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RESEARCH ARTICLE

Unraveling Cointegration and Causality between Covid-19 Dynamics and Malaysian Stock Market Returns: A Sequential Explanatory Mixed Methods Approach

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ABSTRACT

The outbreak of COVID-19 pandemic has had a significant impact across the world and the performance of FTSE Bursa Malaysia KLCI has been in-fluenced by several pandemic-related factors. This study will analyze the causal relationship and cointegration between the COVID-19 daily infect-ed cases, recovery cases, death cases, investor sentiment, government policy and the FTSE Bursa Malaysia KLCI stock return. The fundamental theory to support this study is Black Swan Theory. The potential black swan nature of COVID-19 pandemic and its effect on Malaysia stock mar-ket will be analyzed. While a lot of studies have been carried out to inves-tigate the short-term effect on stock market return in field of disease out-breaks, there is a need of study on the relationships and causal effects be-tween disease outbreaks and stock market performance over a long-term period. This study employs a sequential explanatory mixed methods ap-proach to explore the relationship between COVID-19 variables, investor sentiment, government policy, and the FTSE Bursa Malaysia KLCI stock return during the pandemic. The ARDL test results indicate no long-term cointegrating relationship between COVID-19 indicators like COVID-19 daily infected cases, recovery cases, death cases and FTSE Bursa Malaysia KLCI stock return, suggesting these do not significantly influence the FTSE Bursa Malaysia KLCI's long-term behavior. However, significant long-term relationships exist between FTSE Bursa Malaysia KLCI stock return and variables such as investor sentiment, government policy, gold prices, foreign exchange rates, and Brent crude oil prices.

INTRODUCTION

The global COVID-19 pandemic, driven by SARS-CoV-2 virus, has had a profound impact on countries worldwide. The COVID-19 pandemic is a unique global disaster due to its widespread infection rate, causing economic slowdowns and market panic alike past Black Swan events like the 9/11 terrorist attack, SARS, and the 2008 financial crisis. Regrettably, as of 16 July 2023, based on World Health Organization (WHO), over 768 million documented cases and a loss of 6.9 million lives have been caused by COVID-19 pandemic, rendering it one of the most deadly pandemics ever. The economic turmoil resulting from the pandemic has had severe and far-reaching effects on financial markets. Financial markets experienced heightened volatility and uncertainty during the pandemic. On 27 February 2020, concerns about the virus led to United States stock indexes suffering their most significant losses since the 2007-2008 financial crisis (Oh, 2020).

The political turmoil in Malaysia hindered the government's response to COVID-19 outbreak in the beginning of year 2020. The pandemic started when the first cases from travellers coming from China through Singapore were confirmed on January 25, 2020 (Sipalan and Holmes, 2020; Hasnan, 2020). In March 2020, there were a number of local clusters that appeared, and one of the most well-known ones was a religious event in Sri Petaling, Kuala Lumpur, put on by the Tablighi Jamaat. This gathering

led to a significant increase in local and imported cases to neighbouring countries (Ng, 2020). In response to the surge in cases, from 18 March 2020, the Movement Control Order (MCO), a nationwide lockdown, was enforced by the government of Malaysia headed by former Prime Minister Muhyiddin Yassin (Prime Minister's Office of Malaysia, 2020). Malaysia announced in September 2021 that by October 2021, it planned to consider COVID-19 as an endemic disease, because of most of the adult population has been vaccinated and a reduction in the count of severe cases.

Malaysia is chosen as the primary focus of this study due to several important factors. Malaysia has reported a total of 4.8 million documented COVID-19 cases and more than 36 thousands deaths as of 5 October 2022, according to data from Ministry of Health Malaysia. Malaysia total confirmed COVID-19 cases ranked third among the countries significantly impacted by the COVID-19 pandemic within the Association of Southeast Asian Nations (ASEAN) region (ASEAN BioDiaspora Virtual Center, 2023), making it a representative case for studying COVID-19 pandemic's impacts. Besides, the response of Malaysia to COVID-19 pandemic, including its government policies, healthcare infrastructure, and economic resilience, provides a rich backdrop for analysis. Malaysia stock market is one of the most mature and influential within ASEAN. Also, Malaysia has faced unique economic and political challenges in recent years, including shifts in government, changes in economic policy, and unprecedented COVID-19 pandemic. These factors make Malaysia an attractive case study to assess the effect of COVID-19 pandemic on stock market performance.

The effect of COVID-19 pandemic on Malaysia has been extensive, including a severe economic impact that has caused the country's GDP to shrink and devalued its currency (Kumar, 2021). In February 2021, Malaysia's GDP had contracted by 3.4% in the fourth quarter compared to the previous year, while the entire economy recorded a 5.6% decline for 2020. This was Malaysia's worst economic performance since the 1998 Asian Financial Crisis (Shukry, 2021). In response to the challenging economic conditions, Bank Negara Malaysia (BNM) swiftly enacted a series of interest rate cuts, as outlined in Securities Commission Annual Report 2020. According to the report, measures were taken to ease liquidity pressures by reducing the Statutory Reserve Requirement (SRR) by 100 bps and providing flexibility in compliance requirements, as announced in March 2020. Malaysia government also announced a comprehensive package of economic stimuli amounting to RM305 billion (Securities Commission Malaysia, 2020). The National Recovery Plan (NRP) has been formulated as a roadmap to efficiently manage the spread of the COVID-19 outbreak and facilitate a gradual reopening of the society (MDBC, 2021). The NRP consists of four different phases, designed to be a comprehensive guide for Malaysians on how to coexist with COVID-19 while government planning to shift towards an endemic phase of the virus (MDBC, 2021).

