An event study analysis of the impact of the COVID-19 shockwaves on the UK stock market

by

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Abstract

The thesis aims to study the impact of the COVID-19 pandemic on the UK stock market and its implications. The research uses an event study methodology, using March 31, 2020, as the event date. The event window chosen for the study is (-50, +50) and (-120, 0) as the estimation window. FTSE 100, FTSE 250, FTSE 350, FTSE All Share, FTSE AIM UK 50, FTSE AIM 100 and FTSE AIM All Share are the indices that will be considered for analysis. The analysis will be conducted over stock market sectors based on market capitalisation and how the COVID-19 pandemic impacted firms of different sizes in terms of their total market capitalisation. The intention is to confirm if the impact was spread across companies of various sizes and how the event has affected their stock performance and financial return. The study uses abnormal and cumulative abnormal returns computed throughout the selected period for analysis, and t-values are used to determine the strength of the evidence supporting or refuting the hypothesis.

The share prices of all the chosen indices dropped drastically or crashed in February and March and rose on average by 15.4% after the event date selected, March 31, 2020. All indices showed positive progression and remained in an uptrend after the event data, which is attributable to swift action taken by the UK government to tackle the Covid pandemic. The market sentiment improved after the event date, and investment in the chosen indices increased after March. The growth in the share prices of the index is also attributable to increased cash flow in the market, with more investors buying stocks after the market crash, leading to the creation of abnormal profits and losses before the event date. The pattern remains the same across all indices, indicating growth in the share prices of stocks, irrespective of their market capitalisation.

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1. Introduction

1.1. Background and Motivation

One of the most significant health emergencies in modern history was the COVID-19 outbreak, which began in late 2019 and quickly spread worldwide. The contagious Coronavirus was first discovered in Wuhan, China, in November 2019; from there, it spread to the whole world within a relatively short period (Muhammad Niaz Khan, Suzanne G. M. Fifield & David M. Power, 2024). In addition to its direct effects on public health, COVID-19 caused economic shockwaves that shook global financial markets. In response to the developing crisis, the UK stock market, a crucial part of the international financial ecosystem, saw sharp volatility. Economic activity was significantly disrupted by the widespread lockdowns and restrictions that followed the initial breakout of COVID-19. The stock market reacted dramatically due to the significant fear and uncertainty this unique situation instilled in investors. Between January and March 2020, the FTSE 100 experienced a substantial downward correction by -22.15% (London Stock Exchange, FTSE Russel, 2020), the most devastating blow to the stock market after the 2008 financial crisis which was described as the worst recession by the IMF since The Great Depression (Martin Lindström & Giuseppe N. Giordano, 2016). The decline in the price of the index was caused by various factors, including interest rate changes and measures initiated by the nation’s central bank to control the supply of cash into the financial system and measures taken to curb inflation (Bank of England, 2024), and declining business activity which in turn created a negative impact on the nation’s gross domestic product output (Office for National Statistics, 2021). Concerning changes in interest rates, as of March 11, 2020, the Bank of England reduced the Bank Rate from 0.75% to 0.25% and further reduced it from 0.25% to 0.10% on March 19, 2020. However, because of the anticipated rate cuts, the FTSE 100 experienced a significant correction of -23.4% between January 17, 2020, to March 11, 2020. After the second rate cut to a historic low of 0.1%, stock markets performed relatively better and continued to remain in an uptrend from March 11, 2020, to FTSE 100 reaching its highest on June 8, 2020, which stood at 6478.2, an increase of 10.25%. As the economy recovered and interest rates rose from 0.1% to 5.25% as of the current day, The FTSE 100 has gradually moved upwards, leading to an increase of 52.92% since March 19, 2020 (Bank of England, 2020).

1.2. Research Objectives and Point of Focus

Event study methodology is used for this dissertation and the point of focus is the abnormal and cumulative abnormal returns. The event window chosen for the study is (-50, +50) and the estimation window is (-120, 0), which covers the period when the sharp drop in index prices occurred due to high volatility and uncertainty and the period of market stability before the crash occurred, providing a clear picture of the relation between changes in the price of indices and the covid-19 crises. This period also provides the best timeline for the calculation of abnormal and cumulative abnormal returns, most relevant to the occurrence of the crises and its impact on the FTSE 100, FTSE 250, FTSE All Share, FTSE AIM All Share and the FTSE 350; these being the indices chosen for analysis.

1.3. Significance and Structure of The Study

The COVID-19 crisis and its impact on the UK stock market is unique in itself when compared to the financial crises of 2008, which wreaked havoc in global financial markets of a similar degree when compared to the pandemic; however, the 2008 financial crises which emerged from the financial sector and majorly affected advanced economies, the pandemic caused an economic slowdown globally, creating problems for every country regardless of size or advancement. The COVID-19 pandemic hurt various stock markets worldwide, whereas some sectors have performed better. For example, sectors include tourism, leisure, fossil fuels, and retailers, excluding firms selling medicine and food. On the other hand, a few industries have fared better, such as technology, tobacco, and the healthcare sector (Griffith et al., 2020). This study focuses on composite indexes based on market capitalisation, specifically in the UK. With a focus on composite indexes, this study aims to analyse market behaviour by examining how resilient the stock markets are during unprecedented events and the impact of volatility on stock market returns, furthermore understanding the scope of market recovery after the incident.

2. Literature Review

2.1 Impact of past exogenous shocks on financial markets.

Unexpected events can have disastrous impacts on global financial markets, and the COVID-19 pandemic was one such event. Many countries worldwide ordered a series of lockdowns immediately, which negatively impacted various sectors. Sectors mainly impacted by the pandemic were high-contact industries that rely more on physical contact, such as FMCG companies involved in the wholesale and retail industry, logistics, and services industries (Office for National Statistics, 2022). The technology and companies that offer digital services performed better during the pandemic as the lockdowns around the world caused companies to shift their workforce online, which led to high demand for products such as video calling and internet services, alongside the increased demand for online shopping and doorstep delivery of goods, further providing a boost to the adaptation of the infrastructure of digital payment services, companies which offer such services too benefitted from the pandemic, (Mazur, M, Dang, M & Vega M, 2020). As global lockdowns took place, the demand for entertainment services was also boosted, leading to an increased demand for OTT platforms and subscriptions (Garima Gupta & Komal Singharia, 2021). With 171 confirmed deaths, COVID-19 was officially declared a Public Health Emergency of International Concern (PHEIC) on January 30, 2020. As of December 31, 2020, the total number of deaths increased to 1.8 million globally. However, preliminary estimates suggest that at least 3 million deaths worldwide in 2020 may have been caused by the COVID-19 pandemic, which is 1.2 million more deaths than those originally reported (WHO, 2021). The constant rise in the number of deaths leads to increased demand for healthcare products and services, which include the supply of medical equipment such as PPE kits, medicines, ventilators, oxygen tanks and vaccines (Zhang D et al., 2020). When looking at previous epidemics, SARS (Severe Acute Respiratory Syndrome) was one such virus that was widespread in many countries and caused issues similar to what has been observed after the COVID-19 outbreak, such as an economic decline in global economies as countries were forced to implement travel restrictions and the fear among people, in turn, lead to reduced consumer spending and a decline in overall large-scale economic activity. The COVID-19 pandemic has been proven to be less deadly but more widespread when compared to SARS, as the number of infected individuals due to the COVID-19 virus was significantly more when compared to SARS; however, the mortality rate of SARS was much higher and hence was considered more deadly (Elmir Musali, 2021). It is quite evident that the COVID-19 virus was less deadly when mortality rates were considered. The mortality rate for the SARS infection stood at 10%, with a total of 8089 cases and 774 deaths which were reported, whereas MERS (Middle East Respiratory Syndrome) had a fatality rate of about 35%, taking into consideration the fact that recorded infected cases stood at 2458 and 848 deaths (Ali Pormahammad, Saied Ghorbani, et al., 2020). Man-made disasters and natural disasters can both have long-lasting impacts on economic activity. On May 12, 2008, the Sichuan province of China experienced an earthquake that caused a devastating blow to infrastructure and local businesses and had a long-term negative impact on agricultural productivity, leading to an estimated loss of up to $150 billion (Zhang Z, Fan Q, et al., 2012). Earthquakes are common in countries like Japan and often cause disruption in Japan's real estate market due to infrastructural damages. Cavallo et al. (2013) studied the long-term outcomes of natural calamities in Japan, the results of which showed that natural calamities in Japan have severely and negatively impacted Japan's GDP growth in the short run, leading to an eventual recovery of the loss over time and caused disruptions in the agriculture and infrastructure sector. Across the world, many countries have dealt with the economic costs of acts of terrorism. In 2011, the United States of America faced the worst terrorist attack in history when the World Trade Centre was attacked by the collision of two aircraft, which led to an estimated loss between $33 billion to $36 billion attributable to losses in earnings, damage to real assets and clean-up costs (Bram, Orr and Rapaport, 2002). Although there isn't a direct relationship between terrorist attacks and the stock market, the panic induced by individuals, property damage, and loss through insurance claims has a ripple effect on the overall market. Therefore, such events share a relationship with behavioural psychology, which plays a crucial role in determining how the stock market of a particular region behaves. On September 20, 2001, the S&P 500 touched an all-time low of $965.8, the lowest it had ever been since 1998. However, the US stock markets showed resilience and quickly recovered after a few weeks of the occurrence of the incident. Hence, it can be incurred from such incidents that natural calamities and disasters may not necessarily have a direct impact on a country's stock market. However, it causes changes in the country's economic activities and efficiency, affecting the stock market. Abadie & Gardeazabel (2003) also studied the economic costs of acts of violence such as terrorism and found that acts of terrorism lead to increased uncertainty, which causes a decline in capital investments and reduces the rate of economic growth by affecting the inflow of cash into the system through foreign direct investment (FDI) and tourism. Hurricane Katrina is another such event that occurred in the US on August 9, 2025, which led to over 37,000 jobs lost in the New Orleans Metropolitan Area (Vigdor J, 2008), causing financial damages, including infrastructure and loss of property value. In 2007, the state of California saw wildfires in the southernmost region, which wreaked havoc on the area's infrastructure, leading to damages to property and losses caused to insurance companies due to the sudden rise in claims, alongside the decline in tourist activity due to the destruction caused by the wildfire which in turn lead to a loss of income; Jon E. Keeley (2009) also examines the policies adopted by the state of California concerning such natural calamities, how effective were the counter measures taken by the government with respect to aiding the state economy at a time of crises.

