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Exploring Investor Behaviour and Stock Market Dynamics during Global Pandemics

by

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A RESEARCH REPORT SUBMITTED TO THE FACULTY OF COMMERCE, LAW AND MANAGEMENT, UNIVERSITY OF THE WITWATERSRAND, IN COMPLETE FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION (MBA)

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Abstract

This study examines investor behaviour during the COVID-19 pandemic, focusing on market overreaction and investment opportunities. Using t-tests and regression analysis for 24 countries, the findings reveal heightened volatility, particularly in early-hit markets. While these markets experienced greater instability, late-hit markets showed more stabilised trends, suggesting that timing played a crucial role in market reactions. However, pandemic severity had little direct impact on stock prices. Although overreaction was evident, rapid market corrections limited profitable opportunities. These results challenge the Efficient Market Hypothesis and support behavioural finance theories on investor sentiment. The study highlights the influence of psychological biases during crises, offering insights for investors navigating market disruptions.

1 INTRODUCTION

1.1 Statement of purpose

This study investigates whether equity-market overreaction occurred across 24 countries during COVID-19 and whether such mispricing created exploitable trading opportunities.

By examining public health responses, governmental actions, and societal reactions during a pandemic, researchers aim to understand how perceived threats influence individual and collective behaviour, and to what extent these responses may influence markets (Donadelli et al., 2017; T. L. D. Huynh et al., 2021a; M. Liu et al., 2020a; Shaikh, 2021; Y. H. Wang et al., 2013) .

Pandemics reshape economies, disrupting businesses, supply chains, and consumer behaviour (Türkiye Bilimler Akademisi et al., 2020). Their effects vary across countries and timelines.

Healthcare sectors face unprecedented challenges, requiring rapid adaptation in infrastructure, resource allocation, and vaccine development (Qiu et al., 2017). Financial markets experience volatility as investors navigate uncertainty and reassess risks. This study examines COVID-19's impact on financial markets, focusing on cross-border transmission and investor overreaction.

Findings apply specifically to COVID-19 and may not generalise to other pandemics. The study covers 24 nations, analysing market data three months before, during, and after the pandemic. T-tests compare market performance across these periods and between early- and late-hit countries. Linear regression models assess market returns relative to COVID-19 cases, providing insights into behavioural trends and market fluctuations. These methods ensure a rigorous statistical analysis of the pandemic's impact.

1.2 Background

A pandemic is characterised by the extensive spread of a disease across countries or continents, typically resulting in high transmission rates and significant fatalities (Morens et al., 2009).

Beyond its impact on health, a pandemic can severely disrupt economic systems, trade, and market functioning. COVID-19's global spread from late 2019 to 2023 caused unprecedented volatility in equity markets, exposing vulnerabilities in investor behaviour and market efficiency.

Although several studies examine the market effects of pandemics, many focus on specific regions or short-term impacts, often overlooking behavioural anomalies such as overreaction. Investor sentiment during pandemics tends to be shaped not only by fundamentals but also by psychological biases, as noted during the COVID-19 crisis when fear and uncertainty led to widespread sell-offs and sectoral volatility (Donadelli et al.,2017; Huynh et al., 2021).

However, little is known about whether these behavioural tendencies systematically created exploitable mispricing across multiple markets. Prior research lacks comparative, cross-country analysis of overreaction patterns during a global health crisis. This study addresses this gap by analysing market behaviour across 24 countries using t-tests and regression analysis, focusing on equity overreaction and the viability of short-term trading opportunities.

Grasping the minute reactions of global financial markets is crucial for informed decision-making amid the evolving challenges of pandemics. De Bondt and Thaler were pioneers in recognising the overreaction effect a form of behavioural finance, suggesting investors overvalue new information over old (W. F. M. De Bondt & Thaler, 1985).

Behavioural finance is an interdisciplinary field, that combines insights from psychology, economics, and finance to explore the impact of psychological factors on financial decision-making and market behaviour (Bikas et al., 2013; Kapoor & Prosad, 2017; Thaler, 1999).

This overreaction causes equity prices to deviate significantly from their intrinsic value, often overshooting in one direction initially. As markets process the information more rationally over time, these exaggerated price movements are typically followed by a correction toward equilibrium. According to this hypothesis, the market tends to overreact to both positive and negative news.

De Bondt and Thaler's (1985) research revealed that securities that had underperformed in the market for a three-to-five-year period (e.g., 1926–1982 in their study on the U.S. stock market) demonstrated a subsequent outperformance over the following three-to-five-year period. De-Bondt and Thaler pioneered the recognition of the overreaction effect, suggesting that investors tend to assign greater weight to newly acquired information which presents a contrasting view to the efficient market hypothesis (W. De Bondt et al., 2015; W. F. M. De Bondt & Thaler, 1985; Fama, 1965).

According to Fama the efficient market hypothesis (EMH) suggests that share prices reflect all available information. Consequently, investors cannot consistently outperform the market through investment strategies, as all participants are assumed to be rational and have equal access to information. This paradox between overreaction tendencies and the efficient market hypothesis underscores the complexity of market dynamics and investor behaviour.

Jensen asserts that among economic theories, none boasts robust empirical evidence in its support as the EMH (Jensen, 1978) . However, various studies, both historical

and contemporary, present evidence favouring a certain degree of predictability in price movements. Despite the views of the EMH, investor behaviour often deviates from rationality, leading to elements that challenge the theory's assumptions.

Investors frequently exhibit patterns of irrationality, such as overreaction to new information or a herd mentality which is more prevalent in declining markets which can result in price inefficiencies and market anomalies (Dang & Lin, 2016; Yao et al., 2014). Psychological biases, emotions, and cognitive limitations play significant roles in shaping investor decisions, leading to deviations from rational expectations (Al Mamun et al., 2015).

These deviations from rationality reveal the EMH's limitations in capturing investor behaviour and market dynamics. This research positions itself at the intersection of behavioural finance and market dynamics during a pandemic. By leveraging foundational theories such as the overreaction hypothesis and the efficient market hypothesis, the study seeks to illuminate the unique market responses triggered by pandemic-induced uncertainties.

Summary of Key Studies on Pandemic-Induced Market Behaviour and Identified Research Gaps

Author(s)	Pandemic	Region	Method	Focus	Key Gap
Donadelli et al. (2017)	Ebola	Global (Macro)	Volatility Analysis	Impact on pharma stocks	Behavioural angle not tested
Huo & Qiu (2020)	COVID-19	China	Event Study	Lockdown effects on stocks	Single-country focus
Enow (2022)	COVID-19	South Africa	T-tests, Regression	Overreaction by sector	No cross-country comparison
This Study	COVID-19	24 countries	T-tests, Regression	Market overreaction & trading opportunities	New comparative evidence

1.3 Research Problem & Hypotheses

1.3.1 Research Problem

During global medical emergencies, research on investor overreaction—where investors disproportionately respond to new information—is limited. Understanding investor behaviour is key to assessing market participation. This study examines investor reactions during a pandemic and their impact on markets across countries.

By analysing investor overreaction and opportunities for astute investors to capitalise on market fluctuations, this research offers insights into navigating investment challenges during crises. Identifying investor behaviour patterns is crucial for informed decision-making amid uncertainty and rapid market shifts. Examining investor responses to health threats, societal reactions, and government actions reveals market fluctuations and deviations from rational expectations. Understanding these dynamics helps policymakers, investors, and market participants adapt strategies and exploit market inefficiencies during global crises.

1.3.2 Hypotheses

In this study, two interconnected hypotheses are proposed to examine investor behaviour and its implications during pandemics:

Hypothesis 1 (H_1) : Investors tend to exhibit overreaction behaviour during pandemics, leading to short-term mispricing of securities.

This hypothesis tests whether behavioural tendencies, such as overreaction to negative news, cause market prices to deviate significantly from their intrinsic values, which are typically estimated using fundamental valuation models such as discounted cash flow (DCF) analysis, earnings-based valuation (P/E ratios), or book value approaches. Overreaction may result in sharp declines or exaggerated rallies in security prices that are not justified by fundamental factors.

Alternative Hypothesis (H_{1A}) : Investors do not exhibit overreaction behaviour during pandemics, and markets remain rational, with prices efficiently reflecting all available information.

Hypothesis 2 (H_2) : Astute investors can capitalise on market fluctuations during pandemics to achieve profitable outcomes.

This hypothesis explores whether the potential mispricing caused by investor overreaction (as suggested in H_1) leads to potential mispricing that allows knowledgeable investors to take advantage of market inefficiencies and achieve above-average returns. Such profitability would indicate that overreaction behaviour provides exploitable opportunities in financial markets.

Alternative Hypothesis (H_{2A}): Astute investors cannot consistently capitalise on market fluctuations during pandemics due to factors such as rapid price corrections, transaction costs, or market efficiency.

1.4 Research Objective

The research objectives are to;

1. Examine investor behaviour during pandemics.
2. Assess the impact of a pandemic on markets across 24 countries.
3. Determine the extent of investor overreaction during a pandemic.
4. Investigate whether astute investors can capitalise on market fluctuations during a pandemic to achieve profitable outcomes.

1.5 Rationale

The study analyses market performance in 24 countries during a pandemic, comparing those first affected—reaching 100 confirmed cases earliest—to those impacted later. By identifying performance differences, it assesses whether distinct patterns emerge that could guide investment strategies. Specifically, it examines whether market reactions and recoveries in these groups create opportunities for investors.

1.6 Delimitations

The study analyses the impact of the COVID-19 pandemic of 2019 to 2023, on financial markets in 24 countries, to comprehend the role of investor overreaction in markets.

The research concentrates on investor behaviour, without delving into a detailed examination of individual psychology or trading strategies. It specifically examines market trends in the selected countries during the a pandemic, without exploring broader economic or social consequences.

1.7 Definition of terms

Investor behaviour refers to the actions and decision-making processes of individuals or institutions participating in financial markets, particularly how they respond to information, uncertainty, and risk.

Market anomalies are price patterns or behaviours that deviate from what is predicted by traditional financial theories such as the Efficient Market Hypothesis (EMH). These include overreaction, underreaction, or momentum effects.

Overreaction will be operationally defined as a situation in which "loser" portfolios—identified based on poor pre-pandemic performance—deliver statistically significant positive cumulative abnormal returns within 12 months after the onset of the pandemic. This pattern would suggest that prices initially fell below their intrinsic value and later corrected.

Astute investors are defined operationally as those able to exploit market mispricing (e.g., caused by overreaction) to achieve abnormal returns that are statistically significant and exceed market averages, after adjusting for risk and transaction costs.

T-test refers to a statistical test used to compare the means of two groups (e.g., "winner" vs "loser" portfolios) to assess whether observed differences are statistically significant.

Linear regression model refers to a statistical method used to examine the relationship between a dependent variable (e.g., market return) and one or more independent variables (e.g., COVID-19 cases, GDP, inflation), estimating the strength and direction of the relationship.

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1.8 Assumptions

During a pandemic, investor behaviour is influenced by perceived threats to health, societal responses, and governmental actions.

