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Article

The Impact of COVID-19 on Global Stock Markets: Comparative Insights from Developed, Developing, and Regionally Integrated Markets

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Abstract: This study examines the impact of the COVID-19 pandemic on global stock markets by comparing developed and developing economies, while highlighting regional differences. Using dynamic panel regression models, this study explores the role of pandemic-related variables, fiscal policies, and investor sentiment in shaping market performance. Developed markets, although highly sensitive to infections, benefited from robust fiscal interventions and institutional resilience. Developing markets face greater volatility owing to stringent measures, structural vulnerabilities, and limited fiscal capacities. Regionally, Europe demonstrated resilience through coordinated policies, whereas the Americas experienced significant volatility from fragmented responses. Africa and parts of Asia encountered fewer initial shocks but struggled with prolonged recovery due to limited financial and institutional resources. The findings underscore the importance of economic integration, coordinated fiscal and monetary policies, and investor sentiment management to stabilize markets during crises. These insights guide policymakers in enhancing resilience and fostering sustainable economic growth amid future global disruptions.

Keywords: COVID-19; pandemic; developed markets; developing markets; stock returns

JEL Classification: F15; F42; G01; G15



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1. Introduction

Throughout history, pandemics have left deep economic and social scars that disrupt livelihoods, trade, and financial stability. From the Spanish Flu to SARS and Ebola, these crises have reshaped economies and exposed vulnerabilities in the global markets (Sampath et al., 2021). The COVID-19 pandemic, which emerged in late 2019, triggered unprecedented global economic challenges (Goldstein et al., 2021). When the World Health Organization declared it a global pandemic on 11 March 2020, governments responded with severe restrictions to control the outbreak, stalling economic activities and cross-border trade in the process. For example, the World Trade Organization reported a 5.3% contraction in global trade volumes in 2020, and the International Labor Organization estimated a loss equivalent to 255 million full-time jobs, illustrating the pandemic's disruptive economic impact.

The interconnectedness of modern economies, with tightly linked supply chains and financial systems, meant that the economic fallout from COVID-19 was widespread. Many regional blocs such as the European Union (EU) and the Association of Southeast Asian

Nations (ASEAN) have experienced disruptions in economic cooperation and trade flows (del Maria et al., 2020). Fiscal and monetary responses varied significantly across regions, highlighting structural differences in policy flexibility. Developed economies, such as the United States and the European Union, implemented expansive fiscal interventions, which included stimulus packages totaling trillions of dollars, stabilizing markets, and reinforcing investor confidence (Baker et al., 2020; Zaremba et al., 2021). However, in developing markets such as those in ASEAN and Africa, limited fiscal capacity and weaker institutional frameworks restrict the effectiveness of policy responses, exacerbate economic vulnerabilities, and prolong recovery (Ozili & Arun, 2020).

A critical factor that amplifies economic challenges is the inflexibility of fiscal and monetary policies in many markets. Developing economies, constrained by structural inefficiencies and external dependencies, have struggled to adapt swiftly to the evolving crisis. For example, Indonesia's stock market dynamics highlight the challenges faced by developing economies when integrating into global financial systems, where limited economic freedom and weaker institutional frameworks hinder resilience (Robiyanto, 2018; Endri et al., 2024). This contrasts sharply with developed markets, where coordinated and flexible policy frameworks mitigate market volatility and accelerate recovery (Chevallier et al., 2018). The differences in fiscal and monetary policies across regions underscore the critical importance of policy adaptability during crises, as markets with inflexible policies face extended periods of instability (Bekaert & Harvey, 1995).

Psychological factors have also played a pivotal role during the pandemic, driving significant market instability. Heightened levels of fear and uncertainty, captured through indices such as the Global Fear Index (GFI) and Volatility Index (VIX), underscored the outsized impact of sentiment on market behavior. For instance, the VIX surged to record highs of over 80 in March 2020, reflecting the unprecedented investor anxiety that surpassed the 2008 global financial crisis (Zhang et al., 2020). These sentiment-driven fluctuations are particularly pronounced in less integrated financial markets, where weak institutional frameworks amplify the adverse effects of fear-induced volatility (Bouri et al., 2018; Makun, 2021). This highlights the need for comprehensive approaches to manage psychological factors during crises.