Malaysia Government implemented various measures in reducing the negative effects on stock market and ensuring the stability of the country economy. The implementation of these policies has a crucial effect on investor sentiment. Market participants closely monitored changing economic forecasts and news related to COVID-19 pandemic, which affected their investment decisions. The increasing of Bursa Malaysia trading volume on year 2020 may be due to the surge in retail investor participation in the stock market in Malaysia, particularly active in trading technology and healthcare stocks. Investors looked for alternative investment options in a low-interest-rate environment and amidst the economic uncertainty caused by the disease outbreak. According to Bursa Malaysia FY2020 financial results, compared to year 2019, retail investors contributed to 236% growth in average daily trading value on year 2020. It hit a record of RM1.6 billion, marked the highest retail average daily trading value (ADV) recorded in history.

Throughout COVID-19 outbreak in Malaysia on year 2020, the FTSE Bursa Malaysia KLCI experienced a significant level of volatility associated with the impact of COVID-19 outbreak. The FTSE Bursa Malaysia KLCI witnessed a significant decline by late January 2020, as investors engaged in panic selling due to the economic uncertainty resulting from the pandemic (Aruna, 2020). However, FTSE Bursa Malaysia KLCI rebounds at its lowest point in March 2020 and remained resilient despite the COVID-19 pandemic. According to Bank Negara Report on first half of Year 2020, the Central Bank's purchase of government securities through open market operations played a significant role in stabilizing the market, especially during initial volatility and significant capital outflows caused by

the COVID-19 shock. Additionally, government policies may be one of the factors that contributed to the stock market rebound after sharp drop.

Monitoring the COVID-19 pandemic's progression, as reflected in the health indicators such as daily COVID-19 recovery cases, infected cases, death cases is crucial to gain a better idea of how disease outbreak impacts the FTSE Bursa Malaysia KLCI stock return. Throughout the COVID-19 pandemic, investor sentiment has been hypersensitive to news and progress relevant to COVID-19 pandemic and recovery stages of the economy. Government plays an important part in executing various measures to prevent the transmission of viruses, safeguard public health, and maintain economic stability. Thus, there is a need to develop a conceptual framework that broadly captures the relationship between COVID-19 outbreak and FTSE Bursa Malaysia KLCI stock return. By including COVID-19 health indicators, investor sentiment and government policies, the framework can help to identify correlations, potential causal relationships and measure the reactions to shocks, offering insights into how COVID-19 outbreak affected share market movement.

Previous study has primarily relied on secondary data to analyze the impact of COVID-19 pandemic on financial markets. While existing research provide valuable insights, they often fall short of explaining the "why" behind the observed trends. The empirical evidence gathered so far may not offer a complete and solid understanding of the behavior of Malaysia's stock market during this extraordinary period. This study takes a sequential explanatory mixed methods approach by combining quantitative analysis with qualitative insights. While quantitative data offer statistical trends, qualitative interviews provide the "human" side of the story. These interviews serve as a rich source of primary data, helping to explore the complexities of investor behavior, motivations, and decision-making processes. Understanding why investors made specific decisions during the pandemic is important for comprehending market volatility, stock price fluctuations, and investor sentiment. By combining these two types of data, this study seeks to construct a more comprehensive description of complex dynamics at play in Malaysia's share market on pandemic period.

2. LITERATURE REVIEW

2.1 The underlying theory

Nassim Nicholas Taleb (2007) popularized the term “Black Swan Theory” in his book “The Black Swan: The impact of the Highly Improbable”, which describes the occurrence of uncommon and unpredictable incidents that have enormous and far-reaching effects. The theory derives its name from the assumption that all swans were white, a belief held until black swans were discovered in Australia, where they had previously been thought to be extinct. Taleb (2007) argues that black swan events are distinguished by three key characteristics, which are their extreme rarity, the severity of their effects and the tendency of people to rationalize them after they taken place.

Due to its unexpected and unprecedented nature, the COVID-19 pandemic can be viewed in the context of this study as a black swan event since it significantly disrupted Malaysia economies and financial markets. Besides, the theory also suggests that black swan events can have far-reaching consequences and may cause long term changes in the financial markets. Additionally, the black swan theory also highlights the importance of comprehending, control and manage catastrophic events and their impacts on financial systems. Hence, this study attempts to investigate the cointegration, which examines long-term relationship, and causality, which explores the link between cause and effect, between COVID-19 pandemic and FTSE Bursa Malaysia KLCI stock return, with Black Swan theory served as the underlying theory. This study can help to understand how unanticipated and significant events, like COVID-19 pandemic, can affect financial markets by examining the cointegration and causality between pandemic and Malaysia share market return.

Furthermore, Black Swan Theory also believes that conventional statistical models and forecasting methods are inadequate to control uncommon events. This study aims to explore and validate the Black Swan Theory in a real-world context. While the theory suggests that conventional models may be inadequate for rare events, this study incorporates qualitative interviews with stock market traders to provide a more comprehensive understanding of how these conventional models perform

during unprecedented events like the COVID-19 pandemic. The qualitative data will help to assess whether these models align with the theory's belief or if they demonstrate adaptability and relevance in such situations. Therefore, this study seeks to bridge theory and practical application by examining how these models progress in the face of the Black Swan event and whether stock market traders' experiences support the theory's claims. Black Swan theory served as the underlying theory of the study of Phiri et al. (2023), Nguyen et el. (2021) and Ullah et al. (2023), which also investigate effect of COVID-19 outbreak on performance of share market.