The impact of a pandemic on equity markets varies across different countries and regions due to diverse economic, health, and social dynamics.

Investors may exhibit overreaction tendencies during a pandemic, leading to short-term mispricing of securities.

Astute investors may capitalise on market fluctuations during a pandemic to achieve profitable outcomes.

Psychological biases, emotions, and cognitive limitations significantly influence investor decisions during a pandemic, leading to deviations from rational expectations.

2 Literature Review

2.1 Introduction

2.1.1 Purpose and Scope

The purpose of this literature review is to explore the key theories and empirical studies related to the Overreaction Hypothesis within behavioural finance. Specifically, it examines how psychological factors influence investor decision-making during periods of market stress, such as a pandemic. The review integrates insights from both traditional financial models, such as the Efficient Market Hypothesis and the Capital Asset Pricing Model, offering a comprehensive analysis of their relevance in understanding investor behaviour in times of heightened uncertainty.

2.1.2 Key Themes

The key themes covered in this review focus on behavioural finance, the Overreaction Hypothesis, and how media and pandemics influence financial markets. It explores how psychological biases affect investor behaviour, challenges traditional financial theories and examines the amplified market reactions during a pandemic, driven by

news and social media. Additionally, it highlights gaps in existing research, particularly regarding the overreaction of investors during a pandemic.

2.1.3 Research Gap

Exploring investor behaviour and stock market dynamics during global pandemics is important for several reasons. Notably, pandemics often create significant uncertainty, leading to panic-driven behaviour in financial markets (Altig et al., 2020; Ashraf, 2021; Hsu et al., 2021; N. Huynh et al., 2021). Understanding how investors react during these periods will help explain sudden market movements and volatility.

Among the many topics explored in behavioural finance, the overreaction hypothesis stands out as a prominent area of investigation, examining how investors' exaggerated responses to new information can create price changes in the market (Byrne & Brooks Baillie Gifford, 2008; Thaler, 1999). However, the literature on the overreaction hypothesis largely lacks exploration into whether markets exhibit overreaction during times of pandemics and the potential for astute investors to capitalise on such market overreactions.

There are several reasons why there is limited literature exploring the overreaction effect during pandemics. Firstly, pandemics are relatively rare events, and their occurrence is unpredictable as highlighted by (Nuortimo & Härkönen, 2021), which complicates researchers' ability to collect sufficient data for comprehensive analysis.

Additionally, during pandemics, there is often heightened market volatility and uncertainty, which can deter investors and researchers from conducting detailed analyses. None the less some researchers like Enow discovered that overreaction is predominantly prevalent in healthcare, industrial and telecom sectors during a pandemic (Enow, 2022).

Huo and Qiu also discovered that overreactions in the Chinese equity market were primarily influenced by industries and stocks that responded positively to the announcement of the pandemic lockdown (Huo & Qiu, 2020a).

Research indicates that a pandemic can trigger significant overreactions among investors, who may either panic-sell or engage in excessive buying, particularly in sectors directly affected by the crisis, such as healthcare and technology (Hsu et al., 2021; Huo & Qiu, 2020; Loang, 2022). Analysing these behaviours can reveal possible trends and anomalies that are crucial for understanding market dynamics during a pandemic.

During a pandemic, news and social media play a significant role in amplifying the overreaction effect observed in financial markets. With the widespread availability of real-time information through various news outlets and social media platforms, investors are constantly bombarded with updates on the pandemic's progression, government responses, and economic impacts.

Generally, companies experiencing adverse news events tend to see a decrease in their market value, whereas firms do not experience an average gain from positive news releases (Capelle-Blancard & Petit, 2019). While this doesn't specifically address the overreaction effect during pandemics, it does underscore that equity prices can be influenced during such periods because of news.

Capelle-Blancard and Petit – corroborated by Nofsinger – who, in examining the trading behaviours of institutional and individual investors in reaction to company-specific news releases on Wall Street, found that there is a significant level of trading activity surrounding such news releases, particularly those related to earnings and dividends (Capelle-Blancard & Petit, 2019; Nofsinger, 2001).

By examining market reactions amidst these dynamic news and social media trends, researchers can gain valuable data on the extent to which investors respond to new information and whether such responses lead to overreactions. This is supported by Scherf who argued that the COVID-19 pandemic presented an excellent opportunity to assess market efficiency, given that the unfolding events were entirely unprecedented for financial market participants and mostly external in nature (Scherf et al., 2022).

2.2 Theoretical Review

This review examines existing literature on investor behaviour and stock market dynamics during pandemics, focusing on key findings, patterns, and theoretical frameworks. A central concept in this field is the Overreaction Hypothesis, which has been extensively explored within behavioural finance to explain investor behaviour and its subsequent effects on financial markets. Behavioural finance is a field of study that blends principles of psychology with economics and finance to understand how psychological factors influence financial decision-making and market outcomes (Bikas et al., 2013; Kapoor & Prosad, 2017; Thaler, 1999).

The Overreaction Hypothesis, introduced by De Bondt and Thaler (1985), suggests that investors tend to overreact to new information, leading to short-term mispricing of securities (W. F. M. De Bondt & Thaler, 1985). Mispricing arises when asset values stray from their fundamental worth, often influenced by behavioural tendencies like overreacting to unforeseen news or events. De Bondt and Thaler (1985) demonstrated this by showing that extreme stock price movements caused by overreaction are often followed by reversals as markets adjust to more accurate valuations.

Intrinsic value, while not explicitly discussed in their study, is typically derived from fundamental valuation models, such as discounted cash flow (DCF) analysis or price-to-earnings (P/E) ratios, which estimate a security's value based on conventional financial metrics and expected performance.

(W. De Bondt et al., 2015) further argue that behavioural finance bridges the gap between finance and psychology, providing insights into how investor sentiment drives market inefficiencies. For example, investor sentiment can cause prices to overshoot intrinsic value during periods of heightened uncertainty, such as global pandemics (Kim et al., 2019). These deviations highlight that price movements in equity markets are influenced not only by fundamental factors but also by behavioural biases, making mispricing a critical phenomenon for both researchers and market participants to examine.

In contrast to traditional financial theory, which assume that economic agents always act rationally to maximise expected utility, behavioural finance recognises that investor sentiment and other non-economic factors can significantly influence decision-making. While traditional finance theorists assume that all agents operate based on rational expectations and exclude non-economic factors from their models (*Jegadeesh-JournalFinance-1995*, n.d.), behavioural finance challenges this notion by acknowledging the psychological influences on market behaviour.

The most debated and studied theories among these is the Capital Asset Pricing Model (CAPM) pioneered by Sharpe in 1964, the Modern Portfolio Theory (MPT) introduced by Markowitz and the Efficient Market Hypothesis (EMH) introduced by Fama (Fama, 1965; Markowitz, 1952; Sharpe, 1964). The EMH is one of the most controversial theories in finance. While it has a significant amount of literature supporting its basic premise, the debate mainly revolves around the degree of efficiency of financial markets and the implications for investors and policymakers.

Fama articulated this hypothesis, stating that an efficient market is characterised by security prices consistently and accurately reflecting all available information (Fama, 1970). The standard characterisation of an efficient market consists of 2 components: 1; prices fully reflect all available information, and 2; there are no trading strategies that generate positive, expected, risk-adjusted excess returns (Dothan & Dothan, 2008). Several researchers have challenged the Efficient Market Hypothesis (EMH) based on these 2 characterisations. Robert Shiller argued that markets can exhibit irrational behaviour and that asset prices can deviate from their intrinsic value, contradicting the EMH (Shiller, 2003, 2014).

While Fama is the original proponent of the EMH, he himself has acknowledged limitations and exceptions to the hypothesis, such as during periods of market bubbles or crashes (Barber et al., 1998; Fama, 1970; Shiller, 2003). Richard Thaler provides empirical evidence of systematic investor biases and irrational behaviour, which challenge the assumptions of the EMH (Barberis et al., 2002; Thaler, 1999, 2016).

Robert Haugen's research on anomalies in equity market returns, such as the small-firm effect and the January effect, suggests that markets may not be perfectly efficient

as posited by the EMH (Haugen & Jorion, 1996; Robert Haugen et al., 1996). These findings align with the core principles of behavioural finance, which has become widely accepted in the finance world for its role in explaining and predicting market behaviour.

By offering insights into investor sentiment, asset pricing anomalies, and market trends, behavioural finance provides a more nuanced understanding of the complexities that challenge traditional notions of market efficiency (Thaler, 1999, 2016). This theory recognises the impact of psychological biases and cognitive limitations on investor decision-making, leading to deviations from rationality and market inefficiencies (Kapoor & Prosad, 2017).

Behavioural finance research primarily focuses on exploring the psychological factors that influence investor decision-making and market outcomes. Various studies investigate cognitive biases, emotional biases, and heuristics, assessing how these behavioural factors affect asset pricing, market efficiency, and investment strategies (Hadbaa, 2019; Masini & Menichetti, 2012; Oprean & Tanasescu, 2014; Singh & Yadav, 2016). In the 21st century, the prevalence of social media platforms has further amplified the role of psychological factors, enhancing the interconnectedness of global markets and shaping public sentiment. Social media not only influences how individuals consume and interact with news but also magnifies sentiment through media bias driven by public demand (Ren et al., 2021).

During a pandemic, the heightened media attention and rapid dissemination of information can significantly sway investor sentiment, contributing to behavioural responses that impact market dynamics (Engelhardt et al., 2020; Giri & Maurya, 2021; Jain, 2021; Salisu & Vo, 2020; Szczygielski et al., 2023). With a simple click, individuals can access real-time updates on global events, engage in discussions with people from diverse backgrounds, and participate in movements that transcend borders. This unprecedented level of connectivity has democratised information dissemination, empowering individuals to have a voice on a global scale.

However, it also poses challenges, including the rapid spread of misinformation and the erosion of traditional journalistic standards (Arcuri et al., 2023; Suarez-Lledo & Alvarez-Galvez, 2021; Y. Wang et al., 2019).

2.3 Empirical Studies

The overreaction hypothesis is a theory within behavioural finance that challenges traditional notions of market efficiency, suggesting that investors tend to overreact to new information, causing short-term mispricing in financial markets(W. F. M. De Bondt & Thaler, 1985). It was first introduced by De Bondt and Thaler in 1985, who demonstrated that investor psychology often leads to exaggerated price movements that deviate from the intrinsic value of securities. De Bondt and Thaler highlight that extreme price movements are often temporary, with corrections occurring as the markets reassess initial overreactions. Their work provides a foundation for understanding behavioural anomalies in financial markets, particularly during periods of uncertainty or dramatic events.

During the COVID-19 pandemic, evidence of overreaction was observed as investors responded excessively to news and events, causing heightened volatility. Stocks in sectors like healthcare, industrial, telecom, and technology were particularly affected, with significant price swings driven by panic-driven buying and selling (Enow, 2022; Hsu et al., 2021; Huo & Qiu, 2020b; Loang, 2022). (Howe, 1986) presents evidence of market overreaction, highlighting patterns that can be leveraged through investment strategies. This finding challenges the Efficient Market Hypothesis (EMH), which asserts that stock prices fully incorporate all available information, leaving no opportunity for excess returns.