This study explores how COVID-19 impacted stock market returns in developed and emerging markets, focusing on regions central to global trade and financial networks. As indicators of economic health, stock markets provide insights into the broader effects of the pandemic on cross-border trade and investment flows (Ramelli & Wagner, 2020). This study examines the extent to which fiscal responses, government restrictions, and psychological factors helped stabilize markets or exacerbated volatility across Europe, Asia, and Latin America, regions with distinct economic structures and levels of policy integration. For instance, West Africa's BRVM provides a compelling case study of how structural factors such as a fixed exchange rate regime amplify financial vulnerabilities during global crises (Zaremba et al., 2021).

To analyze these dynamics, this study employs a dynamic panel regression model using stock market indices for both developed and developing economies. The data set spans October 2019 to December 2021 and integrates multiple variables, including COVID-19 infection rates, government response stringency, fiscal policies, and investor sentiment indicators, such as the Volatility Index (VIX) and the Global Fear Index (GFI). By incorporating epidemiological, economic, and psychological variables, this study provides a comprehensive framework for assessing how financial markets respond to pandemics across diverse economic structures.

This study's findings have several important implications. First, they underscore the importance of aligning fiscal and monetary policies within regional trade networks to

absorb economic shocks more effectively. Second, the results highlight the need for flexible and adaptive policies that account for the structural differences between the developed and emerging markets. Finally, the research demonstrates the critical role of psychological factors, such as fear and uncertainty, in stabilizing financial markets during crises.

By providing a comparative, cross-regional analysis of stock market behavior during the COVID-19 pandemic, this study contributes to the growing literature on pandemic economics. This underscores the importance of coordinated policy responses, resilient financial systems, and sentiment management for mitigating the effects of global disruptions. The following sections review the relevant literature, present the methodology and data, discuss empirical findings, and provide practical recommendations for policymakers and avenues for future research.

2. Literature Review

Pandemics have historically disrupted economic systems, exposing weaknesses in financial markets and revealing disparities in resilience among countries. The COVID-19 pandemic, unlike previous crises, simultaneously induced supply and demand shocks, posing unique challenges to economies and financial networks (del Maria et al., 2020). These shocks included disruptions to global supply chains, reduced labor force participation, and sharp declines in consumer demand, as documented by Baldwin and Mauro (2020) and McKibbin and Fernando (2023). The compounded nature of these shocks magnified their impact on stock markets, which served as critical indicators of economic health and policy effectiveness within regional blocs. Economic integration, in which countries align policies to promote trade, financial cooperation, and investment, plays a significant role in determining how well regions navigate such disruptions.

2.1. Economic Integration and Financial Market Performance

The interconnectedness of economies through trade, capital flows, and financial markets has deepened with globalization, making them more susceptible to external shocks. Economic integration frameworks, such as the European Union (EU), ASEAN, and Mercosur, aim to reduce barriers to trade and capital movement, but these frameworks have also been tested during global crises. Ramelli and Wagner (2020) showed that financial markets react swiftly to disruptions, reflecting investor sentiment and economic fundamentals. Regions with stronger integration tend to stabilize faster because of coordinated policy responses such as the EU's synchronized fiscal actions during COVID-19, which mitigated market volatility (Zaremba et al., 2021). These policies included stimulus packages and measures to stabilize financial institutions, which provided immediate relief to markets and reinforced confidence among investors.

However, global financial integration also increases systemic risk because market shocks in one region can spread rapidly to others through contagion effects. A key driver of this phenomenon is herding behavior, in which investors make decisions based on market trends rather than on fundamental analysis (Bikhchandani & Sharma, 2001). Herding amplifies volatility, especially during crises, as panic-driven sell-offs spread across markets through a domino effect. The COVID-19 pandemic saw a sharp increase in market correlations, with stock indices across developed and emerging economies experiencing synchronized declines owing to global risk aversion and liquidity shortages. This highlights how interconnected financial markets react not only to domestic economic conditions, but also to broader shifts in investor sentiment and risk perception.

The contagion effect was particularly visible in emerging markets, where foreign institutional investors exited en masse, exacerbating local currency depreciation and stock market declines. Studies have shown that, during global crises, emerging markets with

higher foreign investor participation experience larger capital outflows and prolonged recovery periods (Forbes & Rigobon, 2002). Conversely, markets with lower foreign exposure, such as some segments of China's stock market, exhibit more insulation from external shocks.

The pandemic has also exposed gaps in regional coordination, particularly in the developing regions. ASEAN's financial cooperation buffered economic fallout through mechanisms such as the Chiang Mai Initiative and shared monetary policies (Wang et al., 2021). This was in stark contrast to Africa and Latin America, where limited policy alignment and weaker market integration exacerbate vulnerability (Ozili & Arun, 2020). These disparities underscore the importance of deeper financial integration, which enhances market stability and strengthens investor confidence in times of uncertainty.