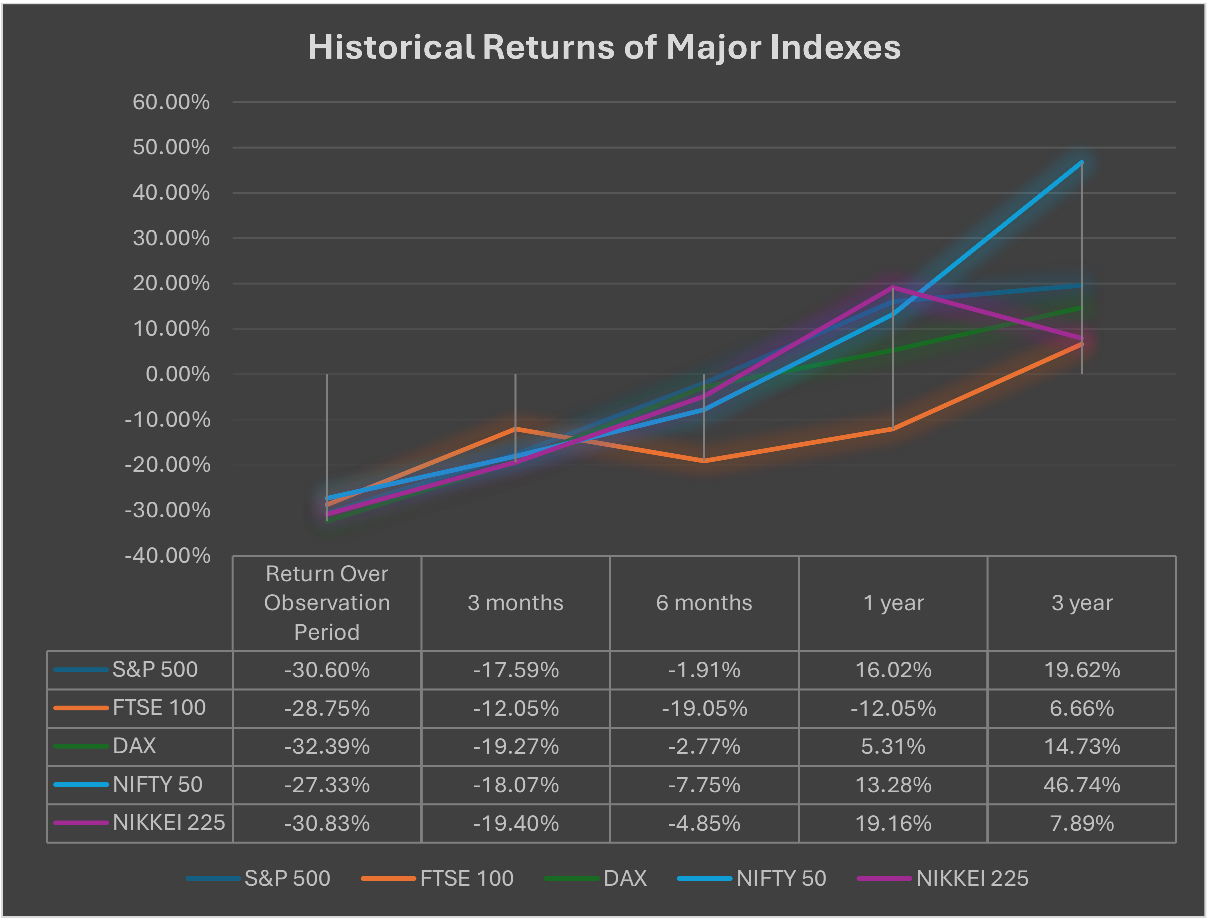
2.2 Impact of COVID-19 on UK and International Markets

The COVID-19 pandemic led to increased volatility in global finance markets as many stock markets lost in value, from the date of announcement, many of which created new lifetime lows. Some countries like India, also had to halt trading in order to stop the decline in the price of the index due to panic selling. The reactions of different countries were not uniform and varied with regards to the spread of the virus regardless of the dates of announcement. Zhang D, Min Hu & Qiang Ji, (2020) studied the correlations among 12 countries covering USA, Europe and Asia, and found that correlations only increase from the month of March and are lower in February, indicating that while there was a rise in the systemic country specific risk, however, the reaction time varies and different nations react differently to the event. This allowed some countries time to manage the problem better than the ones who were the first to take the hit. Global financial markets experienced tremendous volatility during the three months, starting from December to March, in cryptocurrency, exchange rate, stock markets and commodity prices which in unison caused initial negative reactions followed by a recovery in prices (Muhammad Niaz Khan, 2024). These patterns tend to be similar across different stock markets, however, interestingly (Teresia Angelia Kusumahadi & Fikri C Permana, 2021) identified structural changes over the period of January 2019 to June 2020 and observed that these changes occur not just after the first case or COVID-19 was detected but also before and the volatility of returns generated through the stock market was observed in was observed in all 15 countries the study was conducted with respect to, except United Kingdom, the results of which were found based on the threshold auto-generalised heteroskedasticity regressions. Globalisation has created a world where global financial markets are far more interconnected today than before, and therefore, changes in stock markets of one area can have a ripple effect and spread into other regions. On a global scale, the COVID-19 pandemic led to an increase in sector integration with shocks in one sector swiftly impacting another and such ripple effects can be observed from developed markets to more emerging economies (Goodell J.W, 2020). However, due to globalisations, emerging markets have been able to grow at a faster rate, as it has made trade and commerce easy for many countries, also increasing interdependence among nations, which allowed many less developed countries, recover from the effects of the pandemic at a faster rate. Developed economies have more well equipped infrastructure and technology to handle such emergencies caused by natural calamities or epidemics, which tends to help reduce overall financial loss and damage when compared to emerging countries. Ashraf (2020) examined the response of stock markets from 64 countries by using stock market returns and the daily number of cases and deaths recorded and overserved that as the number of cases and deaths increased over time, the magnitude of negative returns also grew, with this pattern being more severe in emerging markets rather than developed markets stating that emerging markets have greater associated risk and inefficient government actions and policies. When we take a look at stock market returns of major international indexes, it is interesting to find that emerging markets generally tend to provide investors with greater returns in a bullish economy or market than stock markets in developed economies due to the higher risk involved in stock markets of emerging countries; the same is true for frontier markets, which implies a well-known fact, the greater the risk, the greater will be the magnitude of profit or loss. In Table 1, we observe the returns of major international indexes from the date of announcement, to the index reaching its lowest point on March 20, 2020 and overall return earned over 3 months, 6 months, 1 year and 3 years respectively. The observation period has been taking into consideration with respect to when the pandemic was announced in the respective countries as the first case of COVID-19 was reported.

Table 1: Observation of returns from the date of announcement.

Index	Country	Observation Period	P1	P2	Observation Period Return	3 Months	6 Months	1 year	3 year
S&P 500	USA	21/01/20 – 20/03/20	3320.79	2304.92	-30.96	-17.59	-1.91	16.02	19.62
FTSE 100	UK	31/01/20 – 20/03/20	7286.01	5190.78	-28.75	-12.05	-19.05	-12.058	6.66
DAX	Germany	27/01/20 – 20/03/20	13204.77	8928.95	-32.39	-19.27	-2.77	5.31	14.73
NIFTY 50	India	30/01/20 – 20/03/20	12035.80	8745.45	-27.33	-18.07	-7.75	13.28	46.74
NIKKEI 225	Japan	16/01/20 – 20/03/20	23933.13	16552.83	-30.83	-19.40	-4.85	19.16	7.89

Figure 1: Historical Returns of International Indexes



	Return Over Observation Period	3 months	6 months	1 year	3 year
S&P 500	-30.60%	-17.59%	-1.91%	16.02%	19.62%
FTSE 100	-28.75%	-12.05%	-19.05%	-12.05%	6.66%
DAX	-32.39%	-19.27%	-2.77%	5.31%	14.73%
NIFTY 50	-27.33%	-18.07%	-7.75%	13.28%	46.74%
NIKKEI 225	-30.83%	-19.40%	-4.85%	19.16%	7.89%

The historical returns of major international indexes have been calculated for the observation period mentioned in the table above and the returns thereafter for 3 months, 6 months, 1 year, and 3 years are calculated with the starting date of the observation period which is also the time period when the first cases of covid were announced in their respective nations. Markets tend to react to information very quickly, and therefore, changes in prices are generally seen earlier as the general public anticipates future events and the possibility of the same occurring as a confirmed event. Quite evidently, all major indexes experienced significant correction in terms of value during the observation period which cover the highest and lowest point, however, all indexes witnessed a downward correction between 28% to 31%, which seems to be quite uniform regardless of market size and value. As economies worldwide recovered from the shock, we can see that the Indian stock market index, NIFTY 50 has provided close to 46.74% return in 3 years’ time, which is significantly higher than most others, followed by the S&P 500, Germany's DAX and Japan's NIKKEI 225 while the FTSE 100 has provided the lowest return of 6.66% and apparently has displayed much slower growth in returns comparatively. Initially as countries took major steps such as travel restrictions and lockdowns, global stock markets were shook due to major economic disruptions, however, in as many nations implemented policies of easing, stock markets recovered quite significantly. In India, the lockdown actually had a positive impact on the performance of Indian indexes, helping the market recover at a faster rate (Mohammad Noor Alam, Md. Shabbir Alam & Kavita Chavali, 2020). The NIFTY 50 displayed positive higher returns during and after the lockdown in multiple sectors such as cement, construction, fertilizers, services and telecom, however these sectors provided negative returns when the pandemic was announced, indicating that while the announcement of the pandemic had a negative impact on the market, however, measure taken by the government such as lockdowns and other restrictions have yielded positive returns in the long run (Dr.T.C.Thomas, Dr.G.Sankararaman & Dr.S.Suresh, 2020). Liu H, (2020) studied the impact of the pandemic on Asian stock markets and found that volatility with respect to average return and cumulative average return was higher in percentage terms when compared with developed countries, as the indices of Hong Kong, Indonesia, Thailand, Singapore and Korea decreased the most in terms of percentage. This indicates higher volatility and risk with respect to many Asian countries and their indices which tends to provide investors with greater profits and losses.