(Barakat Mounther & Barakat Hussein, 2023) provide sustained evidence supporting the overreaction hypothesis, challenging the adequacy of traditional models such as the Efficient Market Hypothesis (EMH) and the Capital Asset Pricing Model (CAPM) in fully capturing market dynamics, especially during periods characterised by overreaction.

(Hong & Stein, 1999) contribute to the empirical understanding of market anomalies by developing a unified model that explains both underreaction and overreaction in financial markets. This 'unified' framework refers to a single, cohesive theory that integrates two contrasting market behaviours: underreaction to new information and overreaction to trends. Their model introduces two types of boundedly rational agents;

news watchers, who gradually incorporate private information into prices, resulting in underreaction, and momentum traders, who follow price trends using simplified strategies, thereby amplifying price movements and causing overreaction. By analysing the interactions between these two groups, Hong and Stein's framework offers a comprehensive explanation of these seemingly contradictory anomalies within a single theoretical construct, significantly advancing behavioural finance theory.

This interaction between agent types generates short-term underreaction to news, which momentum traders exploit, and long-term overreaction, where prices exceed intrinsic values before reverting. The model provides a behavioural alternative to traditional theories like the Efficient Market Hypothesis (EMH) and Capital Asset Pricing Model (CAPM), particularly during periods of significant market stress or uncertainty. This perspective aligns with findings from De Bondt and Thaler (1985), further challenging the notion of fully efficient markets and offering insights into predictable patterns in stock returns driven by behavioural factors.

Pandemics have profound implications for financial markets, with varying impacts across different sectors. The healthcare industry exhibits significant volatility during such periods, driven by increased demand and shifting investor sentiment. (Alberti et al., 2023) present empirical evidence showing that healthcare stocks tend to outperform the broader market during pandemics, as observed during the COVID-19 crisis. Employing an event study methodology, their findings highlight that biotechnology, and pharmaceutical sub-industries generate the highest abnormal returns, reflecting their pivotal role in addressing global health challenges.

The COVID-19 pandemic has had a profound impact on financial markets, particularly through its effects on specific sectors. The healthcare sector, given its central role in addressing the crisis, experienced notable volatility during this period. (Li et al., 2024) utilised Bayesian Convolutional Neural Network (Bayes-CNN) models to examine fluctuations in healthcare stock indices across three phases, pre-pandemic, during the pandemic, and post-pandemic.

Their analysis revealed heightened volatility during the pandemic, underscoring the sector's sensitivity to public health events, increased demand, and shifting investor

sentiment. These findings align with prior research, highlighting that movements in healthcare stock prices are influenced not only by economic fundamentals but also by broader market sentiment and risk perceptions during times of crisis. Further, varying effects were observed across sectors during the pandemic, with notable behavioural anomalies in investor decision-making.

(Enow, 2022) found evidence of overreaction in the healthcare, industrial, and telecom sectors on the Johannesburg Stock Exchange (JSE), driven by heightened market sensitivity to pandemic-related developments. Conversely, sectors such as consumer goods displayed no significant evidence of behavioural anomalies, reflecting their relatively stable demand dynamics during the crisis. Together, these findings illustrate the complex interplay between market sentiment, sectoral dynamics, and investor behaviour during the COVID-19 pandemic.

Building on this, the energy and manufacturing industries exhibited distinct responses to the pandemic, further highlighting the diverse sectoral impacts. (Shaikh, 2021) analysed the effects of COVID-19 on energy markets, focusing on stock indices, futures, ETFs, and implied volatility indices. The study found that pandemic-induced uncertainties, such as surging infection rates and economic policy unpredictability, significantly influenced the historical volatility of energy markets.

Notably, energy ETFs and stocks demonstrated resilience comparable to the S&P 500 energy stocks, indicating a sector-wide adaptation to the crisis. Similarly, (Ghorbel & Jeribi, 2021) revealed significant volatility spillovers from energy assets to financial assets, underscoring the interconnectedness of markets during periods of heightened uncertainty. These findings emphasise the varying sensitivities and resilience of different sectors during the pandemic, shaped by unique challenges and market dynamics.

In addition to the energy sector, the manufacturing sector faced substantial challenges due to supply chain disruptions and decreased demand. A study published by (M. N. Khan et al., 2024) investigated the pandemic's impact on stock market volatility across various industries, including manufacturing. The findings indicated that the

manufacturing sector experienced increased volatility, reflecting the sector's vulnerability to global supply chain interruptions and shifts in consumer demand.

Furthermore, (Wen & Arbogast, 2021), noting that the manufacturing sector had not fully recovered to pre-pandemic levels as of February 2021. This lag in recovery highlights the sector's prolonged adjustment period in response to the pandemic's disruptions.

The mainstream media and social media platforms serve as influential forces in shaping investor behaviour and amplifying market reactions, particularly during periods of high uncertainty such as the COVID-19 pandemic. The swift dissemination of news, whether accurate or speculative, heavily impacts market sentiment, often resulting in market overreactions. Social media platforms have accelerated the spread of information, though this information can sometimes be unverified or emotionally charged, significantly influencing investor decisions.

Research by (Modgil et al., 2024) highlights the role of confirmation bias and echo chambers on social media in shaping public perception and behaviour during the COVID-19 pandemic. Confirmation bias refers to the psychological tendency of individuals to seek out information that reinforces their pre-existing beliefs, while dismissing contradictory evidence. Echo chambers further amplify this effect by creating insular environments where individuals are primarily exposed to opinions and narratives that align with their beliefs. On social media platforms, algorithms that prioritise user preferences exacerbate this dynamic, fostering polarisation and reducing exposure to diverse perspectives.

Similarly, (Huo & Qiu, 2020) identified that misinformation or sensationalist narratives could incite panic-induced investment decisions, exacerbating market volatility. Platforms such as Twitter and Reddit became pivotal during episodes like the GameStop stock surge, facilitating coordinated buying activities among retail investors. These platforms enabled collective actions that significantly influenced stock prices. As noted by (Investopedia, 2024) stocks often gain traction through viral popularity on social media, attracting retail investors and resulting in heightened price

volatility. Empirical studies have further illuminated the predictive power of social media sentiment on stock market movements.

For instance, (Bollen et al., 2011) identified a significant correlation between public sentiment, expressed on Twitter, and fluctuations in the Dow Jones Industrial Average (DJIA), a prominent stock market index. Their analysis of large-scale Twitter data revealed that collective mood states, such as happiness, calmness, or anxiety, could serve as predictors of changes in the DJIA, enhancing the accuracy of market forecasts.

Similarly, (Sprenger et al., 2014) observed that stock-related tweets could anticipate abnormal returns and trading volumes. These findings underscore the growing role of social media as both an indicator of investor sentiment and a catalyst for market behaviour, occasionally resulting in pronounced market overreactions.

2.4 Debates and Controversies

To conclude the literature review, the following analysis brings to light the key debates and controversies between behavioural finance and market behaviour during times of global crises. The exploration highlights the significant implications of the overreaction hypothesis, which presents a compelling challenge to traditional financial frameworks like the Efficient Market Hypothesis (EMH), especially under conditions of extreme uncertainty such as during a pandemic.

Drawing together insights from seminal research and more contemporary studies, this discussion shows the influential role of psychological factors and media dynamics in amplifying behavioural anomalies among investors, ultimately shaping market efficiency and pricing patterns. (W. F. M. De Bondt & Thaler, 1985) laid the groundwork for challenging the Efficient Market Hypothesis (EMH) by introducing the overreaction hypothesis, which suggests that investor psychology often leads to exaggerated price movements. Their study demonstrated that stock prices tend to deviate significantly from their intrinsic values due to overreaction to new information, resulting in temporary mispricing that is subsequently corrected.

This phenomenon directly contradicts the EMH's assumption that markets are fully efficient and that prices always reflect all available information (Fama, 1965). Building on this, (Howe, 1986) provided further empirical evidence of overreaction in stock markets, revealing patterns of price reversals that allow for the exploitation of abnormal returns. This finding undermines the EMH's assertion that excess returns cannot be consistently achieved in an efficient market.

Authors like, (Daniel et al., 1998) developed a model incorporating investor overconfidence and biased self-attribution, explaining both under and overreactions in security markets. Their work highlights that psychological biases can lead to predictable mispricing, challenging the EMH's premise of rational investor behaviour.

Collectively, these studies provide compelling evidence that investor behaviour, driven by psychological biases, introduces inefficiencies that cannot be reconciled with the core principles of the EMH. However, (Lo, 2005) introduces the Adaptive Markets Hypothesis (AMH) as a nuanced framework that bridges the Efficient Markets Hypothesis (EMH) with observed behavioural finance anomalies.

The AMH suggests that traditional models and behavioural deviations are not mutually exclusive but can coexist within a dynamic market landscape. Lo 2005 asserts that behavioural biases, traditionally seen as irrationalities, may serve as adaptive heuristics shaped by evolving market conditions. Rather than dismissing the EMH outright or fully endorsing behavioural finance, the AMH recognises the fluidity of market efficiency. It emphasises that efficiency levels fluctuate over time and depend on varying contexts, challenging the static assumptions of the EMH. This middle-ground perspective underlines the importance of adaptability in understanding investor behaviour and market dynamics.

Authors like (Daniel et al., 1998; Hong & Stein, 1999) contribute significantly to the behavioural finance literature by challenging classical views of market efficiency and providing insights into the psychological factors driving market anomalies. (Daniel et al., 1998) focus on psychological biases such as overconfidence and biased self-attribution. Biased self-attribution refers to a cognitive tendency where individuals

attribute successful outcomes to their own skill while blaming external factors for failures.

This bias reinforces overconfidence, as investors become increasingly assured of their decision-making abilities following positive outcomes, even if these results were due to chance. Daniel et al. propose a theory illustrating how these biases influence investor behaviour, leading to observable patterns of underreaction and overreaction in securities markets. For instance, overconfidence causes investors to overestimate the precision of their private information, contributing to underreaction to public news.

Conversely, biased self-attribution amplifies overreaction as investors adjust their beliefs disproportionately in response to new information that supports their prior decisions.

Similarly, (Hong & Stein, 1999) extend this discussion by offering a unified behavioural model that addresses the interaction between different types of investors, news watchers and momentum traders, and highlights the role of information processing limitations in creating predictable price movements. Together, these studies underscore the importance of behavioural explanations for asset price dynamics, demonstrating that investor psychology and bounded rationality play crucial roles in shaping market behaviour and challenging the core assumptions of market efficiency.

2.5 Conclusion of Literature Review

This literature review explores the overreaction hypothesis in behavioural finance, focusing on investor behaviour during periods of uncertainty, such as pandemics. The Capital Asset Pricing Model (CAPM) explains the relationship between risk and expected return, assuming rational investors and efficient markets, as per the Efficient Market Hypothesis (EMH). However, behavioural finance challenges these assumptions by highlighting psychological biases in decision-making.