Recent findings by Endri et al. (2024) emphasize that low long-term integration levels in developing markets, such as Indonesia, provide diversification benefits, but also hinder swift recovery during global crises. This finding highlights the trade-off between financial integration and portfolio diversification opportunities. While stronger financial integration can improve liquidity and risk-sharing mechanisms, it also increases exposure to global shocks, as seen during COVID-19-induced market sell-offs.

2.2. Disparities Between Developed and Developing Markets

The impact of the pandemic on stock markets varies significantly between developed and developing economies, revealing structural differences. Developed markets in Europe and North America have benefited from robust fiscal measures and institutional support, which have helped stabilize markets (Baker et al., 2020). These economies exhibit faster recovery and mean reversion of stock returns, reflecting their stronger institutional frameworks (Gormsen & Koijen, 2020).

Conversely, developing economies experience prolonged volatility, driven by weaker institutions and limited fiscal capacity (Goodell, 2020). Ozili and Arun (2020) highlight that government restrictions exacerbate market instability in these regions, as stringent lockdowns disrupt economic activities and expose structural weaknesses. In Africa, the limited depth of financial markets and weak cross-border cooperation magnify the economic challenges (Del et al., 2021). Similarly, Latin American markets were particularly vulnerable to capital outflows, reflecting the region's dependence on external investments and limited ability to mobilize domestic resources.

The unique dynamics of financial integration during crises are evident in studies by Robiyanto (2018) and Yuliadi et al. (2024), who find that while developing markets exhibit lower integration with global markets, this segmentation can shield them from the full extent of global shocks. However, these benefits are often outweighed by the structural vulnerabilities that limit recovery.

2.3. Psychological Factors and Regional Market Responses

Investor sentiment, measured through the Global Fear Index (GFI) and VIX, plays a pivotal role in shaping market behavior during the pandemic. In developing regions, where investor confidence is more sensitive to global events, markets experience heightened volatility because of elevated fear levels (Zhang et al., 2020). This fear-induced volatility disproportionately affects emerging markets, where weaker institutional frameworks, lower liquidity, and higher dependence on foreign investors exacerbate uncertainty (Afees et al., 2021). For instance, the VIX surged to an all-time high in March 2020, reflecting widespread panic among global investors and leading to capital outflows, particularly from less integrated financial markets (Zhang et al., 2020).

A crucial factor amplifying this volatility is the behavior of foreign institutional investors in emerging stock markets. Unlike domestic investors, foreign investors often react strongly to global risk perceptions, leading to capital flights during crises (Alfaro et al., 2020). This phenomenon, commonly referred to as the “hot money” effect, intensifies stock market downturns, as large withdrawals of foreign capital trigger liquidity shortages and force downward price spirals (Bekaert & Harvey, 1995). Moreover, exchange rate fluctuations compound instability, as depreciating local currencies increase the cost of foreign-denominated debt, further weakening investor confidence. Emerging markets with significant exposure to foreign portfolio investments, such as Indonesia, Brazil, and South Africa, are particularly vulnerable and have experienced sharp currency depreciation and stock market sell-offs during the early phases of the pandemic (IMF, 2021; Ozili & Arun, 2020).

In contrast, markets in regions with deeper integration frameworks, such as the Eurozone, benefit from coordinated policy announcements that temper investor anxiety and stabilize markets (Izzeldin et al., 2021). These efforts, including quantitative easing programs and fiscal stimulus packages, signaled stability and helped retain investors' confidence. However, regions with weaker integration, particularly those dependent on foreign capital inflows, struggle to align market expectations with policy actions, leading to more prolonged disruptions (Mert & Omer, 2020).

The segmentation of some financial markets, as observed in Indonesia and China, offers opportunities for diversification but also exposes emerging markets to sentiment-driven volatility and exchange rate shocks (Endri et al., 2024). Managing psychological factors requires a dual approach: (1) targeted communication strategies that reinforce policy credibility and market stability and (2) regulatory measures to mitigate excessive foreign capital dependency and strengthen domestic investor participation. Additionally, mechanisms such as foreign exchange interventions and capital flow management tools can help stabilize markets during periods of excessive volatility.

These findings underscore the importance of addressing both structural and psychological factors when managing financial crises. Effective policy coordination within regional blocs can mitigate the impact of fear-driven volatility, whereas stronger financial integration enhances resilience to external shocks. Furthermore, harmonizing fiscal and monetary policies across regions strengthens economic recovery, reduces capital flight risks, and supports long-term market stability.