2.2 Review of empirical studies

In the field of disease outbreaks, a lot of studies have been carried out to examine immediate impact on stock market return, for example the study of Abdullah et al. (2020), Takyi and Bentum-Ennin (2021), Badar (2020), Liu et al. (2020), Mert and Omer (2020). There are also existing studies mainly investigate the immediate reactions of stock markets to the COVID-19 pandemic, exploring reactions (Yarovaya et al., 2022), co-movements (Insaidoo et al., 2023; Phiri et al., 2023), responses (Tetteh et al.,2022; Xu, 2021) of different markets across various regions and economies. Additionally, there is existing study examining the causal effects of a specific stock exchange on international stock markets during COVID-19 pandemic (Lucía and Bernadette, 2020) and study on reaction of stock market during different phases of the COVID-19 outbreak (Choo et al., 2024; Udeaja and Isah, 2022; Khan et al., 2020). While the existing literature provides valuable insights into the short-term impacts of the COVID-19 pandemic on various stock markets, there is a need of study on the relationships between disease outbreaks and stock market performance over an extended period. Therefore, a significant research gap exists when it comes to comprehensively understanding the long-term relationships and causal effects between disease outbreaks and the stock market return. This research gap calls for the construction of a disease outbreak conceptual framework that can be used as a foundation for post-event studies, enabling an investigation into the long-term impacts and revealing unilateral or bilateral causality between disease outbreaks and stock market performance.

The existing literature mainly emphasizes on the short-term impacts of disease outbreaks and government policies on stock market performance, focusing on variables like daily growth in infected cases, mortality rates, and effectiveness of government policy and their immediate impact on stock returns in different economies and financial markets, such as the study of Zaremba et al. (2020), Guven et al. (2022), Paresh et al. (2021), Anh and Gan (2021) and Badar (2020). The study of Caporale et al. (2022) adopts a comprehensive dynamic panel model that considers combined impacts of health situation, containment measures, and financial and monetary actions. While this research has provided valuable insights into governing beginning stages of disease outbreaks, there is a need for study addresses the long-term impacts and causal relationships that can persist long after the disease outbreak has subsided. The research gap appears in the need to consider the persistence of government policy responses and their impact on return of stock market beyond the initial phase of pandemic. Understanding the long-term effects is crucial for formulating effective strategies to mitigate future disease outbreaks and reduce the socioeconomic impacts.

Currently, the existing literature mostly focuses on the immediate impacts of the COVID-19 pandemic and investor sentiment on stock market performance. Several studies examine the trading patterns (Chiah et al., 2022), responses (Tosun, 2022) and behaviour (Choo et al., 2024; Djalilov and Ülkü, 2021; Ortmann et al., 2020) of retail investors during the COVID-19 pandemic. The study of Baig et al. (2022) investigates the causal impacts of retail trading on volatility during COVID and pre-COVID periods. There is a need of study that comprehensively explores how COVID-19 pandemic, investor sentiment, and government policy interact and influence stock market returns over an extended period. Furthermore, while some of the existing studies explore the impact of investor sentiment on share returns, there is a need to integrate these findings into a broader framework that includes effects of COVID-19 pandemic and government policy responses. Understanding the combined impact of these variables on stock market returns would provide more multifaceted insights for policymakers, investors, and financial institutions in managing disease outbreaks and their impacts on financial markets.

Overall, the research gap lies in the absence of a comprehensive disease outbreak conceptual framework that addresses the long-term relationships, unilateral or bilateral causality, and long-term impacts of disease outbreaks. This study can bridge the gap and gain a thorough understanding of the multifaceted dynamics surrounding disease outbreaks by constructing a disease outbreak conceptual framework. It would serve as a roadmap for analysing the post-event relationships and identifying the multifaceted interactions that contribute to the long-term impacts of disease outbreaks. This empirical study will be important in developing effective strategies, policies, and interventions to mitigate the long-term impacts of disease outbreaks.

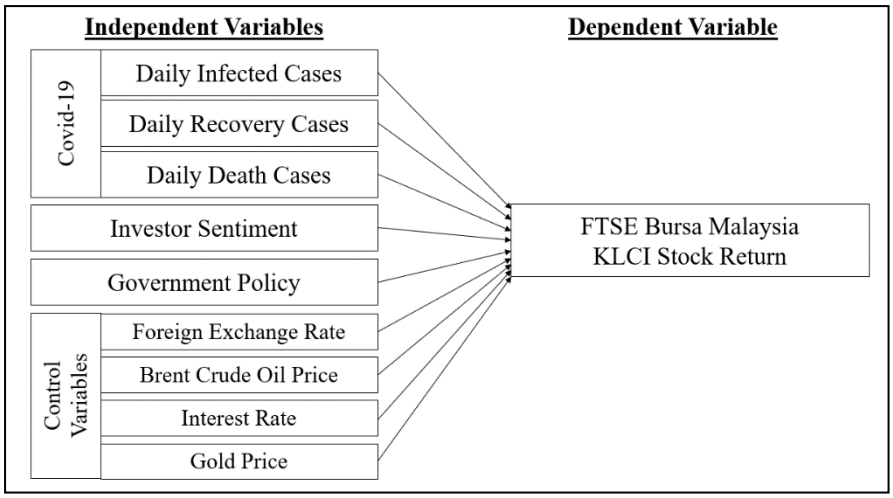

Figure 1: Proposed conceptual framework

3. RESEARCH METHODOLOGY

2.3 Sampling design

Deductive research approach is a method of conducting research in a top-down approach, starting with a specific theory or hypothesis and then tests it through empirical observation and data analysis. This study adopts the deductive research approach, utilizing the Black Swan Theory as the foundational framework. The Black Swan Theory will serve as the starting point, guiding the formulation of specific hypotheses based on its principles. Subsequently, this study will develop the research framework to assess and test these hypotheses. This study will employ various data collection methods and sources, including historical financial market data and news archives. This study will proceed with statistical analysis and other research methodologies to explore the relationship between independent variables and dependent variables once the data has been collected. This study will then determine whether the data supports the Black Swan Theory by comparing the findings with the initial hypotheses.