Traditional financial theories provide essential frameworks for behavioural finance, questioning the idea of perfectly rational markets. Empirical studies show how psychological biases, media influence, and social platforms amplify investor

overreactions, causing short-term market inefficiencies, particularly in healthcare, industrials, and energy sectors.

Despite progress, research gaps remain, especially concerning the long-term impact of pandemic-driven market overreactions and investor adaptation strategies. By integrating behavioural insights with financial models, this review underscores market complexities during crises and calls for research into adaptive models capturing investor sentiment and market resilience.

3 Research Methodology

3.1 Introduction

This study adopts the methodological framework pioneered by De Bondt and Thaler (1985) to test for equity market overreaction. Their approach, originally used to examine long-term return reversals in U.S. equities, is well-suited to this cross-country context as it enables the classification of markets into "winner" and "loser" groups based on pre-pandemic performance.

By analysing whether these groups exhibit return reversals during and after the pandemic, this study assesses whether investor overreaction occurred on a global scale. This framework, coupled with t-tests and regression analysis, offers a structured means of detecting temporary mispricing and assessing potential trading opportunities across diverse market environments.

Building on this framework, this research investigates whether the indices of 24 countries exhibited signs of overreaction during the COVID-19 pandemic. Chapter 3 details the data, sampling, variables, and econometric tests used to detect pandemic-era overreaction across 24 equity markets.

3.2 Research Design

This research adopts a quantitative approach to examine investor behaviour and stock market dynamics during pandemics. The study is divided into two distinct phases. Phase 1 establishes the relationship between the spread of a pandemic and index market performance, while Phase 2 tests the overreaction hypothesis during the pandemic period.

In the initial phase, 24 countries were selected randomly and divided into four groups, each comprising six nations. These groups are further subdivided into two subgroups based on the countries' level of exposure to the pandemic. The timeline for observation begins when each country reports its 100th confirmed case, a significant epidemiological milestone. This threshold is chosen because it represents a point where data becomes statistically significant and reliable for analysis. It allows for robust estimates of disease parameters, such as incidence and prevalence rates, ensuring consistency in comparing the onset and progression of the pandemic across different nations and is used in studies (Binny et al., 2020; I. Khan et al., 2020; Liang et al., 2020) .

The study period is structured into four quartiles, facilitating a detailed analysis of temporal market dynamics and investor behaviour relative to the pandemic's spread. This methodological framework not only ensures precision in statistical inferences but also supports the comprehensive exploration of behavioural patterns and market responses during a global health crisis.

Table 1. List of the randomly selected countries and the dates when they hit their 1st case and their 100th case.

Country name	Date of 1st case recorded	Date of 100th case recorded
Japan	16 January 2020	16 February 2020
South Korea	20 January 2020	20 February 2020
USA	21 January 2020	1 March 2020
France	24 January 2020	29 February 2020
Germany	27 January 2020	1 March 2020
United Kingdom	31 January 2020	5 March 2020
Russia	31 January 2020	19 March 2020
Italy	31 January 2020	23 February 2020
Finland	29 January 2020	14 March 2020
UAE	29 January 2020	14 March 2020
Canada	25 January 2020	14 March 2020
Australia	25 January 2020	10 March 2020
India	30 January 2020	15 March 2020
Egypt	14 February 2020	20 March 2020
Israel	21 February 2020	15 March 2020
Brazil	25 February 2020	15 March 2020
Ireland	29 February 2020	18 March 2020
Qatar	29 February 2020	11 March 2020
New Zealand	28 February 2020	24 March 2020
Saudi Arabia	2 March 2020	15 March 2020
South Africa	5 March 2020	18 March 2020
Mexico	28 February 2020	18 March 2020
Denmark	27 February 2020	12 March 2020
Turkey	11 March 2020	25 March 2020

Table 2 . List of 24 countries grouping into the 4 quartiles.

Quartile	Date range once 100th case it reached	Countries in Groups
1	1 Jan – 5 Mar 2020	Japan, South Korea, United Kingdom, France, USA, Germany
2	6 Mar – 14 Mar	Switzerland, Australia, Qatar, Denmark, Finland, Canada
3	15 Mar – 18 Mar	UAE, India, Israel, Brazil, Saudi Arabia, Ireland
4	19 Mar – 30 Mar	South Africa, Mexico, Russia, Egypt, Turkey, New Zealand

Table 3 . Group of countries with their 100th case where the pandemic spread to the earliest and latest.

Earliest	**Latest**
Japan, South Korea, United Kingdom, France, USA, Germany, Switzerland, Australia, Qatar, Denmark, Finland, Canada	UAE, India, Israel, Brazil, Saudi Arabia, Ireland, South Africa, Mexico, Russia, Egypt, Turkey, New Zealand

This paper examines the impact of World Health Organisation (WHO) announcements on infection numbers across 24 countries, alongside trends in news and social media, to assess their influence on investor behaviour and market performance during COVID-19 (T. L. D. Huynh et al., 2021b; Liu et al., 2020).

Using methods from (W. F. M. De Bondt & Thaler, 1985) daily MSCI index performance is analysed. t-tests compare countries that first reached 100 confirmed cases with those affected later. The study follows prior research (e.g., De Bondt & Thaler, 1985) to calculate abnormal returns, measuring deviations from expected returns using a benchmark approach.

By comparing group-specific returns to the overall average, this method identifies market anomalies during the pandemic. Abnormal returns, key in financial research, measure deviations from expected returns. This study compares average returns of

specific country groups (e.g., "early-hit" vs. "late-hit") to the total average, identifying patterns of overreaction, underreaction, or resilience.

This highlights how markets responded differently based on exposure levels and investor behaviour. The second phase explores market overreaction to COVID-19. Investors often react strongly to negative news, selling shares even after significant declines. Pessimism prevents new investments, deepening market downturns due to a widening gap between sellers and buyers.

This aligns with the overreaction hypothesis (De Bondt & Thaler, 1985), which suggests exaggerated investor responses lead to mispricing. Their study tracked company performance over three-year periods, categorising portfolios into "winners" (strong past performance) and "losers" (weaker past performance).

To test overreaction, this study applies De Bondt and Thaler's framework. Countries are grouped as "winners" and "losers" based on pre-pandemic index performance (1 Jan – 31 Mar 2019), with performance tracked across key intervals following the pandemic's onset.

Winners	Losers
Saudi Arabia, Egypt, New Zealand, Denmark, Switzerland, Ireland, United States, Canada, Russia, France, Australia, United Arab Emirates	Finland, Israel, Brazil, United Kingdom, Germany, Japan, South Korea, India, Mexico, South Africa, Turkey, Qatar

Statistical tools, including t-tests and regression analysis, were used to compare the post-pandemic (1 January - 31 March 2024) returns of these portfolios. This approach evaluates whether "loser" markets experience stronger subsequent returns, consistent with the overreaction hypothesis.

3.3 Research Population and Sampling

The study analyses 24 countries selected from the MSCI All Country World Index (ACWI), which represents a broad and diverse benchmark of global equity markets.

This index was used as the sampling frame due to its comprehensive coverage of both developed and emerging markets. A stratified sampling approach was used to ensure regional diversity and variation in COVID-19 outbreak timelines.

Countries were grouped into four quartiles based on the date each reached 100 confirmed cases, enabling comparison between early-hit and late-hit markets. Six countries were selected from each quartile using random selection within strata to mitigate bias and enhance representativeness. The sample size of 24 countries was determined based on data availability, feasibility of comparative analysis, and to ensure meaningful statistical inference while maintaining analytical manageability.

The second phase applies De Bondt and Thaler's (1985) framework to assess market overreaction. Countries were classified as "winners" or "losers" based on pre-pandemic performance (1 Jan – 31 Mar 2019), with subsequent performance tracked for behavioural patterns. To test the overreaction hypothesis, t-tests and regression analysis compare post-pandemic returns (1 Jan – 31 Mar 2024), assessing whether "loser" markets rebounded more strongly.

3.4 Data Collection Methods

This study uses secondary data to examine investor behaviour and stock market dynamics during COVID-19. Two key sources are utilised: MSCI country indices as a standard benchmark for equity market performance and pandemic-related data from global health authorities.

MSCI index data, sourced from Bloomberg Terminal and Yahoo Finance, ensures accuracy in evaluating market trends and classifying countries as "winners" or "losers" based on pre- and post-pandemic performance. Pandemic timelines, including the date each country reached 100 confirmed cases, are obtained from the WHO and national health departments to align market behaviour with the pandemic's progression.

By integrating reliable financial and health data, this study provides a robust foundation for analysing COVID-19's impact on global markets and testing the overreaction hypothesis.

3.5 Research Instruments

3.5.1 Statistical Tools

T-tests are used to identify whether significant differences exist in market performance between groups (winners vs losers and early-hit vs late-hit countries), this analysis is conducted using the following formula;

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where:

$\bar{X}_1$= Mean of Group 1 (winners / early hit countries)

$\bar{X}_2$= Mean of group 2 (losers / late hit countries)

s_1^2= Variance of group 1

s_2^2= variance of group 2

n_1= Sample size of group 1

n_2= Sample size of group 2

Define the Null and Alternative Hypotheses:

Null Hypotheses (H_0): The mean of the two groups are equal ($\bar{X}_1 = \bar{X}_2$).

Alternative Hypothesis (H_A): The means of the two groups are different ($\bar{X}_1 \neq \bar{X}_2$).

Regression analysis is applied to examine the relationship between the index returns of all 24 countries and the cumulative COVID-19 cases, while accounting for fundamental economic factors. This relationship is expressed mathematically as follows;

$$R_t = \alpha + \beta_1 \ln(AvgCases_t) + \beta_2 AvgGDPGrowth_t + \beta_3 AvgInflation_t + \beta_4 AvgUnemployment_t + \epsilon_t$$

Where:

R_t= The average market return of the 24 countries at time t.

$\ln(AvgCases_t)$= The natural log of the average cumulative Covid19 cases across 24 countries at time t.

$AvgGDPGrowth_t$= The average GDP growth rate of the 24 countries at time t.

$AvgInflation_t$= The average inflation rate of the 24 countries at time t.

$AvgUnemployment_t$= The average unemployment rate of the 24 countries at time t.

α= The intercept, representing the baseline market return

$\beta_1\beta_2\beta_3\beta_4$= The coefficients quantifying the impact of each independent variable on market returns.

ϵ_t= The error term, accounting for variations not explained by the model

The inclusion of GDP growth, inflation, and unemployment as control variables is based on their well-documented influence on financial markets (Chen et al., 1986; Fama, 1981) as they capture fundamental economic conditions affecting investor sentiment, risk perception, and market returns. By incorporating these variables, the model accounts for broader economic influences beyond COVID-19 case numbers (Baker et al., 2020; Barro, 2006), while the log-transformation of COVID-19 cases follows established methodologies in pandemic-related financial research (H. Liu et al., 2020).

3.5.2 Analytical Frameworks

Adapted from De Bondt and Thaler (1985), the overreaction hypothesis framework categorises two portfolios into winners and losers and analyses their market performance over specified intervals. In this research, this framework serves as the foundation for examining market overreactions during the COVID-19 pandemic .