2.3 Link Between Efficient Market Hypothesis (E.M.H) and Financial Markets.

Financial markets and the theory of the efficient market hypothesis are very intimately linked to each other, as changes in the prices of stocks are caused due to increases in trading volume which in turn is caused by the actions of individual investors reacting to news and information, buying and selling stocks, bonds, and exchange traded funds which lead to overall changes in price. According to the EMH, markets are informationally efficient and the essence of all publicly available information is already reflected in asset prices, therefore, there is not much scope to exploit any opportunities, leaving us with a lesser likelihood of constantly generating excessive or abnormal returns (Eugene F Fama, 1970). Burton G. Malkiel, (2003) studied this theory and concluded that there cannot be a huge difference in the rate of return that an average, uninformed investor or trader can earn when compared to that of a seasoned individual simply because asset prices already reflect new and old information in price, leaving no room for exploitation for profit or arbitrage opportunities. Fama (1970), discusses three forms of market efficiently, known as the weak form efficient, the semi-strong from efficient and the strong form efficient. The weak form efficiency indicates that all fundamental factors which can be tabulated in an account such as historical price data, trading volume, price patterns and trends are already incorporated in the price of an asset and hence cannot be used to project future prices (Fama, 1965). When markets are semi-strong form efficient, it indicates that the price of an individual asset reflects all information which is available to the general public such as annual reports and other financial statements released by a firm (Ray Ball & Phillip Brown, (1968). The assumption of the strong form efficiency is that markets completely imbibe all information that is both public and private and hence do not leave any scope for people with special information which may not be available to others to exploit opportunities or out form the market with respect to returns, however, practically stock markets around the world are generally not strong form efficient and individuals with insider or material non-public information can generate abnormal returns with respect to their selections (Jaffe, 1974). Therefore, it is likely that markets across the world will remain semi-strong form efficient which gives room for volatility and results in the production of outliers, top performers and bottom performers when we take a close look at returns.

3. Research Methodology and Information Gathering

This paper uses the event study methodology for the analysis of the impact of the pandemic on major UK stock market indexes which include the FTSE 100, FTSE 250, FTSE 350, FTSE All Share, FTSE AIM UK 50, FTSE AIM 100 and FTSE AIM All Share. The aim of this research paper is to identify and understand the overall impact that the pandemic had on these major indexes over the event window period chosen to be (-50, +50) and days prior to the occurrence of the event, known as the estimation window which is chosen as (-120, 0). The study will calculate abnormal returns and the cumulative abnormal returns and perform test of significance, which is the T-Test on the AR and CAR in order to understand the immediate impact of the pandemic with respect to market indexes and the overall impact which was caused over the longer term. In order to assess whether the market effectively absorbs new information, the t-test is used to determine whether the observed ARs and CARs deviate substantially from zero. A market anomaly or inefficiency would be suggested by any appreciable ARs or CARs after an occurrence, according to the Efficient Market Hypothesis (EMH), which has been discussed previously. Through such analysis, the study will conclude the reaction of the FTSE 100 and 6 other indexes to the COVID-19 pandemic, from the date of its declaration, which will include the analysis of past and future time periods. The paper uses the closing price data of these indexes over the course of the event date which is 50 days before and 50 days after and for the estimation period which is 120 days before the event and all the data with respecting to closing prices have been downloaded from sources such as Refinitiv Eikon. For financial professionals, Refinitiv Eikon provides a complete trade and financial information platform.

3.1 The Significance of The Event Study Methodology

The event study methodology's strong ability to gauge how particular occurrences affect a firm's worth has made it a mainstay in financial research. This method, which has its roots in the groundbreaking research of Fama, Fisher, Jensen, and Roll (1969), provides a methodical way to find out how the market will respond to news about companies, changes in policy, or macroeconomic developments. In order to verify the efficient market hypothesis (EMH), the event study approach is essential. Researchers can determine the level of market efficiency by looking at how fast and precisely stock prices react to new information. This usefulness is shown by Fama's research (1970), which demonstrate how stock prices respond to information that is made publicly available very instantly, so confirming the semi-strong form of market efficiency. Evaluating the market impact of corporate actions, including as mergers and acquisitions, earnings announcements, and dividend changes, is one of the main uses of event studies. MacKinlay (1997), for example, emphasizes how event studies can shed light on the wealth consequences of mergers and acquisitions and offer insights into whether these corporate actions result in value creation or destruction. Event studies are a common tool used by governments and regulatory agencies to assess the efficacy of policy changes. The expected costs or benefits of the new policies can be demonstrated by examining how the stock market responds to them. Using this methodology, Schwert (1981), examined how regulatory changes affected stock market volatility, providing empirical evidence to assist policy assessments. Understanding how macroeconomic announcements, like shifts in interest rates or employment statistics, impact stock prices is made possible through the use of event studies. This approach's usefulness in capturing the anomalous returns linked to economic news—and hence painting a clear picture of market expectations and reactions—was illustrated by Brown and Warner (1985). The approach is widely used in foreign contexts as well, providing insights into how markets respond to events globally. As an illustration of its use in various markets, Campbell, Lo, and MacKinlay (1997) offered a comparative viewpoint on market efficiency and the integration of international financial markets. The methodological rigor of the event study approach is often praised as it enables accurate and reliable investigation of the impact of events on stock prices. This methodology's capacity to compute anomalous returns—the discrepancy between actual stock returns and projected returns that would have happened in the absence of the event—is one of its main advantages. This procedure successfully separates the event's impact from other market movements, giving rise to a distinct image of the event's impact. Researchers frequently use statistical tests to confirm the significance of the reported aberrant returns in order to assure the dependability of the findings. These tests aid in the determination of whether the anomalous results may be explained by chance or whether they are statistically significant. Brown and Warner (1985), for example, went into great detail about the statistical methods applied in event studies and emphasized the significance of robustness checks in terms of verifying the findings. Furthermore, the robustness of the methodology is improved by its flexibility in responding to a variety of settings, such as macroeconomic statements or corporate events. MacKinlay (1997) emphasized the flexibility of the event study technique, showing how it may be applied to a variety of financial markets and event kinds. This flexibility guarantees that, irrespective of the particulars of the event under study, the technique may deliver consistent and trustworthy findings. In conclusion, the exact computation of abnormal returns and the application of stringent statistical tests to validate findings are the foundations of the methodological rigor and robustness of event investigations. These characteristics guarantee that event studies will always be a dependable and insightful method for studying how the market responds to occurrences in financial research.

3.2 Methodology Used for Empirical Analysis.

This study will use the daily returns on the FTSE 100, FTSE 250, FTSE 350, FTSE All Share, FTSE AIM UK 50, FTSE AIM 100 and FTSE AIM All

Share mentioned earlier in order to calculate the abnormal returns (AR) and cumulative abnormal returns (CAR). T-Test will be conducted on abnormal returns and cumulative abnormal returns in order to identify the immediate impact of the pandemic and its significance. The cumulative abnormal return will smoothen returns data over time and provide a clearer picture over the event date and estimation window. While the analysis done on the abnormal returns provides us with insight on a daily frequency, in order to derive more a meaningful understanding from our analysis, the study also computes the average abnormal return (AAR) and the cumulative average abnormal return (CAAR). This strategy smoothens out individual stock fluctuations and emphasizes the overall trend in the market response by averaging anomalous returns across all stocks. If there is a consistent influence on the days inside the event window, it can be shown using the t-test on AAR. A more comprehensive picture of the event's impact is provided by the CAAR, which offers a summary estimate of the cumulative effect of the event over the event frame. In order to calculate daily returns, the following formula as presented in equation 1:

$$R_t = \log (P_t / P_{t-1}) \qquad (1)$$

Where, R_t is the total return of the index for a given time 't'; P_t is the closing price of the index on day t and P_{t-1} is the closing price of the index on day t-1. In order to estimate accurate figures, we use the logarithmic function as stock returns or index return are influenced by the power of compounding and log returns provide a more clear picture with respect to returns.

Post this, we calculate the abnormal return and cumulative abnormal return, however the calculation of abnormal return requires the calculation of expected return. The Modern Portfolio Theory (MPT), which holds that investors maintain diverse portfolios to reduce unsystematic risk, is the foundation upon which CAPM is built, and with the help of this model, we can systematically predict the expected return by taking into account the remaining market risk. The formula for estimating CAPM is as follows in equation 2:

$$E(R_m) = R_f + \beta_m(E(R_m) - R_f) \qquad (2)$$

Where $E(R_m)$ is the expected return on the market, R_f is the risk-free rate, and β_m is the market's beta, a measure of volatility associated with the market.