This study is using a Sequential Explanatory Mixed Methods Study research approach that involves a two-phase investigation, where quantitative data collection and analysis are followed by qualitative data collection and analysis. Qualitative research can make the findings from quantitative data even better because it lets researchers go deeper to understand what people think and feel, and how they handle different experiences. Following the quantitative analysis of this study, a qualitative approach, which is semi-structured interviews, will be employed to gather in-depth information about the attitudes, experiences, and beliefs of stock market investors in order to understand their thoughts (how), reasoning (why), and justifications regarding their investment decisions in Malaysia's stock market during COVID-19 pandemic. Additionally, semi-structured interviews offer a platform to gather insights from stock market investors about specific topics and issues, including the long-term impacts of the COVID-19 pandemic on the Malaysia stock market and the causal relationships involved.

Firstly, this study will utilize a quantitative research design, analyze and interpret numerical data obtained from secondary sources. This study will rely on secondary data collected from reputable sources to ensure validity and reliability of the findings. Daily data of COVID-19 infected cases, recovery cases and death cases for business days were collected from Ministry of Health Malaysia (MOH) official website while data for daily closing price of FTSE Bursa Malaysia KLCI, investor sentiment, foreign exchange rate, interest rate and brent crude oil price for business days were collected from Datastream. The data collection process for government policy announcements involved manual collection by actively monitoring official government sources, such as press releases, government websites, and official statements. The gold price data will be collected from the goldpricez.com website. The data collected starting from the announcement of Movement Control Order (MCO) by Malaysia government, which is 18th March 2020 until Malaysia government announced a transition to treating COVID-19 as endemic phase, which is 31 March 2022. The sample size for this study consisted of 501 observations, providing a robust dataset for analysis. The data spans a specific period that captures the outbreak and subsequent developments of COVID-19 pandemic in Malaysia, providing comprehensive analysis of the effect on FTSE Bursa Malaysia KLCI.

The FTSE Bursa Malaysia KLCI is chosen as focal point of this study due to its importance as the main stock market index mirroring the performance of Malaysian share market. The index consists of 30 largest companies listed on Bursa Malaysia, selected based on their market capitalization and adherence to the eligibility criteria set by the FTSE Bursa Malaysia Index Ground Rules. In this study, investor sentiment proxy by trading volume will be examined to gain insights into the behaviour of investors and level of market activity in the context of the Bursa Malaysia. Based on the study of Chiah et al. (2022) which investigate the trading patterns of retail investors and the study of Tosun (2022) which investigate the investor response, both studies measure the investor sentiment by looking at the trading volume. Therefore, the investor sentiment in this study was measured by trading volume specifically examined for the 30 largest companies listed on the Bursa Malaysia. The data collection for government policy will focus on announcements related to COVID-19 in Malaysia. The measurement of government policy announcement in this study was based on a dummy variable, where a value of 1 was assigned if a policy announcement related to COVID-19 was made by the Malaysian government, and a value of 0 was assigned otherwise. This study will use the market quotation price of USD/MYR to measure the foreign exchange rate. The market quotation price of gold, in Malaysia Ringgit (MYR) per ounce. Brent crude oil prices are measured through the use of Brent crude oil futures prices, in United States dollar per barrel (USD/BBL). The Malaysia Overnight Policy Rate (OPR) is measured and expressed as a percentage, determined by the Monetary Policy Committee (MPC) of Bank Negara Malaysia.

Secondly, this study employs a qualitative analysis approach, utilizes primary data collected through a semi-structured interviews designed to obtain a more in-depth understanding of the perceptions, attitudes, experiences, and beliefs of investors regarding their investment decisions in Malaysia share market during the COVID-19 outbreak period. Stock trader interviews with 12 respondents, based on the study of Watson et al. (2017) will be conducted to gather in-depth information in order to understand investors' thoughts processes (how), reasoning (why), and justifications regarding their investment decisions in Malaysia's share market during COVID-19 outbreak, providing valuable insights into the factors that influence their investment decisions in times of uncertainty. Stock trader interview will be carefully designed with inputs from the quantitative analysis findings to explore the underlying reasons and motivations behind the reactions of the independent variables during COVID-19 pandemic period by involving primary data.

2.4 Research procedure

The research methodologies used in this study follow a systematic flow to comprehensively address the research objectives and provide answers to research questions. The journey begins with the process of data quantification, which includes gathering of secondary data from various sources including Datastream, Online News platforms, and goldpricez.com. These sources provide the necessary data to investigate the factors influencing Malaysia's stock market return during COVID-19 pandemic. Once data collection phase is complete, this study proceeds to perform descriptive statistics analysis on the collected data. Mean, median, standard deviation, kurtosis, and skewness

are calculated to gain insights into the central tendency, variability, and distribution of the variables under investigation. This preliminary statistical overview sets the foundation for more advanced analyses.

The subsequent step involves unit root stationary tests, specifically employing the Augmented Dickey-Fuller test and the Phillips-Perron test. These tests determine the stationarity of time series data, which is crucial for accurate, reliable analysis. In this study, EViews 9 is used to generate descriptive data and run the unit root test such as Augmented Dickey-Fuller test and Phillips-Perron test. The outcomes of both tests guide this study in ensuring the suitability of the data for further analysis. It is followed by determining the optimal lag length in the methodology flow. The Akaike Information Criterion (AIC) is employed to identify the most suitable lag length for the analysis. This helps to find the lag length that provides a good fit to the data while avoiding unnecessary complexity.

This study then proceeds to the data analysis phase after the data is properly prepared and the optimal lag length is established. The research questions are systematically addressed using various econometric techniques. Research Question 1 is addressed through Autoregressive Distributed Lag (ARDL) analysis to test for co-integrated relationships. The research methodology of this study also includes diagnostic tests to ensure the robustness of the conducted analyses. Multicollinearity, heteroscedasticity, autocorrelation, model specification, and normality are assessed to validate the assumptions and reliability of the applied models. VIF test is employed to diagnose multicollinearity issues. The ARCH test is employed to diagnose heteroscedasticity issue. Breusch-Godfrey Test is employed to diagnose autocorrelation issue. Jarque-Bera Test is employed to diagnose normality issue. Research Question 2 is tackled using Granger Causality tests to examine causality relationships while Research Question 3 employs Variance Decomposition Analysis and Impulse Response Function to explore the effects of shocks.