The calculation of abnormal returns will be calculated by comparing actual MSCI index performance to expected returns derived from the historical benchmark of the MSCI index.

3.5.3 Software and Statistical Tools

Statistical software such as Excel and R are used for data analysis and hypothesis testing, ensuring precision in the results.

3.6 Possible limitations and Challenges of the study

This research acknowledges several constraints. The sample of 24 countries, though diverse, may not fully represent global markets, and random selection might overlook key regional or economic nuances. Grouping countries by pre-pandemic performance and the timing of their 100th COVID-19 case may oversimplify complex factors like government policies, healthcare systems, and investor sentiment.

Reliance on specific time frames and secondary data sources (e.g., Bloomberg Terminal, Yahoo Finance, WHO reports) introduces potential discrepancies and reporting lags. Statistical tools such as t-tests and regression analysis, while robust, may not fully capture intricate market dynamics during a global crisis.

Although macroeconomic fundamentals like GDP growth, inflation, and unemployment are considered, other variables—such as government interventions—also significantly influence market behaviour. The unique nature of COVID-19, marked by large-scale interventions, extensive media coverage, and rapid developments, may not align with historical overreaction patterns.

Confounding factors, including monetary policies, geopolitical tensions, and vaccination rollouts, may affect the independent variables, introducing potential bias. Moreover, using the 100th confirmed COVID-19 case as a reference assumes uniform testing and reporting standards, though inconsistencies across nations could impact comparability. These limitations call for cautious interpretation and future research to refine methodologies and expand contexts.

3.7 Ethical considerations

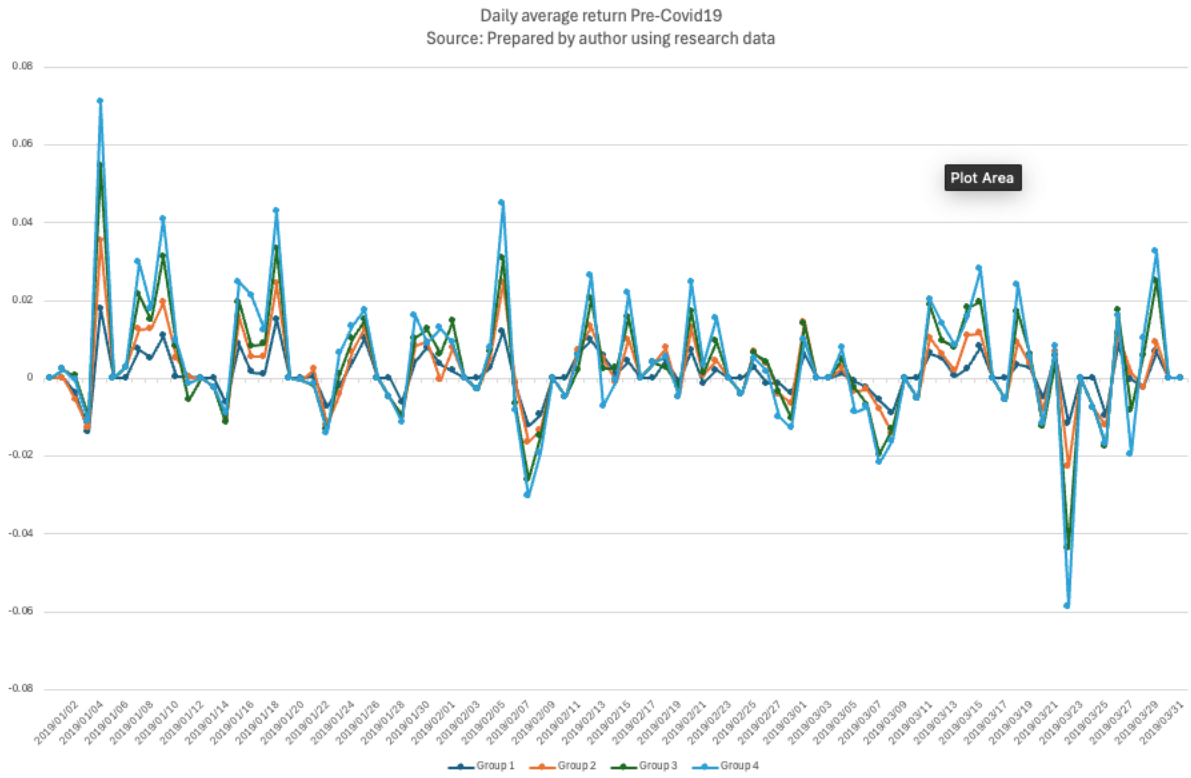
This study is quantitative in nature and does not require the involvement of humans or animals in data collection and analysis. Hence, there are no risks posed to humans or

animals throughout the research process. Regardless, the researcher has adhered to the ethical guidelines the University of Witwatersrand set forth.

4 Findings

4.1.1 Abnormal returns

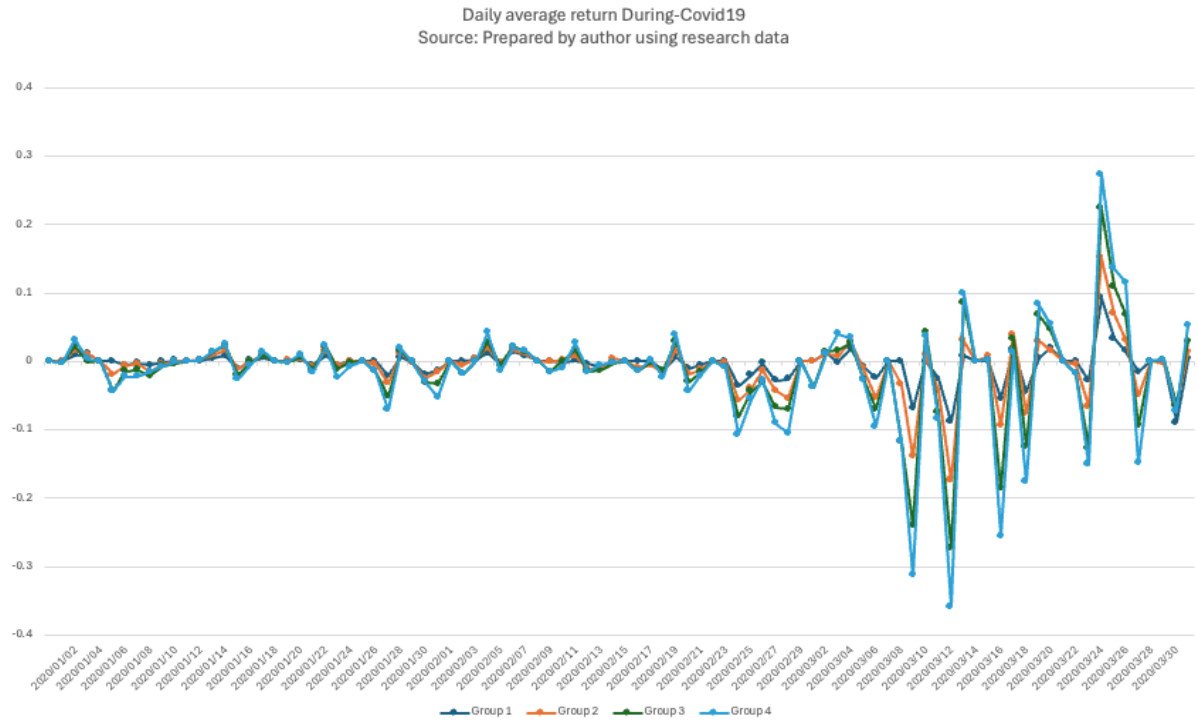
Figure 1: Daily Average Returns of MSCI Country Indices in 2019 (Pre-COVID-19)



The graph shows the daily average returns of MSCI country indices for 24 nations in 2019, before COVID-19. Returns fluctuate around zero, as efficient markets distribute stock returns normally over time, reflecting a balanced environment with no consistent trend.

This pattern supports the idea that markets quickly incorporate new information, leading to offsetting gains and losses. While occasional spikes occur, they remain moderate, highlighting market stability before the crisis.Some synchronisation among groups suggests correlation, likely driven by global trends and investor sentiment. The absence of extreme downturns or sustained volatility further reflects a pre-crisis equilibrium.

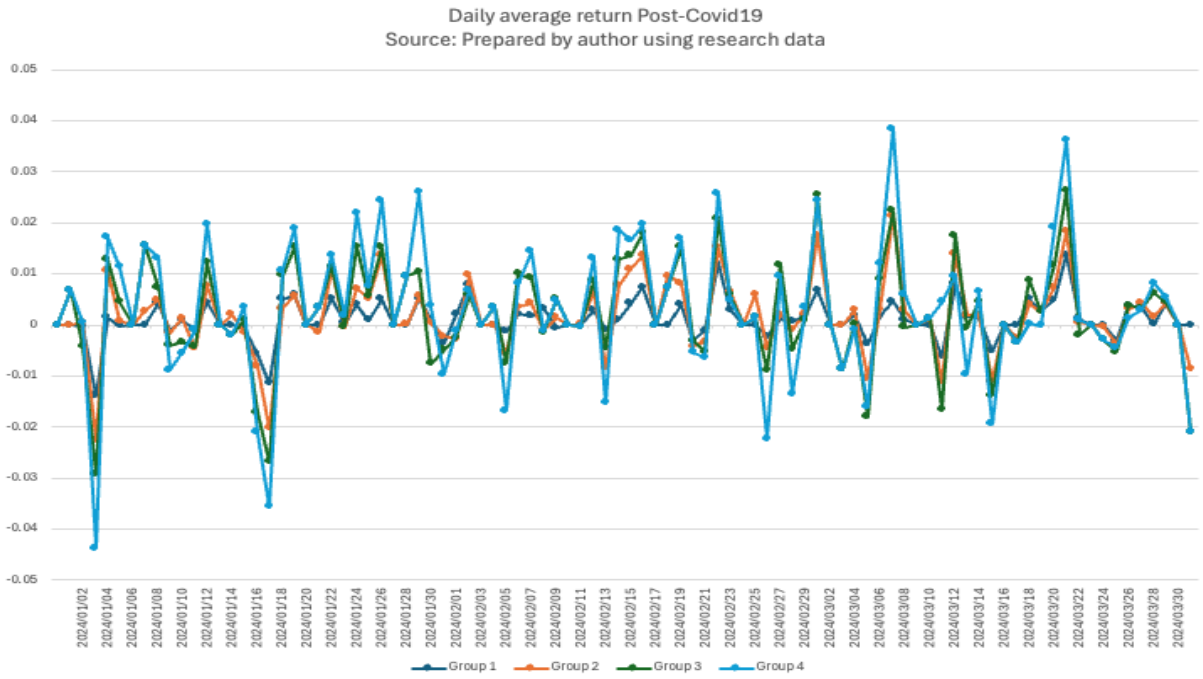
Figure 2: Daily Average Returns of MSCI Country Indices During COVID-19 (2020)



The graph shows the daily abnormal returns of MSCI country indices for 24 nations during COVID-19 in 2020. Compared to the pre-pandemic period, volatility is significantly higher, reflecting severe market disruptions. Sharp negative spikes indicate heightened uncertainty, while large positive returns suggest rebounds driven by government stimulus and central bank interventions.