3. Methodology, Data, and Variables

3.1. Data

This study uses a comprehensive data set that combines stock market indices from both developed and developing economies to ensure regional diversity and varying levels of economic integration. Countries are classified using recognized financial groupings, such as MSCI, Investing.com (accessed on 26 January 2024), S&P, and STOXX (see Appendices A and B). The classification is based on the yearly evaluation and ranking of equity markets around the world as well as a review of market accessibility. This classification provides a clear and objective distinction between developed and developing nations and ensures a meaningful comparison of stock market behavior across diverse economic contexts.

The data set covers October 2019 to December 2021, and is segmented into three distinct phases:

- The pre-outbreak period (October to December 2019): represents a stable baseline period before the emergence of COVID-19.

- Outbreak (January–March 2020): captures the initial shock as the pandemic spreads globally.
- Pandemic (April 2020 to December 2021): reflects sustained impacts and policy responses during the prolonged crisis.

Data on stock market prices and daily returns were sourced from Investing.com and ADVFN, which provide reliable historical financial data for the global markets. Information on COVID-19 confirmed cases, deaths, and government response stringency measures was obtained from Our World in Data and Worldometer Statistics. The Government Response Stringency Index (SI) captured the strictness of policy interventions on a scale from 0 to 100. Market sentiment data were collected from the Chicago Board Options Exchange (CBOE) Volatility Index (VIX) and Global Fear Index (GFI) proposed by [Afees and Lateef \(2020\)](#). Fiscal policy data, including government spending and forgone revenues, were sourced from the International Monetary Fund (IMF) COVID-19 Fiscal Monitor Database.

This data set enables a robust analysis of financial market dynamics during the COVID-19 pandemic, emphasizing the differences between developed and developing markets. By integrating epidemiological, fiscal, and psychological variables, this study captures the multifaceted nature of the impact of the pandemic on global markets.

3.2. Methodology

This study employs a dynamic panel regression model to analyze the impact of COVID-19 on stock market returns in developed and developing economies. This approach is well-suited to capturing temporal dynamics and cross-sectional heterogeneity, enabling insights into how market responses vary across regions and over time.

Three models were estimated to assess the different aspects of market behavior.

- Base Model: Examines the direct effects of COVID-19 variables (confirmed cases, deaths, and stringency measures) on stock market returns.
- Control Model: Incorporates additional variables, such as exchange rate fluctuations, fiscal policies, and sentiment indices (VIX and GFI).
- Interaction Model: This model introduces interaction terms between the COVID-19 variables and government stringency measures to assess how policy interventions influence market dynamics.

The lagged dependent variable is included to account for return persistence, reflecting the momentum and mean reversion tendencies in stock markets.

Diagnostic tests were conducted before estimation:

- Panel Unit Root Tests: Levin–Lin–Chu and Fisher tests ensure the stationarity of variables.
- Hausman Test: Determines the suitability between the random effects and fixed effects models.

The interaction terms allow for an in-depth examination of how government responses mitigate or amplify the economic effects of the pandemic. For example, stringent lockdowns in developing countries may exacerbate market instability due to weaker economic structures, whereas in developed markets, such measures may enhance investor confidence.

This methodological framework provides a nuanced understanding of the effects of the pandemic, accounting for both the structural and temporal dimensions of market responses.

3.3. Variables

The dependent variable is Index Return (Indexret), calculated as the daily log returns of stock market indices.

Independent Variables:

COVID-19 Variables:

- Confirmed Cases and Deaths: Log-transformed to account for exponential growth and normalize the distribution.
- Stringency Index (SI): A composite measure based on nine response indicators, including school closures, workplace closures, and travel bans.

Pandemic Severity: Ratio of confirmed cases to population size, reflecting the intensity of the pandemic's impact on each country.

To analyze the direct effect of COVID-19-related variables on stock market returns while accounting for return persistence, the study estimates the following base model:

$$\text{Indexret}_{it} = \alpha_0 + \alpha_1 \text{Indexret}_{i,t-1} + \alpha_2 \text{ccases}_{it} + \alpha_3 \text{cdeaths}_{it} + \alpha_4 \text{SI}_{it} + \epsilon_{it} \quad (1)$$

This base model includes the lagged dependent variable, $\text{Indexret}_{i,t-1}$, to capture the persistence of stock returns, indicating whether returns exhibit mean reversion (i.e., whether gains or losses are corrected over time). The coefficients $\alpha(2-4)$ estimate the direct effects of COVID-19 cases, deaths, and government stringency measures on stock returns.

The control variables:

Fiscal Policy Measures: Quantified as additional government spending and forgone revenues (in billions of USD). These data were not available for all countries, such as the Palestinian Territory and Venezuela.