Moving beyond quantitative analyses, Research Question 4 introduces a qualitative dimension to this study. Research Question 4 is designed to complement and support the findings of the quantitative analysis conducted earlier in Research Question 1, 2 and 3. The aim of Research Question 4 is to investigate further into the understanding of the study variables and their behavior by seeking insights directly from the respondents. Following the study of Bouteraa et al. (2022), this study will employ semi-structured interviews, a qualitative research method, to gather insights from twelve stock market investors who have invested in the Malaysia stock market during COVID-19 pandemic period using a purposive sampling technique to understand the investors' sentiments, perceptions, attitudes, experiences, and beliefs regarding their investment decisions in Malaysia's stock market during the COVID-19 pandemic period. The n chosen for the interview of this study is twelve, based on the study of Watson et al. (2017), which also used sequential mixed methods study and interviewed 12 participants in their qualitative analysis phase. Unlike fully structured interviews with fixed questions or unstructured interviews with no predetermined questions, semi-structured interviews were adopted in this study due to the limitations of using either structured or unstructured interviews alone. This study will carry out formal interviews using Skype or Microsoft Teams. This study aims to gain deeper insights into the factors influencing investors' decisions and behaviors amidst challenges posed by COVID-19 pandemic through these interviews. This research methodologies flow combines quantitative analysis that provides a structured overview of deviations, and qualitative phase that adds depth and meaning to these deviations through respondents' perspectives. This study will provide a thorough understanding of the complex dynamics at play in Malaysian share market throughout COVID-19 pandemic by combining insights gained from both quantitative and qualitative analysis.

$$KLCI_t = \beta_0 + \beta_1(CovDIC) + \beta_2(CovDRC) + \beta_3(CovDDC) + \beta_4(InvS) + \beta_5(GovP) + \beta_6(FER) + \beta_7(BCOP) + \beta_8(GoldP) + \beta_9(IntR) + \varepsilon_t$$

whereby,
$KLCI_t$ = FTSE Bursa Malaysia KLCI stock return
CovDIC = COVID-19 Daily Infected Cases
CovDRC = COVID-19 Daily Recovery Cases
CovDDC = COVID-19 Daily Death Cases

InvS = Investor Sentiment
GovP = Government Policy
FER = Foreign Exchange Rate
BCOP = Brent Crude Oil Price
GoldP = Gold Price
IntR = Interest Rate
ε_t = error term

In conclusion, this study employing a sequential explanatory mixed methods approach, has shed light on the complex relationship between COVID-19 pandemic and Malaysian share market returns. Although the results of this study provide important insights for investors, policymakers, and analysts seeking to navigate financial markets during crises, it has its limitations. This study was focused primarily on the Malaysian market, leaving room for more extensive investigations into global dynamics. Future research could expand the scope to encompass various market sectors and international contexts, deepening the understanding of these complex relationships and enhancing strategies for coping with unforeseen events in the financial world. Despite these limitations, this study outlines the significance of combining quantitative and qualitative methods to obtain a thorough understanding of complex phenomena, offering a foundation for future research in this critical area.

Empirical analysis

This study systematically explores the relationship between the Covid-19 pandemic and the returns of the Malaysian stock market by outlining the data analysis process and its relevance in understanding these relationships. This study begins with unit root tests including Phillips-Perron test and Augmented Dickey-Fuller test to analyze stationarity. Subsequently, the process of lag length selection is explained to determine the appropriate lag order for subsequent analyses. The study proceeds to apply Autoregressive Distributed Lag (ARDL) model using the bound test to examine cointegration between the variables. Besides, Error Correction Model (ECM) test will also be used to further examines short-term relationships. Granger Causality analysis using the Wald Test is then conducted to explore causal relationships. Impulse response function and Variance decomposition analysis are performed to assess dynamic interactions between variables over time. Finally, diagnostic checking is conducted to ensure the robustness of the model, verify the validity and reliability of the model.

Table 1: Unit root

	ADF Test		**PP Test**	
	At Level	First Difference	At Level	First Difference
FTSE Bursa Malaysia KLCI stock return	0.0000***	0.0000***	0.0000***	0.0000***
COVID-19 Daily Infected Cases	0.0167**	0.0039***	0.3717	0.0000***
COVID-19 Daily Recovery Cases	0.0073***	0.0028***	0.3966	0.0000***
COVID-19 Daily Death Cases	0.0823*	0.0001***	0.0572*	0.0001***
Investor Sentiment	0.0000***	0.0000***	0.0000***	0.0001***
Government Policy	0.0000***	0.0000***	0.0000***	0.0001***
Control Variables:				

Foreign Exchange Rate	0.0593*	0.0000***	0.1713	0.0000***
Gold Price	0.0088***	0.0000***	0.0122**	0.0000***
Brent Crude Oil Price	0.8225	0.0000***	0.7186	0.0000***
Interest Rate	0.1049	0.0000***	0.0538*	0.0001***

Note: The symbols ***, **, and * represent null hypothesis being rejected at significance levels of 1%, 5%, and 10%, respectively.

The findings in Table 1 presents results of Unit Root Tests (both ADF and PP tests) for dependent variable (FTSE Bursa Malaysia KLCI stock return), independent variables (COVID-19 daily infected cases, recovery cases, death cases, investor sentiment, and government policy), and control variables (foreign exchange rate, gold price, Brent crude oil price, and interest rate). According to the result for the ADF Test, the FTSE Bursa Malaysia KLCI stock return and all independent variables exhibit stationary both at the level and after the first difference. However, for the control variables, foreign exchange rate and gold price are stationary at both level and at first difference, while interest rate and Brent crude oil price are not stationary at the level but become stationary after taking the first difference. According to the result for the PP Test, the dependent variable, FTSE Bursa Malaysia KLCI stock return is stationary at both level and at first difference. Independent variables, COVID-19 daily infected cases and daily recovery cases are not stationary at the level but become stationary after taking first difference. COVID-19 daily death cases, investor sentiment, and government policy are stationary at both level and at first difference. Control variables foreign exchange rate and Brent crude oil price are not stationary at the level but become stationary after taking the first difference. Interest rate and gold price is stationary at both level and at first difference. These findings indicate that while some variables are not stationary at the level, they become stationary after taking first difference, suggesting that the data can be used for further time series analysis after differencing.