Unlike the stable fluctuations in Figure 1, Figure 2 shows erratic movements and greater divergence, highlighting varied market responses.

Figure 3: Daily Average Returns of MSCI Country Indices Post-COVID-19 (2024)



The graph shows the daily average returns of MSCI country indices for 24 nations in 2024, reflecting post-COVID-19 market behaviour. Compared to the volatility in Figure 2, Figure 3 indicates greater stability, signalling a market recovery. While fluctuations persist, they align more with pre-pandemic trends, though occasional downturns reflect ongoing economic uncertainties and policy shifts.

Unlike the extreme abnormal returns in Figure 2, driven by market panic and rapid policy responses, Figure 3 suggests a return to more predictable investment conditions. This shift marks a transition from crisis-induced instability to a stabilised yet evolving financial landscape.

4.1.2 t-test

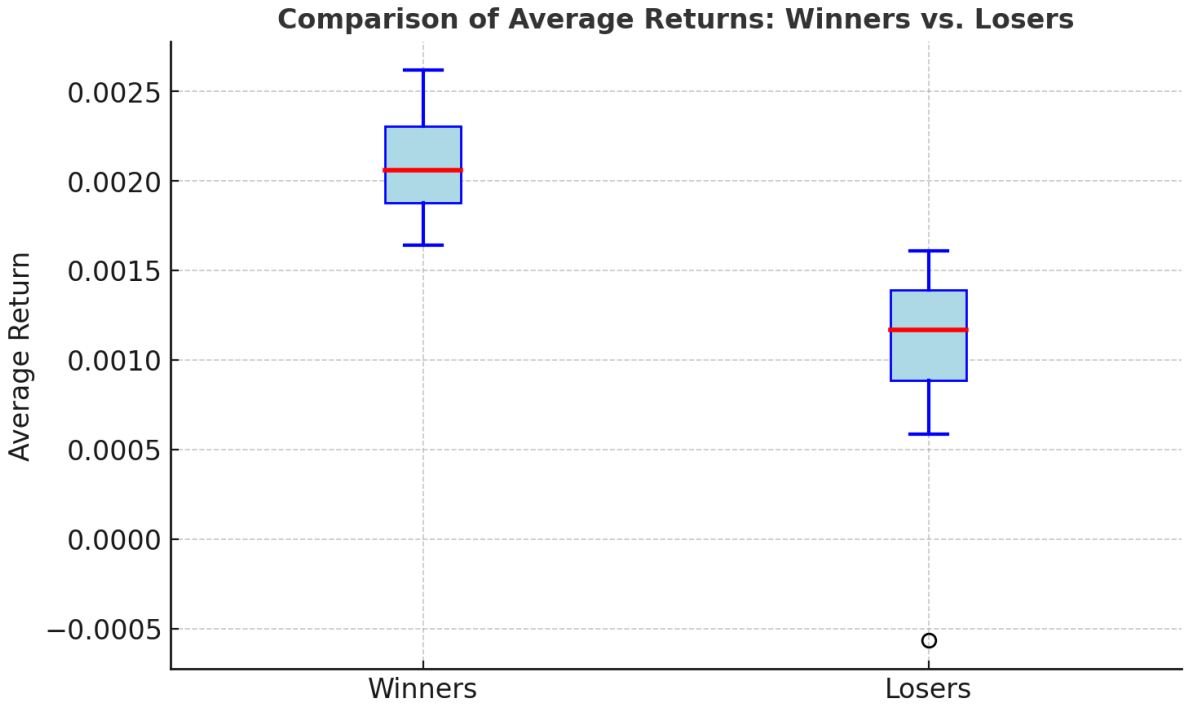
Null Hypothesis (H_0): The mean returns of winners and losers are equal.

Alternative Hypothesis (H_1) : The mean returns of winners and losers are different.

Where the p-value : If $\rho < 0.05$, reject the null hypothesis. There is a significant difference between the two groups.

If $\rho \geq 0.05$, fail to reject the null hypothesis. The difference is not statistically significant.

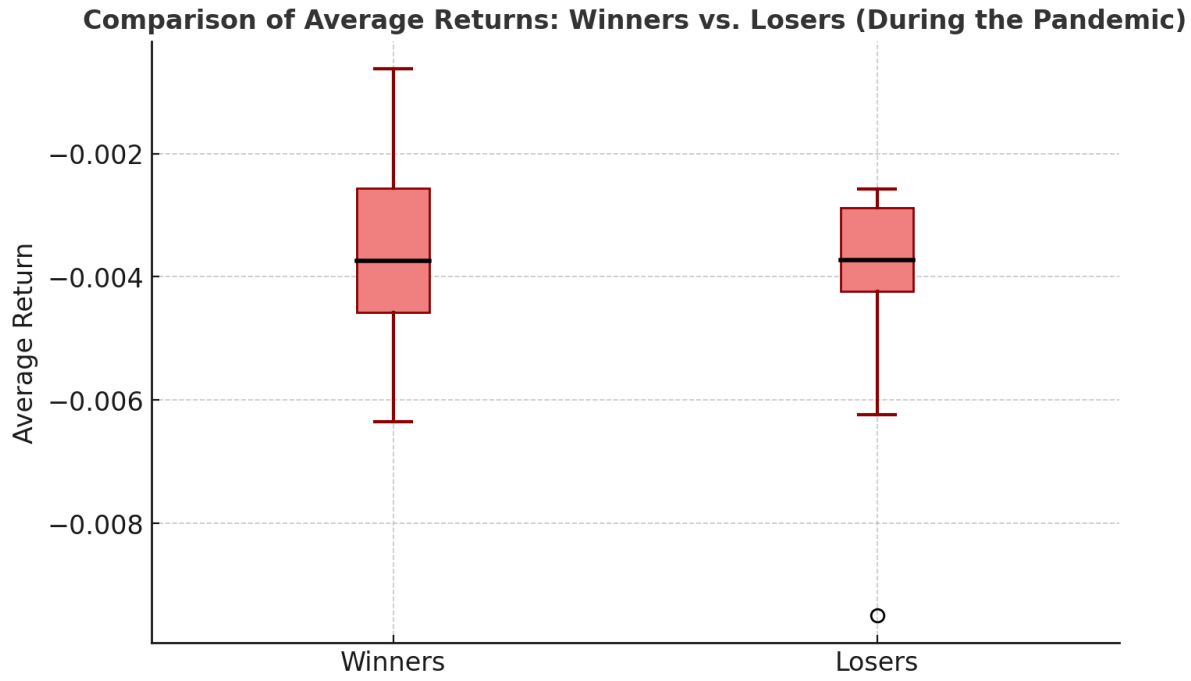
Figure 4 Comparison of average returns for winners vs losers



Prepared by author using research data

The t-test revealed a statistically significant difference between the average returns of "Winner" and "Loser" indices before the COVID-19 pandemic, with a t-statistic of 5.56 and a p-value of 0.00004.

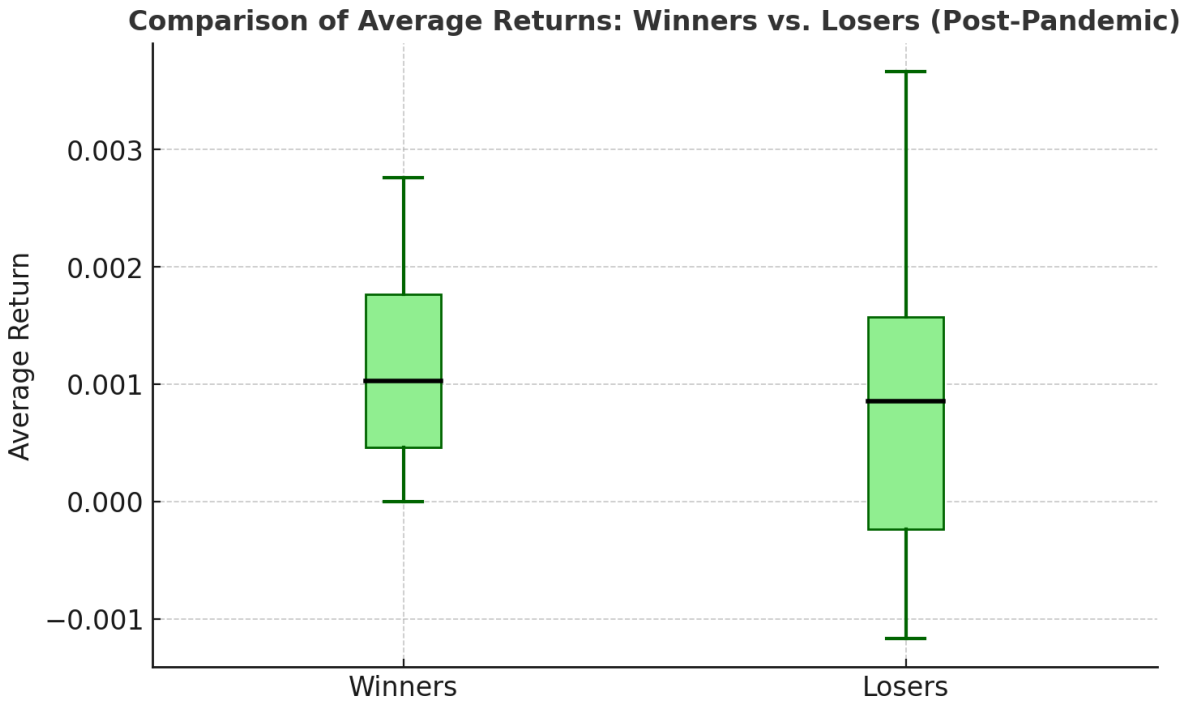
Figure 5 Comparison of average returns for winners vs loser during the pandemic



Prepared by author using research data

During the COVID-19 pandemic, the independent t-test revealed no statistically significant difference between the average returns of "Winner" and "Loser" indices, with a t-statistic of 0.76 and a p-value of 0.453, we fail to reject the null hypothesis, indicating that past winners did not significantly outperform losers during this period. The boxplot further supports this, showing considerable overlap in the distributions of both groups.