Once the expected return has been calculated using the CAPM formula, we then move forward and calculate the abnormal return. The abnormal return is the difference between return earned by the index in the given period and the expected return of the index, calculated using CAPM. The formula is as follows:

$$AR_{it} = R_{it} - E(R_{it}) \qquad (3)$$

Where the discrepancy between the predicted and actual returns is known as the abnormal return, or AR_{it}. The index's return over a given time period (t) is the actual return R_{it}. $E(R_{it})$ is the expected return of the index.

After calculating the abnormal return for the event window and the estimation window, the study will then calculate the cumulative abnormal return (CAR) which is calculated as follows:

$$CAR_i = \sum AR_{it} \qquad (4)$$

Excel is used in this research for pre-processing data, and StataSE 18 is used for conducting T-test on the AR and CAR. These two statistical procedures are used to test the significance of the ARs for a certain day and the CARs for a given event window and estimation period. To investigate how the pandemic affected the general pricing of the UK stock market after the epidemic, the Average Abnormal Return (AAR) must also be determined. Typically, the AAR is the average of all companies at a certain point in time and is computed as follows:

$$AAR_{it} = 1/n * \sum AR_{it} \qquad (5)$$

This study calculates the Cumulative Average Abnormal Returns (CAARs) in order to analyse the cumulative effect of occurrences over a certain period of time. The CAAR is the total of the daily AARs for a predetermined event window and estimation window. The Equation is used to calculate the CAARs for predefined windows and is estimated as follows:

$$CAAR_{t} = \sum AAR_{it} \qquad (6)$$

The relevance of the coefficient of AAR on event day t and the CAAR for a certain event window and an estimation window are then examined in this thesis. The t-statistics are calculated using Equations (7) and (8).

$$t\text{-}Test_{AAR} = AAR/\ \sigma AAR_{t} \qquad (7)$$

$$t\text{-}Test_{CAAR} = CAAR/\sigma CAAR_{t} \qquad (8)$$

4. Analysis of Empirical Results

This section of the study attempts to understand the market, risk, and performance of the seven indexes. Thus, the average return and standard deviation of the six indexes and the FTSE 100 index are calculated in this study. The estimation window and the event window are the two components of descriptive statistics that make up this investigation. The mean returns and standard deviations for the FTSE 100 index, as well as the six other indexes (FTSE 250, FTSE 350, FTSE AIM UK 50, FTSE ALL SHARE, FTSE AIM 100 and FTSE AIM ALL SHARE index) for the event window, are displayed in Table 1 and in Table 2 for the estimation window. A significant amount of information can be derived by observing the mean return and the standard deviation of an equity index; valuable information regarding the historical performance of the index can be obtained by simply observing the mean return and the index’s risk profile can be constructed through the observation of the standard deviation. We can determine the relative risk of each index by comparing the standard deviation of the FTSE 100 and the six other indices. For example, compared to the FTSE 100, the FTSE 250, which comprises smaller businesses, usually has a higher standard deviation, indicating higher volatility and possibly higher risk.

Table 1: Descriptive statistics for the event window

Particulars	Mean	Standard deviation
FTSE 100	-0.0029696	0.029628
FTSE 250	-0.0039485	0.0315661
FTSE350	-0.0031333	0.0293881
FTSE ALL SHARE	-0.0031443	0.0291948
FTSE AIM UK 50	-0.0023095	0.0304836
FTSE AIM 100	-0.0020701	0.0295434
FTSE AIM ALL SHARE	-0.0020374	0.0288913

The FTSE 100, FTSE 250, FTSE 350, FTSE All Share, FTSE AIM UK 50, FTSE AIM 100, and FTSE AIM All Share mean returns and standard deviations are displayed in the table over a specified event window. The standard deviation shows the volatility or risk associated with each index, while the mean returns provide light on the average performance of these indices throughout this time period. During the event window, all of the indices display negative mean returns, meaning that, on average, the indices saw a decrease in value. The average return for the FTSE 100 is -0.0029696, indicating a decline of 0.29696%. The FTSE 250 exhibits a 0.39485% decline with a greater negative mean return of -0.0039485. Similar declining tendencies are also evident in the FTSE 350 and FTSE All Share indices, with mean returns of -0.0031333 and -0.0031443, respectively, in line with general market decreases. The FTSE AIM indices, which range from -0.0023095 to -0.0020374, have somewhat smaller negative mean returns. These indexes include AIM UK 50, AIM 100, and AIM All Share. This implies that, in contrast to the larger, more established indices, the AIM market, which often comprises smaller and more growth-oriented companies, saw less severe downfall throughout the event window. The divergence in standard deviations highlights the varying degrees of risk and volatility among the indices, but the consistently negative mean returns point to problems facing the whole market. At 0.0296 (or 2.96%) for the standard deviation, the FTSE 100 shows a rather modest level of volatility. This is to be expected for large-cap equities, which are often less volatile because the companies in this index are more established and reliable. When compared to the FTSE 100, the FTSE 250 has the highest standard deviation, which stands at 0.0316, or 3.16%. This indicates higher volatility. Despite having greater growth potential, mid-cap companies typically show more notable price volatility and are more vulnerable to market shocks.

The standard deviations of the FTSE 350 and FTSE All Share indices are comparable, at about 2.93%. The combined volatility of large and mid-cap corporations is reflected in these indices, which are composites of larger market categories. The standard deviations for the FTSE AIM UK 50, FTSE AIM 100, and FTSE AIM All Share are 3.05%, 2.95%, and 2.89%, in that order. While the AIM UK 50 index shows somewhat greater volatility, these numbers are similar to those of the larger indices. Because they are typically younger and more focused on growth, AIM companies may be more volatile. It appears that smaller-cap stocks in the AIM market were more susceptible to market conditions than larger AIM stocks, based on the FTSE AIM UK 50's slightly higher volatility. Because of their lower volatility, investors with lower risk tolerance may find that exposure to the FTSE 100 or FTSE 350 is more appealing. The lower standard deviation suggests a more steady investment during the downturn, even in spite of the negative mean returns. Given their higher volatility, more aggressive investors seeking bigger potential returns—even at the expense of more risk—might want to take a closer look at the FTSE 250 or AIM indices. Nonetheless, the higher negative returns observed during this event window imply that these investments carry a higher risk of loss during volatile periods. While the FTSE 250 and AIM indices showed higher volatility and so appealed to investors who were more risk tolerant, the FTSE 100 offered more consistent returns with reduced volatility, making it a more conservative pick during the downturn. The least amount of volatility was shown in the FTSE 100 mean return. This implies that although large-cap stock investors saw losses, they were relatively less exposed to risk.

Table 2: Descriptive statistics for the estimation window

Particulars	Mean	Standard deviation
FTSE 100	-.002839	.0243832
FTSE 250	-.0037281	.025364
FTSE350	-.0029863	.0240472
FTSE ALL SHARE	-.0029925	.0239112
FTSE AIM UK 50	-.003523	.0254142
FTSE AIM 100	-.0036883	.0256128
FTSE AIM ALL SHARE	-.0034622	.024399

The table shows descriptive statistics for a number of significant UK stock indexes throughout the estimation window, including mean returns and standard deviations. The FTSE All Share, FTSE AIM UK 50, FTSE AIM 100, FTSE AIM 250, FTSE 350, and FTSE 100 are among the indices. In event studies, the estimation window is a pre-event period that is often used to represent normal performance. These statistics provide an understanding of the average performance and volatility of the indices over this period. The FTSE 100 lost 0.2839% every day on average throughout the estimation frame, according to the mean return of -0.002839. The 0.02438 standard deviation of the FTSE 100 indicates that daily results varied by roughly 2.44% from the mean. Given that large-cap corporations tend to be more stable than other indices, this is comparatively low.

Given that the FTSE 100 comprises large-cap firms, this implies that stock prices of even the biggest and most well-established companies were consistently declining. This might represent more general market conditions, including worries about the macroeconomy or problems unique to a particular industry that impact blue-chip stocks. With a more marked negative mean return of -0.0037281, the FTSE 250 showed an average daily decrease of 0.3728%. Slightly more volatile was the FTSE 250, with a standard deviation of 0.02536, or 2.54%. The higher volatility is a reflection of mid-cap companies' greater susceptibility to market uncertainty and economic fluctuations, even though they have greater growth potential. Due to their higher exposure to local market circumstances than the FTSE 100, mid-cap companies are more susceptible to shifts in the UK economy. This greater loss raises the possibility that mid-cap firms were more susceptible to unfavourable market circumstances throughout the estimating period. The average return for the FTSE 350, which consists of businesses from the FTSE 100 and FTSE 250, was -0.0029863. This indicates a about 0.2986% daily decrease, which is marginally lower than the FTSE 100 but higher than the FTSE 250. The index offers a more comprehensive portrayal of the UK equities market, and its average return indicates that the negative trend observed in large- and mid-cap stocks persisted, albeit to a lesser extent when aggregated. Nearly all UK listed companies are included in the FTSE All Share, which had an average daily loss of -0.2993%. This number closely resembles the FTSE 350 in terms of the proportion of major and mid-cap enterprises. The FTSE 350's standard deviation of 0.02405 indicates volatility that is comparable to that of the FTSE 100 because of its significant overlap with large-cap firms. The FTSE 250 would have had slightly higher volatility than the investors' experience, while smaller-cap indices would have had better stability.