Table 2: The autoregressive distributed lag

Variable	**Coefficient**	**Standard Error**	**t-Statistic**	**P-value**
COVID-19 Daily Infected Cases	2.14E-07	1.33E-07	1.612941	0.1074
COVID-19 Daily Recovery Cases	-1.63E-07	1.48E-07	-1.096498	0.2734
COVID-19 Daily Death Cases	-4.51E-06	8.00E-06	-0.563906	0.5731
Investor Sentiment	1.46E-11	4.96E-12	2.941439	0.0034***
Government Policy	0.002754	0.001334	2.063701	0.0396**
Gold Price	-3.16E-06	1.46E-06	-2.163775	0.0310**
Foreign Exchange Rate	-0.201917	0.034675	-5.823110	0.0000***
Interest Rate	-0.002373	0.008237	-0.288069	0.7734
Brent Crude Oil Price	-0.000232	0.000101	-2.286798	0.0226**

Note: The symbols ***, **, and * represent null hypothesis being rejected at significance levels of 1%, 5%, and 10%, respectively.

Table 2 presents result of Autoregressive Distributed Lag (ARDL) test for examining the cointegrating relationship between KLCI stock return and independent variables (COVID-19 daily recovery cases, daily death cases, daily infected cases, investor sentiment, government policy) and the control variables (foreign exchange rate, gold price, Brent crude oil price, interest rate). In summary, the ARDL test results reveal there is no long-term cointegrating relationship between FTSE Bursa Malaysia KLCI stock return and the variables COVID-19 daily recovery cases, death cases,

infected cases and interest rate. The COVID-19 daily infected cases coefficient (which has a p-value of 0.1074), coefficient of COVID-19 daily recovery cases (which has a p-value of 0.2734) and COVID-19 daily death cases coefficient (which has a probability value of 0.5731) is not statistically significant at the 10 percent level. The ARDL test does not support a long-term cointegrating relationship with FTSE Bursa Malaysia KLCI stock return for these variables, showing that these variables do not significantly influence the long-term behavior of FTSE Bursa Malaysia KLCI stock return. However, it shows a significant long-term cointegrating relationship between KLCI stock return and variables investor sentiment, government policy, gold price, foreign exchange rate and Brent crude oil price. The coefficient of investor sentiment (with a p-value of 0.0034), coefficient of government policy (with a p-value of 0.0396), coefficient of gold price (with a p-value of 0.0310), coefficient of foreign exchange rate (with a p-value of 0.0000) and coefficient of Brent crude oil price (with a p-value of 0.0226) exhibits significance at 10 percent significance level. The ARDL test confirms a long-term cointegrating relationship with FTSE Bursa Malaysia KLCI stock return for these variables, indicating that changes in investor sentiment, government policy, gold price, foreign exchange rate and Brent crude oil price are significantly associated with the long-term behavior of FTSE Bursa Malaysia KLCI stock return

Table 3: The error correction model

Variable	Coefficient	Standard Error	t-Statistic	p-value
COINTEQ	-1.188064	0.041621	-28.54476	0.0000***
D(Government Policy)	0.002754	0.001250	2.203009	0.0281**
D(Foreign Exchange Rate)	-0.201917	0.033769	-5.979331	0.0000***
D(Brent Crude Oil Price)	-0.000232	9.87E-05	-2.345880	0.0194**

Note: The symbols ***, **, and * represent null hypothesis being rejected at significance levels of 1%, 5%, and 10%, respectively.

Table 3 presents the results of the Error Correction Model (ECM) test, which investigates short term relationship and adjustment to long term equilibrium between FTSE Bursa Malaysia KLCI stock return with government policy, foreign exchange rate and Brent crude oil price. In summary, the Error Correction Model test results demonstrate that government policy, foreign exchange rate and Brent crude oil price all have significant short-term impacts on FTSE Bursa Malaysia KLCI stock return. The coefficient of D(government policy) (with a p-value of 0.0281), coefficient of D(foreign exchange rate) (with a p-value of 0.0000) and coefficient of D(Brent crude oil price) (which has a probability value of 0.0194) are statistically significant at 5 percent significance level. These variables cause immediate changes in the stock market return, indicating their important role in influencing stock market return in short run.

Table 4: The wald analysis

Variables	F-Statistic	P-Value
COVID-19 daily infected cases does not Granger Cause FTSE Bursa Malaysia KLCI stock returns	2.601579	0.1074
COVID-19 daily recovery cases does not Granger Cause FTSE Bursa Malaysia KLCI stock returns	1.202308	0.2734
COVID-19 daily death cases does not Granger Cause FTSE Bursa Malaysia KLCI stock returns	0.317990	0.5731
Investor Sentiment does not Granger Cause FTSE Bursa Malaysia KLCI stock returns	8.652065	0.0034***
Government Policy does not Granger Cause FTSE Bursa Malaysia KLCI stock returns	4.258862	0.0396**
Gold Price does not Granger Cause FTSE Bursa Malaysia KLCI stock returns	4.681920	0.0310**

Foreign Exchange Rate does not Granger Cause FTSE Bursa Malaysia KLCI stock returns	33.90861	0.0000***
Interest Rate does not Granger Cause FTSE Bursa Malaysia KLCI stock returns	0.082984	0.7734
Brent Crude Oil Price does not Granger Cause FTSE Bursa Malaysia KLCI stock returns	5.229447	0.0226**

Note: The symbols ***, **, and * represent null hypothesis being rejected at significance levels of 1%, 5%, and 10%, respectively.

