Quantitative Analysis*, 35(2), 127-151. doi. 10.2307/2676187

Sibony, A.-L. (2020). The UK COVID-19 response: A behavioural irony? *European Journal of Risk Regulation*, (March), 11(2), 350-357. doi. 10.1017/err.2020.22

Simon, H.A. (1972). Theories of bounded rationality. *In*: C.B. McGuire & R. Radner, (eds.), *Decision and Organization*. (pp.161-176), Amsterdam, the Netherlands: North-Holland.

Smales, L.A. (2015). Time-variation in the impact of news sentiment. *International Review of Financial Analysis*, 37, 40–50. doi. 10.1016/j.irfa.2014.11.019

Sohrabi, C., Alsafi, Z., O'Neill, N., Khan, M., Kerwan, A., Al-Jabir, A., Iosifidis, C., & Agha, R. (2020). World health organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *International Journal of Surgery*, 76(February), 71–76. doi. 10.1016/j.ijsu.2020.02.034

Spilimbergo, A., Symansky, S., Blanchard, O., & Cottarelli, C. (2011). Fiscal policy for the crisis. *In*: R.W. Kolb, (ed.), *Lessons from the Financial Crisis: Causes, Consequences, and Our Economic Future*. (pp.587-594), Hoboken, NJ, USA: John Wiley & Sons, Inc.

Taleb, N.N. (2008). *The Black Swan: The Impact of the Highly Improbable*. London, UK: Penguin Group.

Taylor, J.B. (2009). The financial crisis and the policy responses: An empirical analysis of what went wrong. *NBER Working Paper*. No.14631. doi. 10.3386/w14631

Thaler, R.H. (2016). *MISBEHAVING: The Making of Behavioural Economics*. 01 ed. New York, NY, USA: Penguin.

Thompson, S.C. (1999). Illusions of control: How we overestimate our personal influence. *Current Directions in Psychological Science*, 8(6), 187–190. doi. 10.1111/1467-8721.00044

Thornton, J. (2020). Covid-19: A&E visits in England fall by 25% in week after lockdown. *BMJ (Clinical research ed.)*, 369(April), p.m1401. doi. 10.1136/bmj.m1401

Tobin, J. (1971). *Essays in Economics Volume 1: Macroeconomics*. New York, NY, USA: North Holland.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5(2), 207–232. doi. 10.1016/0010-0285(73)90033-9

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157), 1124–1131. doi. 10.1126/science.185.4157.1124

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5(4), 297–323. doi. 10.1007/BF00122574

von Neumann, J., & Morgenstern, O. (1944). *Theory of Games and Economic Behavior*. 1st ed. Princeton, New Jersey, USA: Princeton University Press.

Wason, P.C. (1960). On the failure to eliminate hypotheses in a conceptual task. *Quarterly Journal of Experimental Psychology*, 12(3), 129–140. doi. 10.1080/17470216008416717

Watkins, J. (2020). Preventing a covid-19 pandemic. *The BMJ*, 368(February), 1–2. doi. 10.1136/bmj.m810

Wren-Lewis, S. (2020). The economic effects of a pandemic. *In*: R. Baldwin & B.W. di Mauro, (eds.), *Economics in the Time of COVID-19*. (pp.109-112), London, UK: CEPR Press.

Yarovaya, L., Matkovskyy, R., & Jalan, A. (2020). The effects of a 'black swan' event (COVID-19) on herding behavior in cryptocurrency markets: Evidence from cryptocurrency USD, EUR, JPY and KRW markets. *SSRN Electronic Journal*. [Retrieved from].

Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters*, (April), p.101528. doi. 10.1016/j.frl.2020.101528

Zumla, A., Chan, J.F.W., Azhar, E.I., Hui, D.S.C., & Yuen, K.Y. (2016). Coronaviruses-drug discovery and therapeutic options. *Nature Reviews Drug Discovery*, 15(5), 327–347. doi. 10.1038/nrd.2015.37