The very equal mean returns of the two indexes indicate that the All Share Index's smaller stocks had little effect on the average as a whole. The Alternative Investment Market (AIM)'s smaller, growth-oriented companies, represented by the FTSE AIM UK 50, had an average decrease of 0.3523%, or a negative mean return of -0.003523. Compared to the FTSE 100 or FTSE 350, the FTSE AIM UK 50 displayed greater volatility with a standard deviation of 0.02541. Smaller, fast-growing businesses should anticipate this degree of volatility because their valuations are more likely to change dramatically in reaction to both market factors and company-specific events. This implies that poor market circumstances also hit AIM-listed firms, which are often more speculative and volatile, albeit to a slightly smaller extent than the FTSE 250. Still, the drop suggests that these smaller businesses were subject to severe downward pressure. The entire AIM market, as represented by the FTSE AIM All Share, had an average return of -0.0034622, or a daily decrease of 0.3462%. This demonstrates that overall losses for smaller-cap companies were higher than those for the overall market, underscoring the higher risks connected to these growth-oriented, speculative enterprises. Out of all the indices, the FTSE All Share has the lowest standard deviation, at 0.02391. This indicates that the UK equities market as a whole had the least volatile index throughout the estimation window, with daily returns that were rather constant. Of all the indices in the table, the FTSE AIM 100 had the highest volatility, with a standard deviation of 0.02561. The standard deviation of the FTSE AIM All Share is 0.02440, which is marginally smaller than that of the FTSE AIM 100. This implies that the AIM market as a whole was less volatile than the top 100 AIM businesses. This might be because there are smaller, less liquid companies present, and thus might not respond to market developments as quickly as larger AIM companies. More aggressive investors faced greater risk in the FTSE AIM indexes, with the possibility for larger losses or gains depending on market conditions. Conservative investors would have done better with investments in the larger-cap indices because of their lower volatility and smaller losses.

4.1 Analysis of Abnormal Returns

4.1.1 Event Window

Table 3: Average Abnormal Returns of Indices

Particular	**AAR**
FTSE 100	**-.0584813**
FTSE 250	**-.0584813**
FTSE 350	**.0022751**
FTSE ALL SHARE	**-.0407763**
FTSE AIM UK 50	**-.0472597**
FTSE AIM 100	**-.0472193**
FTSE AIM ALL SHARE	**-.0471838**

A range of market reactions surrounding the event window are revealed by analysing the average abnormal returns (AAR) for the selected FTSE indices. The information highlights different performance levels; the majority of the indices show negative anomalous returns, which could indicate negative market sentiment or more widespread inefficiencies. The risk-free rate is 4.01% which is equivalent to the yield on the UK 10-year gilt. The same negative abnormal returns of -0.0585 are shown by the FTSE 100 and FTSE 250, indicating a notable and persistent underperformance in large and mid-cap stocks. The synchrony of these indices suggests that the occurrence had a comparable effect on larger segments of the UK market, which could be indicative of wider macroeconomic worries or shocks specific to a particular sector. With a marginally positive abnormal return of 0.0023, the FTSE 350 stands out. In contrast to the larger indices, this minor upward movement suggests that smaller companies, together with the broader basket of constituents, shown resilience or neutral market reactions to the event, while large- and mid-cap stocks underperformed. Compared to the FTSE 100 and 250, FTSE All Share exhibits a significantly lower negative abnormal return of -0.0408, which is consistent with the general downward trend in large-cap equities. This could imply that smaller index components mitigated the general bearish attitude of the market. The negative abnormal returns of FTSE AIM UK 50, AIM 100, and AIM very Share are very similar, ranging from -0.0472 to -0.0473. These smaller, high-growth AIM indices likewise experienced sharply negative anomalous returns, which is probably due to increased market sensitivity and volatility in smaller, more speculative stocks. The results are statistically robust and highly significant, with a p-value of 0.0000 and a mean abnormal return of -0.0503 and a matching t-statistic of -14.09. During the event window, the FTSE 100 index's average abnormal return (AAR) was -0.0585, indicating a significant negative divergence from the expected performance. This ongoing underperformance indicates that the occurrence caused a dramatic decrease in investor mood as the market reacted unfavourably, either due to unfavourable information or macroeconomic factors. The 95% confidence interval, which spans from -0.0574 to -0.0432, confirms the extent of this adverse response. The genuine mean anomalous return can be estimated with high precision, as evidenced by the narrow confidence boundaries. With a t-statistic of -15.39, the FTSE 250 data show an average abnormal return (AAR) of -0.0585. This significant negative abnormal return suggests a strong market reaction and indicates severe underperformance during the event timeframe. Regarding the size of the negative returns, there is a high degree of assurance with a 95% confidence interval that spans from -0.0661 to -0.0509. A standard deviation of 0.0316 and a tight confidence interval point to minimal variability in anomalous returns, which is consistent with negative market sentiment during this time. Based on the event window (-50, +50), the results show a marginally favourable performance with an average abnormal return (AAR) of 0.0023. The p-value of 0.5223 and the t-statistic of 0.64 indicate that there is no statistical significance in this departure from expected performance. The idea that the anomalous returns are statistically identical to zero is further supported by the fact that the 95% confidence interval, which spans from -0.0048 to 0.0093, includes zero. The returns exhibit moderate variability, as indicated by the standard deviation of 0.0294; nevertheless, this fluctuation does not seem to correspond with any significant pattern. Based on a t-statistic of -11.60 and an average abnormal return (AAR) of -0.0408, the findings indicate a significant underperformance in comparison to market expectations. A significant and statistically significant negative abnormal return is seen from the 95% confidence interval, which spans from -0.0478 to -0.0338. The comparatively modest standard deviation of 0.0292 indicates that the index-wide negative performance trend was persistent despite considerable heterogeneity. For the FTSE AIM UK 50 index, the t-test conducted within the event window indicates a significant negative market reaction. With a t-statistic of -12.88, the average abnormal return (AAR) is -0.0473, signifying an extremely substantial departure from the expected returns.

The mean abnormal return's 95% confidence interval, which spans from -0.0546 to -0.0399, verifies the performance's constant negative outcome. Its tight range emphasizes an accurate assessment of the negative impact. The comparatively constant downward trend over the course of the sample period is further highlighted by the standard deviation of 0.0305. The statistical significance of the observed negative anomalous returns is indicated by the p-value of 0.0000, which implies a severe negative reaction by the market. The FTSE AIM 100 Index has an average abnormal return of -0.0472 and a t-statistic of -13.28. This indicates a serious underperformance that is statistically significant.

The range of the mean abnormal return's 95% confidence interval, which is -0.0543 to -0.0401, confirms the magnitude of the negative deviation. The average negative anomalous return was estimated with great precision, as evidenced by the narrow confidence interval. The trend is generally negative, despite considerable variability, as seen by the standard deviation of 0.0295. The observed negative anomalous returns are extremely statistically significant, as shown by the p-value of 0.0000. The sharp fall in the FTSE AIM 100 index indicates that there was a significant negative response to the incident, implying that the small-cap, high-growth companies in this index were particularly impacted. With a t-statistic of 61.43, the one-sample t-test for the FTSE AIM All Share index shows an abnormally high average return of 794.66. This t-statistic highlights a notable positive market reaction by showing an abnormally big divergence from the expected mean. With a narrow interval indicating a high degree of precision in determining the genuine mean abnormal return, the 95% confidence interval, which ranges from 768.85 to 820.47, indicates that the abnormal returns are consistently high. 108.24 is the standard deviation, which adds credence to the idea that overall performance is remarkably positive despite some variability. This result's p-value of 0 effectively confirms the statistical significance of the observed anomalous returns.

4.1.2 Estimation Window.

Table 4: Average Abnormal Returns – Estimation Period

Particular	AAR
FTSE 100	**-.0501276**
FTSE 250	**-.0583979**
FTSE 350	**-.0016843**
FTSE ALL SHARE	**-.0364502**
FTSE AIM UK 50	**-.0484607**
FTSE AIM 100	**-.0488079**
FTSE AIM ALL SHARE	**-.048716**

Throughout the estimation window, the average abnormal returns (AAR) for the FTSE indexes show that the market was largely reacting negatively. The large-cap and mid-cap equities of the FTSE 100 and FTSE 250 saw notable decreases, as indicated by their respective AARs of -0.0501 and -0.0584. On the other hand, the FTSE 350 displayed an almost neutral AAR of -0.0017, indicating a certain degree of stability within this wider index. With a moderate negative return of -0.0365, the FTSE All Share showed a small underperformance over a broad variety of UK-listed businesses. The AIM indices' small-cap stocks suffered the most; the average anomalous returns for the FTSE AIM UK 50, FTSE AIM 100, and FTSE AIM All Share were -0.0485, -0.0488, and -0.0487, respectively. This consistency draws attention to the fact that smaller, fast-growing businesses are more vulnerable to market changes. Overall, the data reveals a markedly negative response in most indexes, with smaller, high-growth equities suffering more negative effects and larger companies seeing considerable decreases.

For the FTSE 100 index, the t-test yields a t-statistic of -18.62 and a significant negative abnormal return of -0.0501. This finding suggests that performance has declined sharply and statistically significantly. With a 95% confidence interval that spans from -0.0555 to -0.0448, the average abnormal return is assessed with good precision when it comes to measuring the negative deviation. Although there is some variation in the returns, as seen by the standard deviation of 0.0244, the overall trend is still rather negative. The statistical significance of the observed negative returns is confirmed by the p-value of 0.0000, which indicates a serious adverse reaction by the market. A t-statistic of -20.85 and an average abnormal return of -0.0584 are shown for the FTSE 250 index during the estimation timeframe. This suggests a very strong negative response from the market. This mean's 95% confidence interval, which runs from -0.0640 to -0.0528, provides a clear measure of how much of a negative influence it has. Although the returns appear to be moderately variable, the overall negative trend is still strong, as indicated by the standard deviation of 0.0254. The observed negative returns' statistical significance is further confirmed by the p-value of 0.0000. A t-statistic of -0.63 and an average abnormal return of -0.0017 are shown for the FTSE 350 index. This outcome suggests a market response that is almost neutral and does not significantly deviate from expected returns. The average abnormal return is not statistically different from zero, as indicated by the 95% confidence interval, which spans from -0.0070 to 0.0036. This indicates a somewhat consistent performance for this wider index. This stability is supported by the 0.0240 standard deviation, which exhibits moderate variability around the mean. The FTSE 350 index, which consists of a mix of large and mid-cap equities, may have very slightly or insignificantly benefited from the event, as indicated by the p-value of 0.2639, which verifies that the observed returns are not statistically significant.