Exchange Rate Returns (ex): Daily changes in exchange rates to account for currency effects on market returns.

CBOE Volatility Index (VIX): Captures market sentiment and reflects global risk aversion.

Global Fear Index (GFI): Broader measure of investor sentiment that accounts for global cases and deaths over a 14-day horizon. The GFI is calculated as the weighted average of the Reported Cases Index (RCI) and the Reported Deaths Index (RDI). The RCI measures to which extent expectations from reported cases in a period of 14 days ahead swerved from the present reported case, as most estimates of the COVID-19 incubation period range from 1–14 days ([WHO, 2020](#)).

$$\text{RCI}_t = \left(\frac{\sum_i^N C_{i,t}}{\sum_i^N (C_{i,t} + C_{i,t-14})} \right) \times 100 \quad (2)$$

where the numerator is the total number of COVID-19 pandemic reported cases at time t for all the countries globally, $i = 1, 2, \dots, N$. N stands for the total number of captured cross-sections in the index; $C_{i,t-14}$, the number of COVID-19 pandemic reported cases for each cross-section at the incubation period beginning, is represented as the preceding 14th day. The whole equation is then multiplied by 100 to provide the index on a scale of 0 to 100. The highest value represents the highest level of fear in the pandemic period. The fear level decreases as the index tends toward 0.

The reported cases are mirrored by the Reported Death Index by connecting the number of daily reported deaths to the expected number of deaths reported in a 14-day period ahead, which is in line with the assumption for RCI.

$$\text{RDI}_t = \left(\frac{\sum_i^N D_{i,t}}{\sum_i^N (D_{i,t} + D_{i,t-14})} \right) \times 100 \quad (3)$$

where the numerator is the total number of COVID-19 reported deaths at time t for all the countries in the world. $D_{i,t-14}$ is the number of COVID-19 reported deaths at the beginning of the incubation period, $t - 14$.

From the above two equations, the Global fear Index is computed as:

$$GFI_t = [0.5(RCI_t + RDI_t)] \quad (4)$$

Following the development of the GFI, Makun (2021) applied to examine the effect of COVID-19 on stock returns of nine major Asia-Pacific countries. He used the COVID-19 GFI to estimate the COVID-19's effect on stock returns empirically. The results showed that the global fear index negatively and significantly affects stock returns in the long and short run. To control for additional factors that could influence stock market returns, such as exchange rates, fiscal policies, and market sentiment, the model is extended as follows:

$$\text{Indexret}_{it} = \alpha_0 + \alpha_1 \text{Indexret}_{i,t-1} + \alpha_2 \text{ccases}_{it} + \alpha_3 \text{cdeaths}_{it} + \alpha_4 \text{SI}_{it} + \alpha_5 \text{psev}_{it} + \alpha_6 \text{fiscp}_{it} + \alpha_7 \text{VIX}_{it} + \alpha_8 \text{ex}_{it} + \epsilon_{it} \quad (5)$$

The interaction Terms:

The model includes interaction terms (e.g., COVID-19 Variables \times Stringency Index) to assess how policy measures influenced the relationship between pandemic developments and stock market performance. These terms capture the differential effects of policy interventions across regions and market types.

$$\begin{aligned} \text{Indexret}_{it} = & \alpha_0 + \alpha_1 \text{Indexret}_{i,t-1} + \alpha_2 \text{ccases}_{it} + \alpha_3 \text{cdeaths}_{it} + \alpha_4 \text{SI}_{it} \\ & + \alpha_5 (\text{ccases} \times \text{SI})_{it} + \alpha_6 (\text{cdeaths} \times \text{SI})_{it} \\ & + \epsilon_{it} \end{aligned} \quad (6)$$

This model includes the interaction terms between COVID-19 cases and stringency measures, allowing us to examine how government restrictions modified the impact of the pandemic on stock returns. The lagged dependent variable remains important for capturing momentum or mean-reversion tendencies. This interaction model provides a comprehensive understanding of the impact of the pandemic, ensuring robust and policy-relevant insights into the market dynamics. By combining epidemiological, fiscal, and psychological factors, this study offers a multidimensional perspective on financial market resilience during global crises.

4. Empirical Analysis

The empirical analysis was designed to systematically evaluate the effects of the COVID-19 pandemic on global stock markets using a strategic segmentation of the data set into distinct time frames. This segmentation facilitates nuanced risk assessment by capturing temporal and regional variations in market behavior.