Table 4 presents the results of the Granger Causality Test, which examines whether one variable can predict another. Specifically, it assesses the causal relationship between FTSE Bursa Malaysia KLCI stock return with independent variables (COVID-19 daily recovery cases, daily death cases, daily infected cases, investor sentiment, government policy) and control variables (gold price, foreign exchange rate, interest rate and Brent crude oil price). In summary, the Granger Causality Test results indicate that investor sentiment, government policy, Brent crude oil price, gold price and foreign exchange rate all have predictive power over KLCI stock return, as evidenced by their low p-values, which is p-value less than 0.05. This suggests that changes in these variables have a significant impact on FTSE Bursa Malaysia KLCI stock return. In contrast, COVID-19 daily infected cases, recovery cases, death cases and interest rate do not show significant granger causality with FTSE Bursa Malaysia KLCI stock return, as their p-values exceed the 10 percent significance level.

This study utilizes a sequential explanatory mixed methods approach, combining quantitative and qualitative research techniques. Semi-structured interviews are conducted as qualitative component to gather insights from twelve investors in Malaysian share market during COVID-19 pandemic. All of the respondents are 21 years old and above, with investment experience in Malaysian share market during COVID-19 pandemic, particularly between 18th March 2020 and 31st March 2022. The study aimed to explore and understand the sentiments, perceptions, attitudes, experiences, and beliefs of these investors regarding their investment decisions throughout the pandemic using a purposive sampling technique.

There are respondents from this study's interview believed that COVID-19 daily recovery cases, daily death cases or daily infected cases did not significantly impact FTSE Bursa Malaysia KLCI stock return, aligning with this study's findings. Respondent 1, who has more than 15 years of investment experience, argued that the Malaysia stock market was more influenced by global economic trends, particularly changes in major economies like the United States and China. Respondent 2, with roughly 6 to 7 years of investment experience, emphasized that investors were more concerned with government stimulus measures aimed at supporting the economy, which provided a stable outlook that influenced market movements more than daily infection numbers. Similarly, other respondents also shared the view that Covid-19 variables did not significantly impact KLCI stock returns, with investor attention focused on vaccination progress, government policies, sector-specific trends, business reopenings and consumer spending, company performances and earnings reports, and international capital flows. These views support this study's finding that COVID-19 daily recovery cases, daily death cases or daily infected cases did not significantly influence the long-term behavior of FTSE Bursa Malaysia KLCI stock return. However, there are also respondents from this study's interview believed that COVID-19 daily recovery cases, daily death cases or daily infected cases did indeed affect FTSE Bursa Malaysia KLCI stock return during the pandemic. Respondent 8, who has 6 years of investment experience, argued that rising infection rates led to investor uncertainty, fearing stricter lockdowns and economic crisis, which prompted some investors to sell stocks, causing prices to go down. With over 5 years of investment experience, Respondent 9 suggested that high recovery rates boosted investor confidence in economic recovery and encouraged investment in the stock market. Respondent 10, who has over 10 years of investment experience, argued that high daily death numbers created fear and uncertainty among investors, leading to cautious investment behaviors. These views are inconsistent with this study's finding that COVID-19 daily recovery cases, daily death cases or daily infected cases did not significantly influence the long-term behavior of FTSE Bursa Malaysia KLCI stock return.

Subsequently, there are respondents from this study's interview believed that investor sentiment significantly impacts FTSE Bursa Malaysia KLCI stock return, aligning with this study's findings. With 6 years of investment experience, Respondent 5 argued that sector-specific optimism or pessimism influenced trading volumes and stock prices, with positive sentiment towards sectors like technology and healthcare increasing trading volumes and stock returns, and negative sentiment having the opposite effect. Respondent 12, who has around 7 years of investment experience, believed that positive investor sentiment, influenced by favorable economic news or corporate earnings reports, led to increased stock purchases and higher trading volumes, while negative sentiment resulted in reduced trading volumes and declining stock prices. Similarly, other respondents also shared the view that investor sentiment significantly impact FTSE Bursa Malaysia KLCI stock return, with optimism leading to increased stock purchases and higher trading volumes, and pessimism resulting in reduced trading activity and lower stock returns. These views support this study's finding that investor sentiment significantly influence the long-term behavior of FTSE Bursa Malaysia KLCI stock return. In contrast, there are also respondents from this study's interview believed that changes in investor sentiment, as measured by trading volume, did not have a major impact on FTSE Bursa Malaysia KLCI stock return during the pandemic. Respondent 8 explained that economic indicators and government actions, such as stimulus packages and policy changes, played a more significant role in influencing stock market trends. With over 10 years of investment experience, Respondent 11 argued that global economic conditions and events, such as supply chain disruptions and international economic policies, played a more important role in influencing stock prices.

Besides, there are respondents from this study's interview believed that government policy significantly affected the FTSE Bursa Malaysia KLCI stock return during the pandemic. Respondent 3, who has over 5 years of investment experience, acknowledges the important role of government policies in influencing KLCI stock returns, stating that financial aid and stimulus packages increased investor confidence and led to higher stock prices, although lockdowns created uncertainty and market volatility. Respondent 5 feels that healthcare improvements and vaccination programs boosted investor confidence and stock prices, with central bank policies like adjusting interest rates also having significant impacts. Similarly, other respondents also shared the view that government policy significantly impact FTSE Bursa Malaysia KLCI stock return, with supportive government actions such as stimulus packages boosted investor confidence while restrictive government actions such as lockdowns created uncertainty and market volatility. On the other hand, there are also respondents from this study's interview believed that government policy did not significantly impact FTSE Bursa Malaysia KLCI stock return, instead pointing to broader economic trends and global market conditions as more influential. Respondent 7 thinks that government policy did not significantly affect KLCI stock returns, suggesting that the market was more influenced by broader economic trends and global market conditions. Having around 7 years of investment experience, he believes that in the short term, stock returns were more impacted by global events and economic news. Respondent 9 also disagrees that government policy had a major impact on KLCI stock returns, believing that the market was more influenced by global economic conditions and investor sentiment while in the short term, other factors like economic data releases or company earnings reports had a more immediate impact on stock returns than government policy.