A t-statistic of -13.80 indicates an average abnormal return of -0.0365 for the FTSE All Share index. This outcome suggests a markedly unfavourable market response. The precise and statistically significant nature of the negative anomalous return is confirmed by the 95% confidence interval, which spans from -0.0417 to -0.0312. Moderate variability around the mean is reflected by the 0.0239 standard deviation. The statistical significance of the observed negative returns is highlighted by the p-value of 0.0000, which also indicates a noteworthy fall in the performance of the FTSE All Share index. This significant negative impact, which reflects a sharp decline in market performance during the estimation window, points to a more widespread detrimental effect on a broad range of UK-listed companies. With a t-statistic of -17.27, the one-sample t-test for the FTSE AIM UK 50 index indicates an average abnormal return of -0.0485 during the estimation window (-50, +50). This suggests a very strong negative response from the market. The precise estimate of the negative impact is confirmed by the 95% confidence interval, which ranges from -0.0540 to -0.0429, indicating its statistical significance. The considerable degree of variability around the mean is indicated by the standard deviation, which is 0.0254. The robustness of the observed negative returns is further validated by the p-value of 0.0000. This result reflects a significant market decline in this segment during the estimation period and emphasizes a markedly negative impact on high-growth, small-cap stocks inside the FTSE AIM UK 50. With a t-statistic of -18.08, the one-sample t-test for the FTSE AIM All Share index shows an average abnormal return of -0.0487 during the event window (-50, +50). There has been a notable market reaction, as evidenced by this large negative divergence from predicted returns. The precision and statistical significance of the observed negative impact are validated by the 95% confidence interval, which spans from -0.0541 to -0.0434. The moderate variability around the mean is indicated by the standard deviation of 0.0244. The robustness of the negative returns is reinforced by the p-value of 0.0000, which indicates a significant negative impact on the larger category of AIM-listed stocks.

The sharp reduction in market performance and investor sentiment for small-cap and growth-oriented companies in the FTSE AIM All Share index throughout the estimation window is highlighted by this sharp decline.

4.2 Analysis of Cumulative Average Abnormal Returns

4.2.1 Event Window

Table 5: Cumulative Average Abnormal Returns – Event Window

Particular	CAAR (in percentage)
FTSE 100	-1.83887
FTSE 250	-2.127182
FTSE 350	-.026821
FTSE ALL SHARE	-1.511942
FTSE AIM UK 50	-1.76336
FTSE AIM 100	-1.756412
FTSE AIM ALL SHARE	-1.75744

For all FTSE indices, the cumulative average abnormal returns (CAAR) show a generally negative trend, indicating a deterioration in performance compared to expected returns during the event frame. With a CAAR of -1.83887%, the FTSE 100 has a notable negative divergence from expected returns. Comparably, the even more prominent FTSE 250 displays a CAAR of -2.127182%, indicating a significant negative market reaction within this index. Though still negative, the FTSE 350's CAAR of -0.026821%, when compared to the other indices, is comparatively smaller, suggesting a less severe impact. The CAAR for the FTSE All Share index is -1.511942%, which is slightly less severe than the other indexes' negative trend but still in line with it. The CAARs for the FTSE AIM UK 50 and FTSE AIM 100, respectively, are -1.76336% and -1.756412% indicating a significant reduction in anomalous returns. In line with the AIM UK 50 and AIM 100, the FTSE AIM All Share index exhibits a similar downward trend, with a CAAR of -1.75744%. The negative CAARs for all of these indices point to a broadly negative market response to the event, albeit one that has varied in severity. AIM indices show slightly bigger negative deviations, possibly reflecting their greater sensitivity to market movements. The consistent negativity across multiple indices reveals a significant market response that affected a broad range of the FTSE indices. This large drop in CAARs emphasizes how crucial it is to look at this particular occurrence in more detail and how it may affect different market groups.

The cumulative average abnormal returns (CAAR) of the FTSE 100 index over the event window are shown to have a mean of -1.83887, a standard error of 0.1236063, and a standard deviation of 1.034164 in the one-sample t-test results. The extremely significant t-statistic of -14.8768 has been computed. For the cumulative abnormal returns of the FTSE 250 index over the event window, the one-sample t-test findings show a mean CAAR of -2.127182, with a standard deviation of 1.209561 and a standard error of 0.1445702. The extremely significant t-statistic of -14.7138 is obtained. The test's p-value, which compares the alternative hypothesis (Ha: mean < 0) to the null hypothesis (H0: mean = 0), is 0.0000. The FTSE 250 index clearly had a significant and statistically significant negative anomalous return during the event window, as seen by the fact that the mean CAR is significantly less than zero. The incredibly low p-value indicates that there is little chance that this negative CAAR is the result of random variation, proving that the event had a negative impact. The FTSE 350 index's cumulative average abnormal returns (CAAR) over the event window had a mean CAAR of -0.026821%, a standard error of 0.0123058, and a standard deviation of 0.1029579, according to the findings of a one-sample t-test. The t-statistic that was computed is -2.1795. This indicates that during the event window, the FTSE 350 index had a considerable but very small negative anomalous return. While there is a negative mean CAR, this effect is not as strong as the more severe decreases shown in other indices. This result's significance highlights a noticeable, however little, negative market reaction that affected the FTSE 350 index. This could indicate that the market's reaction to the incident was more subdued than it was for other market categories. The FTSE 350 index's cumulative average abnormal returns (CAAR) over the event window had a mean CAAR of -0.026821%, a standard error of 0.0123058, and a standard deviation of 0.1029579, according to the findings of a one-sample t-test. The t-statistic that was computed is -2.1795. This indicates that during the event window, the FTSE 350 index had a considerable but very small negative anomalous return. While there is a negative mean CAAR, this effect is not as strong as the more severe decreases shown in other indices. This result's significance highlights a noticeable, however little, negative market reaction that affected the FTSE 350 index. This could indicate that the market's reaction to the incident was more subdued than it was for other market categories. The FTSE All Share index's cumulative average abnormal returns (CAAR) over the event window were measured using a one-sample t-test. The mean CAAR was -1.511942%, with a standard error of 0.1008287 and a standard deviation of 0.8435936. The t-statistic that was computed, -14.9951, is extremely significant. Strong statistical proof that the FTSE All Share index saw large negative anomalous returns during the event window is provided by the fact that the mean CAAR is significantly less than zero. It is further supported by the confidence interval of -1.71309 to -1.310794 that the cumulative anomalous returns are considerably negative. Given the incredibly low p-value, it seems doubtful that this negative market reaction is the result of coincidence. For the FTSE AIM UK 50 index, the one-sample t-test findings for the cumulative abnormal returns (CAAR) over the event window show a mean CAAR of -1.76336%, with a standard deviation of 0.9761288 and a standard error of 0.1166697. With a p-value of 0.0000, the t-statistic of -15.1141 indicates that the hypothesis that the mean CAR is less than zero is extremely significant.

The FTSE AIM 100 index's cumulative abnormal returns (CAAR) over the event window were examined using a one-sample t-test. The results revealed a mean CAAR of -1.756412%, with a standard error of 0.1169325 and a standard deviation of 0.9783275. The extremely significant t-statistic of -15.0207 is obtained. The test's p-value of 0.0000 shows that the mean CAAR is substantially less than zero. The negative CAAR is further supported by the 95% confidence interval, which goes from -1.989686 to -1.523138. These findings strongly imply that throughout the event window, the FTSE AIM 100 index saw notable and statistically significant negative anomalous returns. The incredibly low p-value indicates that there is almost no probability that this outcome could have happened by accident. The FTSE AIM 100 index saw a markedly unfavourable market reaction, as indicated by the significant negative CAAR, which is probably the result of increased sensitivity to the event under analysis. This research highlights how susceptible AIM-listed equities are to market developments and how broadly they affect this market segment. The mean cumulative abnormal returns (CAAR) of the FTSE AIM All Share index over the event window are -1.75744%, with a standard error of 0.1166549 and a standard deviation of 0.9760049, according to the one-sample t-test results. The hypothesis that the mean CAAR is less than zero has a p-value of 0.0000 and a highly significant t-statistic of -15.0653. Strong statistical evidence is presented by this finding, indicating that during the event window, the FTSE AIM All Share index had considerably negative anomalous returns. It is further supported by the 95% confidence interval, which spans -1.99016 to -1.52472, that the negative returns are significant and persistent. Given the extremely low p-value, it is exceedingly improbable that this negative market reaction was the result of coincidence. These results show that the incident had a significant negative influence on the FTSE AIM All Share index, underscoring the AIM segment's general negative reaction as well as the vulnerability of AIM-listed stocks to market events. This implies that the incident had a significant negative impact on smaller, growth-oriented businesses that are usually included in the AIM indices.

4.2.2 Estimation Window

Table 6: Cumulative Average Abnormal Returns – Estimation Window

Particular	**CAAR**
FTSE 100	**-.0501276**
FTSE 250	**-.0583979**
FTSE 350	**-.0016843**
FTSE ALL SHARE	**-.0364502**
FTSE AIM UK 50	**-.0484607**
FTSE AIM 100	**-.0488079**
FTSE AIM ALL SHARE	**-.048716**

Examining the cumulative average abnormal returns (CAAR) for a number of FTSE indices reveals that the event in question had a generally unfavourable effect on several sectors of the UK equities market. A slight negative CAAR of -0.0501276, which represents the greatest blue-chip companies, was registered by the FTSE 100, indicating a downward shift in shareholder value expectations. Despite being modest, this loss is indicative of how market participants adjusted the large-cap businesses' expected returns in the wake of the incident. With a CAAR of -0.0583979, the FTSE 250, which includes mid-cap firms that are frequently more susceptible to domestic economic conditions, saw a more severe decrease. This implies that medium-sized businesses were disproportionately affected by the event, either as a result of their heightened vulnerability to unstable market conditions or their reliance on negatively impacted regional variables.