The calm period (1 October 2019 to 30 November 2019) serves as a baseline for market stability, free from pandemic-related disruptions. This period allows for the control of seasonal effects and provides a reference point against which subsequent volatility can be measured. By establishing a stable benchmark, this phase contextualizes the shifts observed in the later periods.

The outbreak period (1 December 2019 to 10 March 2020) marks the emergence of COVID-19, characterized by uncertainty surrounding the virus's transmission and economic implications. This phase captures the initial responses of global markets, reflecting the heightened uncertainty and early impact of government interventions aimed at curbing the spread of the virus. During this period, stock markets were influenced by speculation and information asymmetry, as investors reacted to unfolding developments.

The pandemic began on 11 March 2020, when the World Health Organization officially declared COVID-19 a global pandemic. To capture evolving market responses, this period is further divided into the early pandemic phase (11 March to 31 May 2020) and the extended

pandemic phase (1 June 2020 to 30 December 2021). This segmentation highlights the trajectory from the initial shock to the gradual adaptation of the markets to prolonged restrictions, fiscal interventions, and monetary policy responses.

This framework enables a comprehensive understanding of the dynamic transitions from normalcy to crisis and eventual stabilization. This aligns with the study's objective of analyzing both immediate and long-term market responses, emphasizing the interplay between investor sentiment, government policies, and economic adjustments during the pandemic.

By disaggregating the analysis into these distinct phases and employing a robust panel data methodology, this study provides a detailed exploration of the market dynamics during an unprecedented global crisis. This approach contributes to the understanding of the resilience and vulnerabilities of financial markets, offering valuable insights for policymakers, investors, and researchers.

4.1. Global Markets Analysis

Table 1 provides detailed descriptive statistics, offering critical insights into the economic and financial impact of the COVID-19 pandemic on global stock markets. The Stringency Index (SI), a composite measure of government restrictions averaged over 50 during the pandemic, reflects moderate to severe interventions across countries.

Table 1. Descriptive Statistics.

	N	Mean	Std. Dev.	Min	Max	Median	99th Perc.	Skewness	Kurtosis
ccases	56,408	1,228,471.4000	4,093,294.0960	3	54,302,740	186,545.50000	25,594,566	7.1840	63.0430
cdeaths	56,408	26,984.2050	77,200.8350	0	826,945	3079.5000	470,115	5.6610	41.1540
psev	56,408	0.0310	0.0410	0	0.2680	0.0110	0.1600	1.6750	5.8700
SI	56,408	59.3640	18.9060	0	100	60.1900	93.5200	−0.5420	3.2580
fiscp	56,408	180.2910	688.4300	0	5838	18.900	5838	6.7550	53.0740
GFI	56,408	38.8660	24.0400	0	83.6230	50.9260	79.1460	−0.9000	2.1080
VIX	56,408	−0.0020	0.0680	−0.2200	0.4800	0	0.2150	1.4850	12.4870
ex	56,408	0	0.1580	−8.0160	13.8060	0	0.0120	11.8760	2177.9670
lrindex	56,408	0	0.1020	−7.5610	7.5690	0	0.0280	9.0610	2245.5360

These measures, ranging from lockdowns to travel restrictions, were vital for controlling public health risks but simultaneously caused widespread disruptions to economic activities. The International Monetary Fund (IMF, 2021) reported a global GDP contraction of 3.5% in 2020, underscoring the pandemic's far-reaching economic consequences.

These disruptions significantly influence investor sentiment and stock market performance, with varying degrees of impact depending on regional resilience and policy effectiveness.

The wide variation in the minimum, maximum, and standard deviation values in Table 1 suggests a significant heterogeneity in the data set. For instance, the Stringency Index ranges from 0 to 100, capturing stark contrasts in policy responses across countries. Similarly, stock market returns exhibit substantial fluctuations, with some indices recording extreme losses. These patterns highlight the uneven distribution of the effects of the pandemic, shaped by differences in market structures, policy measures, and levels of economic integration.

The Global Fear Index (GFI) averaged below 85, indicating elevated but not extreme levels of investor anxiety throughout the pandemic. This finding aligns with previous research by Makun (2021), who noted that investor sentiment, while volatile, remained within manageable thresholds during the crisis. However, fear-induced volatility persists during periods of heightened uncertainty, amplifying market fluctuations. For example,

major economies, such as the United States, recorded over 50 million confirmed cases and 800,000 deaths by December 2021, which, coupled with policy uncertainty, had profound effects on global markets (Baker et al., 2020). These findings underscore the critical role of psychological factors in shaping market behavior during crises, such as fear and uncertainty, as highlighted in the literature review.