4. CONCLUSION

This study, using a sequential explanatory mixed methods approach, examines into the relationship between COVID-19 variables, investor sentiment and government policy with the FTSE Bursa Malaysia KLCI stock return during the pandemic period. The ARDL test results indicate there is no long term cointegrating relationship between FTSE Bursa Malaysia KLCI stock return and variables including COVID-19 daily recovery cases, death cases, infected cases and interest rate. These findings suggest that these variables do not significantly influence the long-term behavior of FTSE Bursa Malaysia KLCI stock return. The results of this study align with research conducted by Cervantes, Díaz, Esparcia, and Huélamo (2022), who indicates that shifts in panic indexes due to COVID-19 pandemic did not show substantial correlation with raw stock market returns. Similarly, the study by Phiri, Anyikwa, and Moyo (2023), who found a dynamic pattern in the co-movement between COVID-19 indicators and G20 stock returns, alternating between negative and positive correlations.

This suggests that the impact of COVID-19 indicators on stock markets may not be stable over time, aligning with this study's findings of no significant long-term relationship. However, this study's findings are inconsistent with several other studies that suggest a significant impact of COVID-19 indicators on stock markets. Nguyen, Hai, and Nguyen (2021) found significant negative effects on stock market returns and liquidity due to daily increase in total counts of infected COVID-19 cases. Ullah, Zhao, Amin, Syed, and Riaz (2023) uncovered that COVID-19 and economic policy uncertainty have crucial adverse effects on Shanghai and Shenzhen share market's return. This inconsistency suggests that while COVID-19 cases significantly affected other stock markets, the FTSE Bursa Malaysia KLCI did not exhibit a similar long-term cointegrating relationship.

Conversely, the test reveals significant long-term relationships between FTSE Bursa Malaysia KLCI stock return and investor sentiment, government policy, gold price, foreign exchange rate and Brent crude oil price. These variables are significantly associated with the long-term behavior of the FTSE Bursa Malaysia KLCI stock return. The Error Correction Model (ECM) further shows that government policy, foreign exchange rate, and Brent crude oil price have immediate short-term impacts on the FTSE Bursa Malaysia KLCI stock return, highlighting their importance in influencing stock market returns in the short run. Additionally, the Granger Causality Test confirms that investor sentiment, government policy, Brent crude oil price, gold price and foreign exchange rate have predictive power over KLCI stock return, while COVID-19 daily recovery cases, death cases, infected cases and interest rate do not show significant predictive relationships with the KLCI stock return. The results of this study align with research conducted by Ortmann, Pelster, and Wengerek (2020), which proved a significant increase in trading activities among investors as the COVID-19 pandemic unfolded. It is aligning with this study's findings that investor sentiment significantly impacts the long-term behavior of the FTSE Bursa Malaysia KLCI, suggesting that increased trading activity caused by investor sentiment played an important role during the pandemic. However, the study by Tosun (2022) found that investors tend to trade more heavily in the beginning phase of the COVID-19 pandemic compared to eight months later, with a subsequent decline in trading volume as the pandemic progressed. This is inconsistent with this study's findings, as it suggests a diminishing influence of investor sentiment over time, whereas this study's results show a long-term impact. The results of this study align with the research conducted by Guven, Cetinguc, Guloglu, and Calisir (2022), which stated that government response policies to COVID-19 have positive influence on share market returns in the examined emerging economies. It is aligning with this study's findings, indicating that government policies have a significant long-term and short-term impact on the stock market return in Malaysia. On the other hand, the study by Caporale, Kang, Spagnolo, F., and Spagnolo, N. (2022) indicated that government restrictions have a greater negative effect on share markets of G7 countries compared to COVID-19 pandemic itself. This is inconsistent with the findings of this study, as it suggests a negative influence of government policies, while this study found a significant positive relationship between government policies and stock market's return.

This study's qualitative component involved semi-structured interviews with twelve investors in Malaysian stock market during COVID-19 pandemic, exploring their sentiments, perceptions, attitudes, and experiences regarding their investment decisions. The qualitative findings support the quantitative results, particularly in understanding the lack of significant impact of COVID-19 daily recovery cases, daily death cases and daily infected cases on the FTSE Bursa Malaysia KLCI stock return. The interview respondents believed that these COVID-19-related variables did not significantly influence stock returns, aligning with the study's findings. Conversely, respondents noted the significant impact of investor sentiment and government policy on stock market returns, supporting the ARDL test results that identified investor sentiment and government policy as key factors in the long-term behavior of FTSE Bursa Malaysia KLCI stock return. These insights reinforce the importance of considering investor sentiment and government policy when analyzing stock market movements during the pandemic.

This study contributes to a deeper theoretical understanding of market movement during crises by reinforcing principles outlined by the Black Swan Theory. The significant long-term cointegrating relationship between KLCI stock return and variables like investor sentiment, government policy, gold price, foreign exchange rate and Brent crude oil price highlights the importance of these factors in shaping stock market's behavior during unexpected global events like the COVID-19 pandemic.

The study highlights the complexity of financial market movements in response to such crises, emphasizing the need for robust and adaptable economic systems capable of mitigating the effects of unforeseen events. This study's findings also have practical implications for various stakeholders, including policymakers, businesses, and investors. Policymakers can design strategies to stabilize and boost the stock market, while investors can adjust their portfolios to minimize risks and maximize returns during volatile periods like the COVID-19 pandemic by focusing on the variables identified as significant.

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