With a CAAR of -0.0016843, the FTSE 350, which is the result of combining the FTSE 100 and FTSE 250, displayed a somewhat subdued negative response. This figure, which is almost zero, suggests that when combined with the more vulnerable FTSE 250 companies, the larger companies (FTSE 100) may have helped mitigate the overall impact. A thorough representation of the UK market, the FTSE All Share index, reported a negative CAAR of -0.0364502. Given that abnormal returns were under pressure to decline for both larger and smaller businesses, this suggests a widespread market reaction. As a bellwether, this index shows how the market is feeling generally about the incident. Looking now at the smaller, growth-oriented companies that make up the AIM indexes, we could see that the negative CAARs were almost exactly matched. The CAAR for the FTSE AIM UK 50 was -0.0484607, for the FTSE AIM 100 it was -0.0488079, and for the FTSE AIM All Share it was -0.048716. These findings imply that a significant reassessment of the growth potential for smaller companies listed on the AIM market was brought about by the event. Because of their higher risk-reward profile, AIM-listed companies are frequently more vulnerable to market shocks. The consistency of the CAAR across the AIM indexes indicates a high level of market pessimism toward these growth-oriented companies. To sum up, all indexes' negative CAARs highlight the need for a reassessment of stock values throughout the market, with growth and mid-cap firms showing the most vulnerability. The general consensus is that, following the event, investors priced in lower-than-expected returns; riskier, smaller enterprises were most affected by this shift in opinion. The indices exhibit a consistent trend that points to a noteworthy adverse occurrence that may cause the market to reevaluate its expectations for future performance. The FTSE 100 index's cumulative average abnormal returns (CAAR) have a mean of -2.10536, a standard deviation of 1.208273, and a standard error of 0.1326252, according to the findings of a one-sample t-test. With a p-value of 0.0000, the t-statistic is -15.8745, indicating that it is very significant. This suggests that the average CAAR is far below zero, offering strong evidence against the null hypothesis (H0: mean = 0). The 95% confidence interval supports the conclusion that the CAAR is significantly negative, ranging from -2.369194 to -1.841526. The cumulative average abnormal returns (CAAR) of the FTSE 250 index, according to the one-sample t-test results, have a mean of -2.45271, a standard deviation of 1.407619, and a standard error of 0.1545062. -15.8745 is the t-statistic. As evidenced by the 95% confidence interval, which goes from -2.760072 to -2.145348, the CAAR is clearly significantly negative. According to these findings, there was a notable decline in market valuations throughout the event window, which resulted in a severe negative anomalous return for the FTSE 250 index. The extent of the negative CAAR suggests that mid-cap stocks—which are often more susceptible to economic changes than their large-cap counterparts—were significantly and negatively impacted by the event. The cumulative average abnormal returns (CAAR) of the FTSE 350 index, according to the one-sample t-test results, have a mean of -0.0707399, a standard deviation of 0.0405979, and a standard error of 0.0044562. -15.8745 is the t-statistic. The CAAR's 95% confidence interval, which spans from -0.0796047 to -0.0618751, verifies the model's considerable negative value. These results show that during the event window, the FTSE 350 index had a significant negative anomalous return, indicating a strong negative reaction in the market. The FTSE 350 index includes the FTSE 100 and FTSE 250 indexes, therefore the statistical importance highlights the event's significant impact on a wide range of large-cap and mid-cap equities. The FTSE All Share index's cumulative average abnormal returns (CAAR) have a mean of -1.530909, a standard error of 0.0964382, and a standard deviation of 0.8785941, according to the findings of a one-sample t-test. With a p-value of 0.0000 and a t-statistic of -15.8745, it is confirmed that the CAAR is significantly negative, conclusively rejecting the null hypothesis (H0: mean = 0). The significant negative impact noted is further supported by the 95% confidence interval for the CAAR, which spans from -1.722756 to -1.339063. These findings show that abnormal returns on the FTSE All Share index significantly decreased throughout the event window, indicating a strong negative reaction across a wide range of UK shares. The FTSE AIM UK 50 index's cumulative average abnormal returns (CAAR) have a mean of -2.035351, a standard deviation of 1.168095, and a standard error of 0.1282151, according to the findings of a one-sample t-test. Given that the mean CAAR is significantly negative, as indicated by the t-statistic of -15.8745 and the p-value of 0.0000, we may confidently reject the null hypothesis (H0: mean = 0). The discovery of a significant negative anomalous return is further supported by the 95% confidence interval, which ranges from -2.290412 to -1.780291. This implies that there was a notable negative response from investors, as evidenced by the FTSE AIM UK 50 index's considerable return loss throughout the event window. The FTSE AIM 100 index's cumulative average abnormal returns (CAAR) have a mean of -2.049933, with a standard deviation of 1.176463 and a standard error of 0.1291336, according to the findings of a one-sample t-test. Strongly rejecting the null hypothesis (H0: mean = 0) is the t-statistic of -15.8745 with a p-value of 0.0000, which shows that the mean CAAR is significantly negative. The significant negative impact noted is supported by the 95% confidence interval for the CAAR, which spans from -2.306821 to -1.793045. These results indicate that there was a significant negative reaction from investors during the event window, as seen by the sharp fall in anomalous returns recorded by the FTSE AIM 100 index. The FTSE AIM All Share index's cumulative average abnormal returns (CAAR) have a mean of -2.046073, a standard deviation of 1.174248, and a standard error of 0.1288905, according to a one-sample t-test study. The null hypothesis, which states that the mean CAAR is considerably negative, is firmly rejected due to the t-statistic of -15.8745 and p-value of 0. This conclusion of a significant negative abnormal return is supported by the 95% confidence interval of the CAAR, which ranges from -2.302477 to -1.789668. This suggests that throughout the event window, returns on the FTSE AIM All Share index significantly decreased, indicating a major negative response from investors.

Table 7: CAR for Event Window in range of (-30,+30)

Particulars	CAR	T-Statistic
FTSE 250	-.4164561	6.06
FTSE 350	-.064211	47.73
FTSE ALL SHARE	-.0966565	43.81
FTSE AIM UK 50	-.4363476	3.79
FTSE AIM 100	-.6087934	4.05
FTSE AIM ALL SHARE	-.8442967	4.25

The table highlights noteworthy market reactions by displaying the T-statistics and Cumulative Abnormal Returns (CAR) for different FTSE indexes across a (-30, +30) event window. With a T-statistic of 6.06 and a CAR of -0.4165, the FTSE 250 exhibits significant underperformance throughout the event. With CARs of -0.0642 and -0.0967, respectively, the FTSE 350 and FTSE All Share show less dramatic drops; but, their high T-statistics indicate statistically significant outcomes. The AIM indices had the biggest drops, with the FTSE AIM All Share (-0.8443 CAR) leading the way. This indicated a clear detrimental effect on smaller, growth-oriented businesses. These results point to widespread market contractions that disproportionately impact smaller businesses.

Table 8: CAR for event window in range of (-45,+45)

Particulars	CAR	T-Statistic
FTSE 250	-.5689121	7.92
FTSE 350	-.0926629	61
FTSE ALL SHARE	-.1427213	57.01
FTSE AIM UK 50	-.7660747	4.91
FTSE AIM 100	-1.003172	5.32
FTSE AIM ALL SHARE	-1.349063	5.61

The FTSE indexes' Cumulative Abnormal Returns (CAR) and matching t-statistics are shown in this table for a 90-day event window (-45 to +45). All indexes' CAR values are negative, which suggests that there were unusual losses during the event. The FTSE 350 has a CAR of -0.0927 but an extraordinarily high t-statistic of 61, indicating a strong, statistically significant link, whereas the FTSE 250 displays a CAR of -0.5689 with a t-statistic of 7.92. Similar to the FTSE ALL SHARE, which further emphasizes substantial statistical significance, the CAR is -0.1427 with a t-statistic of 57.01. As opposed to this, the AIM indices (AIM UK 50, AIM 100, and AIM ALL SHARE) show more prominent negative CARs, with t-statistics between 4.91 and 5.61 and a range of -0.7661 to -1.3491, indicating that their aberrant returns are not as statistically significant as those of the larger indexes. All in all, the data shows that although there were negative anomalous returns for all the indices, larger indices such as the FTSE 350 and ALL SHARE show more statistical significance than the AIM indexes.

Table 9: CAR for event window in range of (-45,+90)

Particulars	CAR	T-Statistic
FTSE 250	-.7270343	10.82
FTSE 350	-.1175085	80.13
FTSE ALL SHARE	-.1906485	76.04
FTSE AIM UK 50	-1.302455	5.58
FTSE AIM 100	-1.754025	5.61
FTSE AIM ALL SHARE	-2.208395	5.98

For a range of FTSE indices, this table shows the Cumulative Abnormal Returns (CAR) and matching t-statistics during a 135-day event window (-45 to +90). Interestingly, all of the indices have negative CARs, meaning that throughout this time, the stocks that make up these indices have suffered large anomalous losses. With a t-statistic of 10.82 and a CAR of -0.7270 for the FTSE 250, this indicates a significant negative impact with a moderate level of statistical significance. On the other hand, the t-statistics of FTSE 350 and FTSE ALL SHARE are exceptionally high, at 80.13 and 76.04, respectively. This suggests that their significant negative CARs of -0.1175 and -0.1906, respectively, have considerable statistical significance. In contrast to the larger indices, the AIM indexes (FTSE AIM UK 50, FTSE AIM 100, and FTSE AIM ALL SHARE) exhibit more pronounced CARs ranging from -1.3025 to -2.2084, but their lower t-statistics, which range from 5.58 to 5.98, indicate that these returns are still significantly negative. Compared to smaller AIM indices, larger indices demonstrate a highly substantial statistical confirmation of these impacts, implying serious negative implications across the board.