Table 2 presents the correlation matrix, confirming the absence of multicollinearity among variables, thereby ensuring robust regression estimates. The strong positive correlation between confirmed cases and deaths reflects the expected epidemiological relationship, in which increased infections lead to higher mortality rates. Additionally, the positive correlation between the Stringency Index and pandemic-related variables supports the notion that governments implement stricter policies in response to rising infections and fatalities (Ramelli & Wagner, 2020; Zaremba et al., 2021). While such measures are essential for public health, their economic repercussions disproportionately affect investor sentiment, particularly in less-integrated markets with weaker institutional frameworks. These observations emphasize the uneven resilience of financial systems globally and the heightened vulnerability of developing economies to fear-driven market disruptions.

Table 2. Correlation Matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ccases	1.0000							
(2) cdeaths	0.6490 ***	1.0000						
(3) psev	0.2650 ***	0.2040 ***	1.0000					
(4) SI	0.0940 ***	0.0950 ***	−0.0680 ***	1.0000				
(5) fiscp	0.4190 ***	0.4530 ***	0.0470 ***	0.1590 ***	1.0000			
(6) GFI	−0.0160 ***	−0.0260 ***	0.0520 ***	0.0090	−0.0230 ***	1.0000		
(7) VIX	0.0280 ***	0.0240 ***	0.0020	−0.0110 *	0.0000	−0.0210 ***	1.0000	
(8) ex	−0.0020	0.0010	−0.0570 ***	0.0090 **	−0.0050	0.0000	−0.0030	1.0000

Notes: The following table shows the Pairwise's correlation matrix between the daily frequency regressors for the countries. ***, **, and * denote significance at the 1%, 5%, and 10%, respectively.

The panel data model was employed to capture temporal dynamics and cross-country heterogeneity, offering granular insights into the incremental effects of pandemic-related variables. Unlike DiD models, which are limited by binary treatment designs, the panel framework accommodates continuous variables such as the Stringency Index (SI) and Global Fear Index (GFI), enabling a nuanced exploration of their impacts over time and across regions. Additionally, panel data models address unobserved heterogeneity through fixed or random effects, enhancing the robustness of the analysis in various economic and policy environments (Hsiao, 2022).

Stationarity checks were conducted on all variables using Harris and Tzavalis (1999), Breitung (2000), Fisher-type test (Choi, 2001), and Levin et al. (2002). The results indicate that certain variables contained unit roots, requiring first-order differencing to ensure stationarity (results not reported for space efficiency). Addressing non-stationarity ensures that the regression results are robust and reliable, thereby preventing spurious relationships.

The regression estimates are summarized in Tables 3 and 4. Hausman test results (p -values: 0.461, 0.418, and 0.219) indicated the suitability of the random-effects model (Table 4), which effectively captured both within- and between-group variations. The results (Table 4) highlight that confirmed death and stringency measures exert the strongest negative impacts on stock returns, consistent with the findings of Baker et al. (2020). For instance, the coefficient for confirmed deaths in Equation (1) (−0.0500) is more pronounced than that in Equation (2) (−0.0120), suggesting that interaction terms (e.g., deaths \times stringency) moderate the direct effects of mortality rates on stock returns. These findings empha-

size the critical role of contextual factors such as government interventions in shaping market outcomes.

Table 3. Fixed Effects Regression (World).

Equation (1)			Equation (2)			Equation (3)		
Variable	Coef.	<i>p</i> -Values	Variable	Coef.	<i>p</i> -Values	Variable	Coef.	<i>p</i> -Values
indexret	−0.1134 ***	0.0000	indexret	−0.0014	0.1300	indexret	0.0010	0.2430
ccases	−0.0580 *	0.0790	ccases	−0.1510	0.1900	ccasesxSI	−0.1660	0.1420
cdeaths	−0.0890 **	0.0460	cdeaths	−0.1580 *	0.0850	cdeathsxSI	−0.1700 *	0.0510
SI	−0.5170 **	0.0140	SI	−0.4660 **	0.0270			
			psev	−742.7840 ***	0.0020	psev	−766.2270 ***	0.0010
			fiscp	0.2560	0.9640	fiscp	0.2200	0.9690
			GFI	0.0080	0.0520	GFI	0.0080	0.0590
			VIX	1.5040 ***	0.0100	VIX	1.5140 ***	0.0090
			ex	1.4590 ***	0.0000	ex	1.4550 ***	0.0000
Constant	1.9980 ***	0.0050	Constant	2.0450	0.8320	Constant	0.0140	0.9990
R-square	0.3600		R-square	0.3500		R-square	0.3600	
N	56,232		N	56,232		N	56,232	

Notes: This table presents the dynamic panel regression with fixed effects on indices daily returns worldwide. Equation (1) is the base regression for the effect of the COVID-19 pandemic on stock returns. Equation (2) repeats the process in the presence of other independent variables. Equation (3) uses the interaction term controlling for the effect of the COVID-19 pandemic during enforcement of stringency measures. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Table 4. Random Effects Regression (World).