Figure 6 Comparison of average returns for winners vs loser post the pandemic



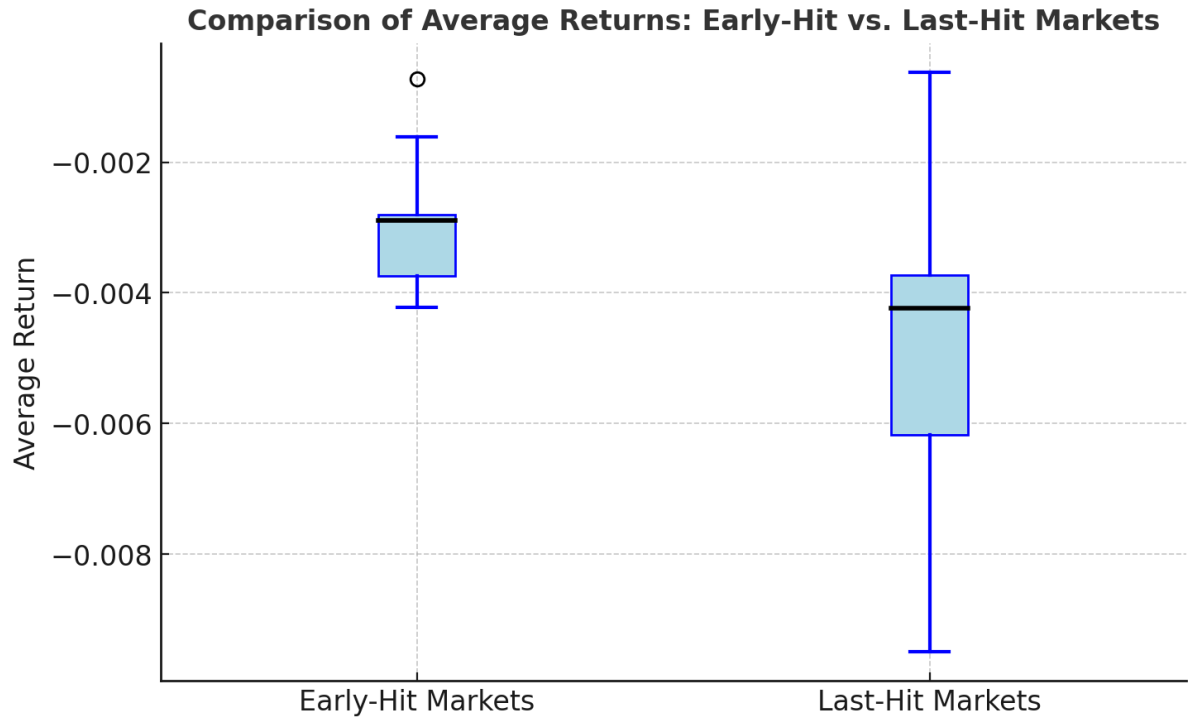
Prepared by author using research data

Post-COVID-19, the independent t-test showed no significant difference in average returns between "Winner" and "Loser" indices (t = 0.69, p = 0.498). This fails to reject the null hypothesis, indicating past winners did not outperform losers. The boxplot supports this, showing overlapping distributions.

Independent t-tests across pre-, during-, and post-pandemic periods highlight shifts in market dynamics. Before COVID-19, winners significantly outperformed losers, but this pattern collapsed during the pandemic due to volatility and uncertainty. T-tests during this phase found no significant difference, suggesting historical performance no longer predicted future returns.

Post-pandemic, despite market stabilisation, t-tests again found no significant difference, indicating the crisis disrupted past trends. These findings emphasise the need for adaptive investment strategies in evolving economic conditions.

Figure 7 Comparison of average returns for early-Hit vs. last-hit markets



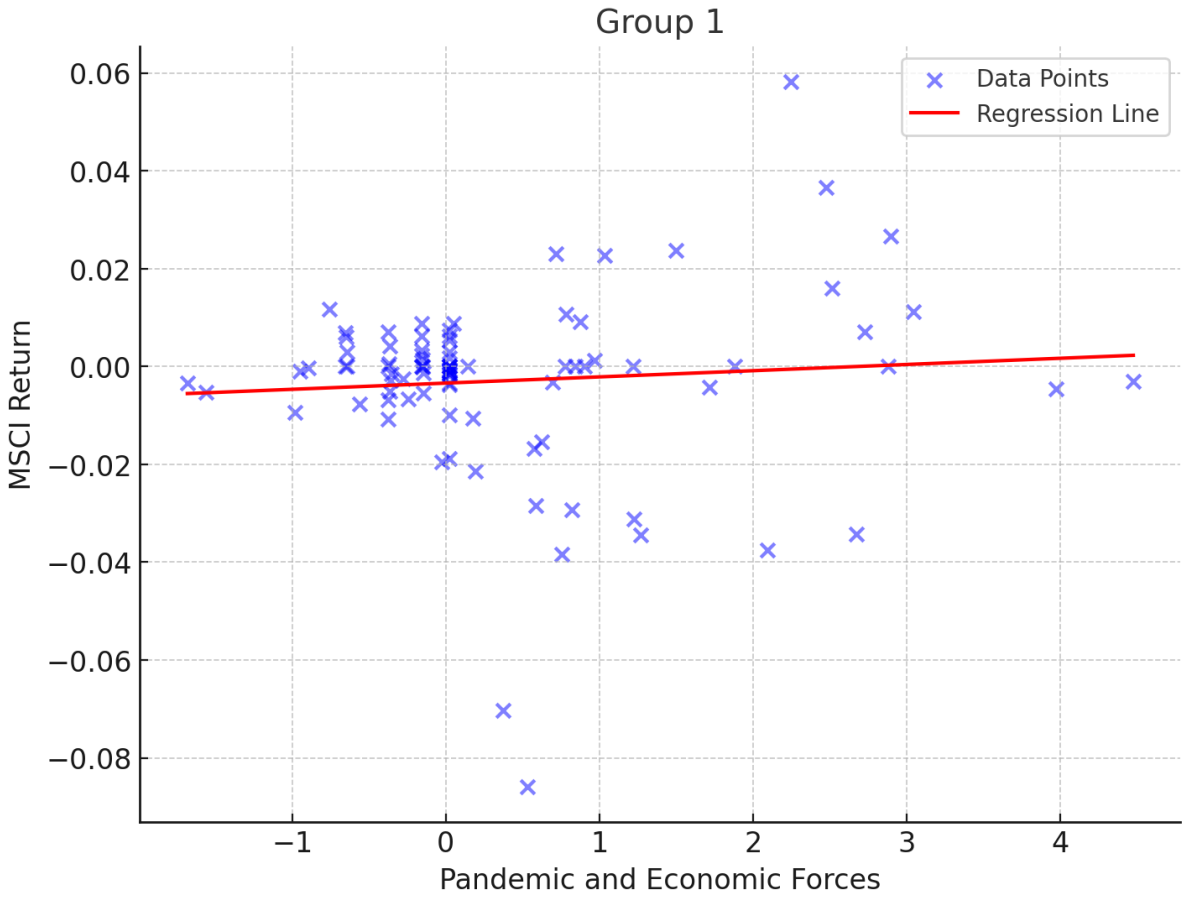
Prepared by author using research data

The t-test comparing early- and late-hit markets during COVID-19 showed a significant difference in average returns ($t = 2.50$, $p = 0.024$), indicating financial impacts varied by outbreak timing. The boxplot highlights a wider return spread in early-hit markets, likely due to uncertainty, panic, and unpreparedness.

Late-hit markets, having observed global responses, may have benefited from more informed economic and market stabilisation strategies. These findings underscore the importance of timing in crises. Early-hit markets pose high-risk, high-reward opportunities, while late-hit markets may offer more stable, data-driven investments.

4.1.3 Regression analysis

Figure 8 Relationship Between Pandemic and Economic Forces and MSCI Returns for Group 1

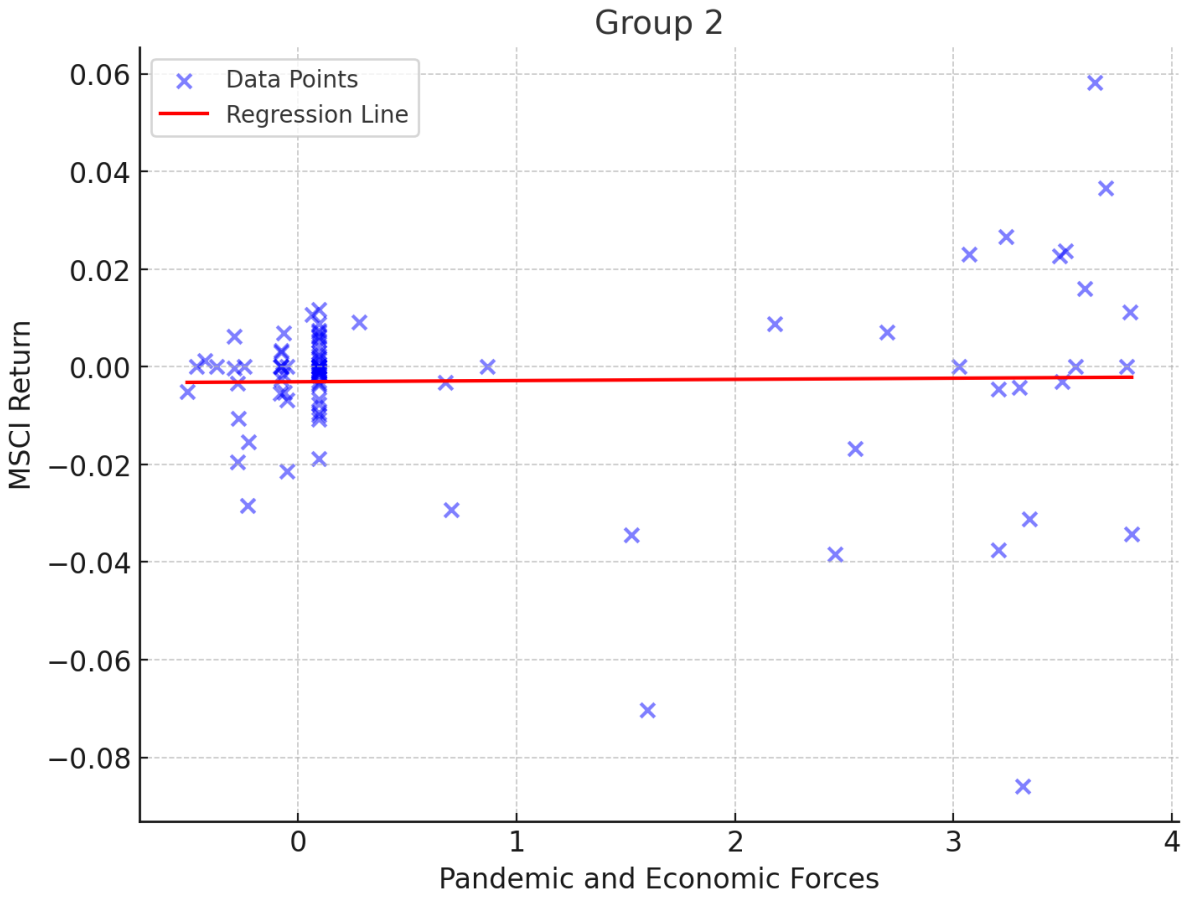


Source: Prepared by author using research data.

Figure 8 illustrates a weak positive relationship between pandemic and economic forces and the average MSCI return for Group 1, indicated by the slope of the regression line. However, the wide dispersion of data suggests that other factors influence returns. The analysis shows a negligible coefficient (0.0013), a high p-value (0.456), and a low R-squared value (0.006), confirming that these variables explain only 0.6% of return variations and lack statistical significance.

Overall, the findings indicate that pandemic and economic conditions had little direct impact on MSCI returns, suggesting that other market-specific factors played a more significant role.