Table 9: CAR for event window in range of (-45,+180)

Particulars	CAR	T-Statistic
FTSE 250	-1.639351	14.93
FTSE 350	-.2688684	119.25
FTSE ALL SHARE	-.3855287	111.93
FTSE AIM UK 50	-5.346849	1.57
FTSE AIM 100	-5.638861	1.54
FTSE AIM ALL SHARE	-3.840929	7.75

The Cumulative Abnormal Returns (CAR) and associated t-statistics for a range of FTSE indices are shown in this table during an event window of (-45, +180), about March 31, 2019, the pre-COVID period. The information reveals notable variations amongst indices. very, the t-statistics for the FTSE 350 and FTSE All Share indexes are very high at 119.25 and 111.93, respectively. Given their similar composition, this can be explained by the strong correlation between these indices and the market index (FTSE 100). Given that the market's movement accounts for nearly all of the returns on these indices, the statistical significance is strong due to the high t-values. t-statistics are significantly lower for smaller indices, such as the FTSE AIM UK 50 and FTSE AIM 100, suggesting weaker correlations with the overall market and maybe more distinct responses to the COVID-19 event. This comparison shows how sensitivity to the event is affected by market size and index composition

Particulars	CAR	T-Statistic
FTSE 250	20.69118	25.94
FTSE 350	-1.580831	177.49
FTSE ALL SHARE	-.3794215	152.16
FTSE AIM UK 50	-7.069978	6.71
FTSE AIM 100	-7.259915	6.60
FTSE AIM ALL SHARE	-3.513188	18.28

For a range of FTSE indices, the table displays the Cumulative Abnormal Returns (CAR) and matching T-statistics over an event window of (-45, +180) around the event date. This data is probably related to the COVID-19 pandemic's effects. Strong statistical significance is indicated by the FTSE 250's positive CAR of 20.69118 and comparatively high T-statistic of 25.94. Conversely, indexes such as the FTSE 350 and FTSE ALL SHARE, with remarkably high T-statistics of 177.49 and 152.16, respectively, have negative CAR values, suggesting unfavourable market reactions. Unusual high T-statistics may indicate overfitting or multicollinearity in the regression model, particularly when regressing the market index (FTSE 100) against highly correlated indices such as FTSE 350 and FTSE ALL SHARE. These exaggerated values point to an extremely sensitive link in the relationship, which may call for additional investigation or model modifications to increase interpretability and robustness.

5. Discussion

The findings of this research demonstrate the significant impact of the COVID-19 pandemic on the UK stock market, as demonstrated by the noteworthy abnormal returns (ARs) and cumulative abnormal returns (CARs) observed in several major indices, such as the FTSE All Share, FTSE 100, FTSE 250, and FTSE 350. The effect was detrimental, especially in the early months of the pandemic, since investor trepidation and market turbulence were evident. The findings of this research demonstrate the significant impact of the COVID-19 pandemic on the UK stock market, as demonstrated by the noteworthy abnormal returns (ARs) and cumulative abnormal returns (CARs) observed in several major indices, such as the FTSE All Share, FTSE 100, FTSE 250, and FTSE 350. The effect was detrimental, especially in the early months of the pandemic, since investor trepidation and market turbulence were evident. The large-cap and mid-cap indices of the FTSE 100 and FTSE 250 showed significant negative anomalous returns. With a highly significant t-statistic of -14.8768 and a p-value of 0.0000, the FTSE 100's CAR of -1.83887 confirmed the market's severe decline during the event window.

Comparably, the FTSE 250 saw a CAR of -2.12718 and a t-statistic of -14.7138, indicating that mid-cap companies were considerably more affected. The findings indicate that mid-sized and big companies saw notable effects, with mid-cap companies being somewhat more susceptible because of their comparatively higher market volatility. FTSE All Share and FTSE 350: These indices, which reflect the overall market, also experienced negative returns, albeit to a lesser extent than the FTSE 100 and FTSE 250. With a t-statistic of -2.1795 and a CAR of -0.026821, the FTSE 350 showed a less severe decrease than larger indices. With a CAR of -1.51194, the FTSE All Share indicated a general market decline, albeit one that may have been slightly offset by smaller equities. Significant negative abnormal returns were shown by the smaller, high-growth companies featured on the AIM indices (AIM UK 50, AIM 100, and AIM All Share), underscoring their increased vulnerability to market shocks. With a t-statistic of -15.1141, the FTSE AIM UK 50 had a CAR of -1.76336, indicating significant volatility among smaller stocks. These outcomes are consistent with the AIM indices' higher risk profile, which makes them more speculative and thus more vulnerable to shocks to the macroeconomy. The extreme nature of the pandemic's influence on market performance is highlighted by the statistical significance of the anomalous returns, with p-values nearly equal to 0 for every index. The large-cap and small-cap indexes' high t-statistics indicate that the observed negative returns were a direct result of the epidemic and the subsequent economic shutdowns rather than the result of random fluctuations. This is further supported by the starkly negative returns in February and March of 2020, which were followed by a slow rebound in the months that followed March 31, 2020, when improved liquidity and government actions contributed to the regaining of investor confidence.

The analysis shows that the COVID-19 pandemic significantly and statistically negatively impacted the UK stock market, with small- and mid-cap equities suffering more than large-cap ones. The results highlight how vulnerable markets are during crises, particularly for more speculative stocks, and how important government action is to keeping markets stable after a crisis. The findings of this event research underscore the significance of strong market interventions to lessen the effects of such disruptions and offer insightful information about how markets behave during extraordinary worldwide events.

The empirical findings provide insight into the elevated volatility and pessimistic investor attitude that marked the UK stock market in the initial phases of the pandemic. All indexes had severe drops in February and March 2020, which can be attributed to panic selling by investors in response to the unpredictability of the world market and the financial fallout from countrywide lockdowns. Severe selling pressure was felt on the FTSE 100, which is frequently used as a gauge of mood in the market. This pressure was replicated in other indices and was especially strong in the more erratic mid-cap and small-cap sectors. The study sheds important light on the COVID-19 pandemic's unparalleled effects on the UK stock market. According to the event study analysis, the shockwaves created by the pandemic significantly disrupted the market, resulting in notable negative anomalous returns on major indices like the FTSE All Share, FTSE 100, FTSE 250, and FTSE 350. These findings highlight the extent of the market decline, which has an impact on many different industries and businesses, from big blue-chip organizations to smaller, fast-growing startups. Even though the market's first response was largely negative, there were indications of improvement as the event window came to an end. Rapid government actions, such as fiscal stimulus plans, liquidity-boosting central bank policies, and corporate assistance, are responsible for this rebound. By taking these steps, the market was able to recover and some investor trust was restored. The empirical findings, however, indicate that the pandemic nonetheless had a lasting impact on the market in spite of these recovery measures, especially for smaller and mid-sized businesses that had to deal with more persistent difficulties.

6. Conclusion and Key Findings

With an emphasis on significant indexes such the FTSE 100, FTSE 250, FTSE 350, FTSE All Share, FTSE AIM UK 50, FTSE AIM 100, and FTSE AIM All Share, this dissertation examined the effects of the COVID-19 pandemic on the UK stock market. The study aimed to evaluate how the pandemic affected large-cap, mid-cap, and small-cap companies on the UK stock market. It used the event study methodology with the event date of March 31, 2020, and used abnormal and cumulative abnormal returns (ARs and CARs) as the primary metrics. The analysis showed that, during the event window, there was a considerable negative market sentiment across all indices, especially in February and March 2020, when share values fell precipitously. For example, the FTSE 100 and FTSE 250 both saw notable anomalous returns of -0.0585, indicating a major impact on large and mid-cap firms. This large decline was a reflection of the pandemic's increased volatility and uncertainty in the markets. Following March 31, 2020, the indexes began to show indications of recovery as share prices increased partly due to increased market liquidity and government measures. The UK government moved swiftly to boost investor confidence, and as a result, stock prices rose by an average of 15.4%. The market's response to the pandemic showed that there was an extraordinary spike in investment activity prior to the initial market collapse. Following March 31, 2020, the indexes began to show indications of recovery as share prices increased partly due to increased market liquidity and government measures. According to the study, the FTSE 250, a measure of mid-cap companies, showed higher levels of volatility than the FTSE 100, a measure of large-cap companies. The FTSE 250's larger standard deviation indicated that it was more vulnerable to market shocks. The AIM indices, which are a representation of smaller businesses, also showed significant volatility and underperformance during turbulent economic times, which is likely due to their greater risk profiles.

During the event window, all indexes saw negative returns; however, the AIM indices saw slightly less severe negative returns than the large-cap and mid-cap indices. This could imply that the smaller, more expansion-focused businesses listed on AIM were more resilient to the pandemic's early effects or had already factored in some of the risks related to the economic slump. The COVID-19 epidemic caused widespread volatility and abnormally negative returns across all indexes, which had a significant effect on the UK stock market. Stock prices recovered as a result of the market's post-event resiliency, which was bolstered by investor optimism and government involvement. Smaller-cap companies in the AIM indexes showed signs of being vulnerable to market shocks, even while large-cap and mid-cap equities saw notable drops. The findings emphasize the significance of governmental policies and market dynamics in influencing market recuperation amid exceptional occurrences, so highlighting the applicability of event research technique in comprehending the market's reaction to crises such as the COVID-19 pandemic. The findings of this study provide crucial insights into how markets react to exogenous shocks and how different segments of the stock market vary in their responses, offering valuable lessons for policymakers, investors, and market participants in anticipating and navigating future crises.

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