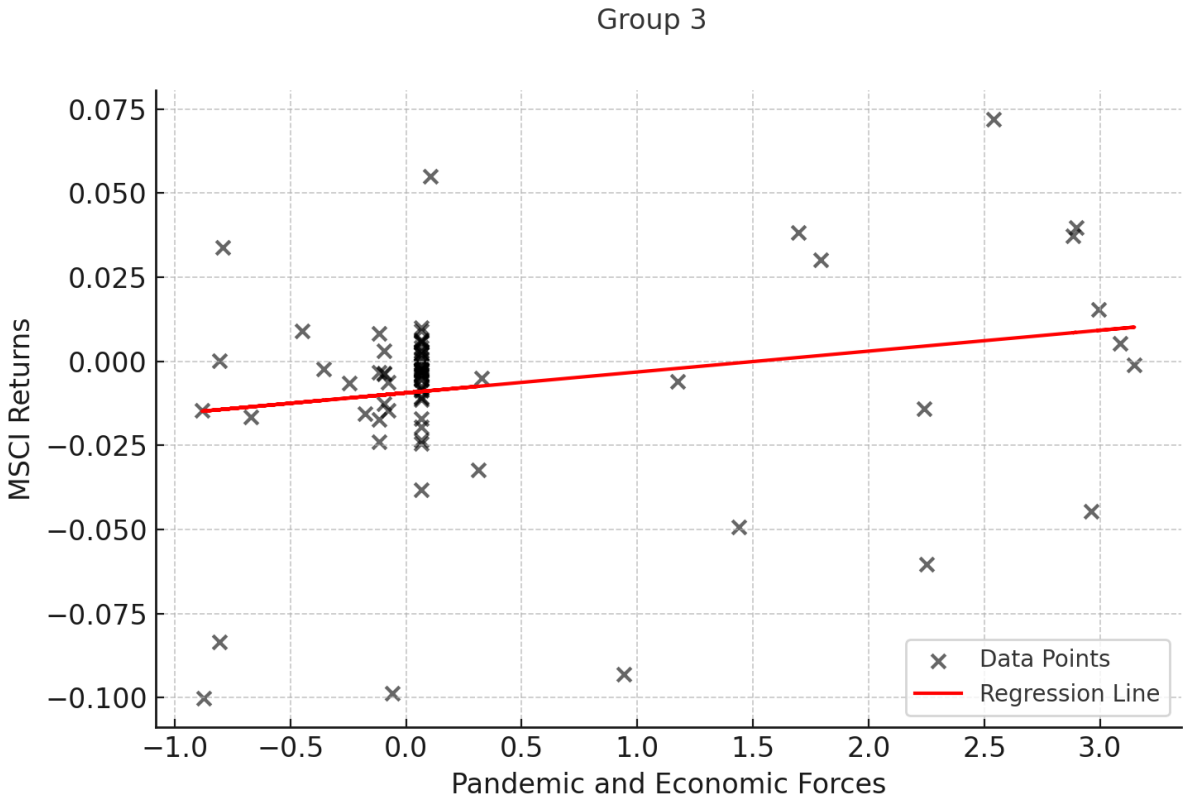
Figure 9 Relationship Between Pandemic and Economic Forces and MSCI Returns for Group 2



Source: Prepared by author using research data.

Figure 9 shows no strong correlation between pandemic and economic forces and Avg MSCI Return for Group 2, as indicated by the widely scattered data points and nearly flat regression line. The regression analysis confirms this, with a negligible coefficient (0.0002), a high p-value (0.859), and an R-squared value of 0.000, meaning these factors explain none of the variance in MSCI returns. Generally, pandemic and economic conditions had no meaningful impact on MSCI returns for Group 2, suggesting that other factors, such as market liquidity, monetary policy, or investor sentiment, were more influential.

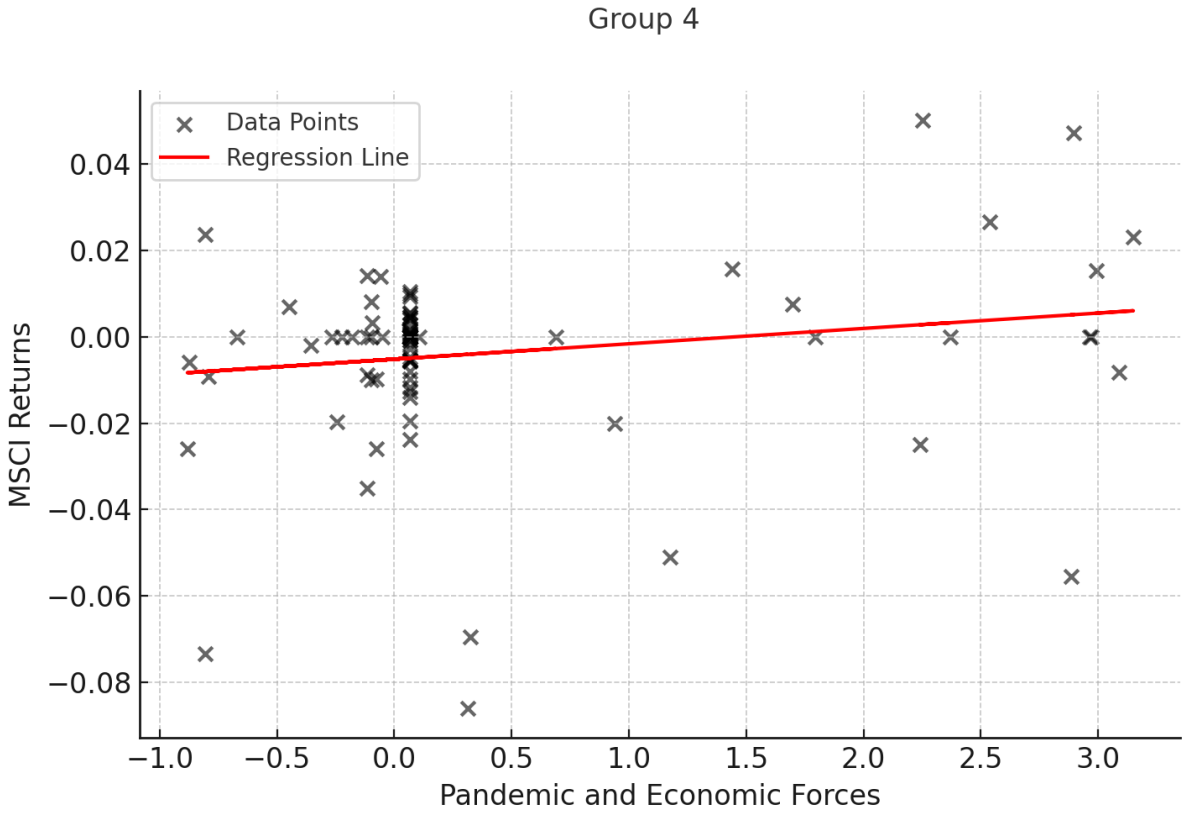
Figure 10 Relationship Between Pandemic and Economic Forces and MSCI Returns for Group 3



Source: Prepared by author using research data

Figure 10 reveals a weak positive relationship between pandemic and economic forces and MSCI Returns, with a coefficient of 0.0062. However, the relationship is only marginally significant ($p = 0.058$) and explains just 4.6% of return variations ($R^2 = 0.046$), indicating that other factors influenced market performance. Other macroeconomic or market-specific variables, such as monetary policies, investor sentiment, or global trade conditions, likely played a more dominant role in determining stock market behaviour.

Figure 11 Relationship Between Pandemic and Economic Forces and MSCI Returns for Group 4



Source: Prepared by author using research data

Figure 11 illustrates the weak relationship between Pandemic and Economic Forces and MSCI Returns. The regression model accounts for only 3.1% of the variation in returns ($R^2 = 0.031$), with a small positive coefficient (0.0036) that is not statistically significant ($p = 0.097$). This indicates that pandemic and economic factors had no significant impact on MSCI Returns, suggesting that other variables played a more substantial role in influencing market performance.

5 Conclusion

This study examined investor behaviour and stock market dynamics across 24 countries during the COVID-19 pandemic, with a particular focus on identifying overreaction and assessing whether astute investors could exploit short-term market inefficiencies. The analysis, grounded in behavioural finance and tested using t-tests and regression models, produced mixed support for the two core hypotheses.

While pre-pandemic data revealed a statistically significant difference between "winner" and "loser" markets ($t = 5.56$, $p = 0.00004$), this performance disparity dissipated during and after the pandemic, suggesting that heightened volatility disrupted traditional return patterns. No significant differences were observed in those periods ($p = 0.453$ and $p = 0.498$, respectively).

However, a notable finding emerged from the comparison between early- and late-hit countries, where a significant difference in average returns was found ($t = 2.50$, $p = 0.024$), implying that market reactions were influenced by the timing of exposure to the pandemic. Regression analysis indicated that pandemic and macroeconomic variables had little explanatory power ($R^2 \leq 4.6\%$, $p > 0.05$), highlighting the predominance of sentiment and behavioural factors during this period.

These findings confirm that investor behaviour was characterised by overreaction during the early stages of the pandemic, with volatility and sentiment dominating rational evaluation of fundamentals. However, the lack of persistent mispricing and the rapid correction of prices undermine the second hypothesis: that investors could consistently capitalise on these fluctuations.

Although opportunities may have existed briefly, they were likely eroded by transaction costs, information lags, and institutional interventions. When assessed against the study's four objectives—examining investor behaviour, assessing market impact, testing the extent of overreaction, and evaluating profitability—findings largely support the presence of behavioural biases and temporary inefficiencies, while offering limited evidence for sustained arbitrage.

This study is not without limitations. The sample of 24 countries, while globally diverse, may not fully capture the spectrum of investor behaviour or market conditions. Defining pandemic onset based on the 100th confirmed case introduces a standardised but potentially imprecise threshold, overlooking the diversity in national responses and reporting practices.

Furthermore, while GDP growth, inflation, and unemployment were included as controls, other relevant variables such as monetary interventions and fiscal policies were excluded. The study also relies on secondary data sources which may contain reporting lags or inconsistencies. Importantly, the time frame for post-pandemic analysis (Q1 2024) may be too short to capture delayed or long-term corrections in market performance.

Despite these limitations, the findings offer several practical implications. Investors are cautioned against relying heavily on historical performance during crisis periods, as behavioural volatility can quickly undermine traditional metrics. Incorporating real-time sentiment analysis may provide a more adaptive edge. Policymakers should prioritise transparent, timely communication to reduce panic and volatility, and deploy stabilisation mechanisms early in the crisis cycle.

Future research could expand on these findings by examining the role of institutional versus retail investors, exploring other crisis periods, and integrating sentiment data from social media or news analytics to better understand behavioural triggers. Ultimately, this study contributes to the behavioural finance literature by demonstrating how crisis conditions challenge market efficiency and provoke psychological responses among investors.

While overreaction was evident, the ability to consistently profit from it was not—suggesting that market inefficiencies during pandemics are real but fleeting. This reinforces the adaptive markets perspective: that efficiency fluctuates with context, and understanding these dynamics is critical for resilient financial decision-making.

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