Equation (1)			Equation (2)			Equation (3)		
Variable	Coef.	<i>p</i> -Values	Variable	Coef.	<i>p</i> -Values	Variable	Coef.	<i>p</i> -Values
indexret	−0.1137 ***	0.0000	indexret	−0.0006	0.2900	indexret	0.0002	0.6940
ccases	−0.0230	0.1840	ccases	−0.0360	0.1667	ccasesxSI	−0.0270	0.1749
cdeaths	−0.0500 *	0.0502	cdeaths	−0.0120 *	0.0878	cdeathsxSI	−0.0140 *	0.0861
SI	−0.0300 *	0.0960	SI	−0.0670 *	0.0568			
			psev	−796.4470 ***	0.0000	psev	−771.0700 ***	0.0000
			fiscp	0.0060 *	0.0865	fiscp	0.0050 *	0.0886
			GFI	0.0060	0.8070	GFI	0.0060	0.7970
			VIX	1.4950 ***	0.0100	VIX	1.5000 ***	0.0100
			ex	1.4500 ***	0.0000	ex	1.4490 ***	0.0000
Constant	−0.0600	0.9250	Constant	−0.1930	0.7660	Constant	−0.5240	0.3340
R-square	0.3700		R-square	0.3800		R-square	0.3800	
N	56,320		N	56,320		N	56,320	

Notes: This table presents the dynamic panel regression with random effects on indices daily returns worldwide. Equation (1) is the base regression for the effect of the COVID-19 pandemic on stock returns. Equation (2) repeats the process in the presence of other independent variables. Equation (3) uses the interaction term controlling for the effect of the COVID-19 pandemic during enforcement of stringency measures. *** and * denote significance at 1% and 10% levels, respectively.

The interaction term between deaths and stringency measures ($cdeaths \times SI$) revealed that stricter policies amplified the adverse effects of rising mortality rates. This highlights the key trade-off between public health objectives and economic stability. Regions with deeper economic integration, such as the European Union (EU), have demonstrated greater resilience due to coordinated policy responses, which mitigated market volatility and supported recovery (Zaremba et al., 2021). In contrast, fragmented policy actions in less-integrated regions exacerbated market disruptions and prolonged recovery periods, as seen in parts of Africa and Latin America.

Unexpected coefficients, such as the positive effect of fiscal policies on stock returns in Equation (2) but not in Equation (1), likely reflect regional disparities in policy effectiveness. Developed markets equipped with stronger fiscal capacities and institutional frameworks leveraged government spending to stabilize investor sentiment and restore

market confidence. In contrast, the muted impact in developing markets underscores structural constraints, such as weaker financial systems and limited fiscal space, which constrain their ability to implement impactful measures (Goodell, 2020). These observations align with the literature, highlighting the structural vulnerabilities of less-integrated financial systems during global crises (Robiyanto, 2018).

The base model's significant lagged dependent variable confirms mean reversion tendencies in global stock markets, where markets stabilize after initial shocks. However, extended models reveal the diminishing influence of past returns, reflecting the increasing role of external shocks such as fear indices (GFI and VIX) and fiscal interventions in shaping market dynamics during the pandemic. This aligns with Gormsen and Koijen (2020), who emphasized the interplay between market expectations and policy interventions in driving recovery.

These results underscore the interconnected nature of global financial markets and the pivotal role of investor sentiment and government intervention during crises. While the pandemic has disrupted markets universally, its impact varies significantly across regions, reflecting disparities in economic structures, fiscal capacities, and policy effectiveness. Regions with stronger economic integration and adaptive policy frameworks, such as the EU, exhibit greater resilience and faster recovery, serving as a model for other regions. Conversely, less integrated and structurally weaker markets struggled to balance public health priorities with economic stability, thereby prolonging market instability.

These findings highlight the need for tailored policy frameworks that account for regional economic structures and integration levels. Future policies must aim to balance public health objectives with economic stability, emphasizing the importance of regional cooperation and fiscal flexibility to enhance market resilience during global crises.

4.2. Developed and Developing Markets Analysis

Tables 5 and 6 provide a comparative analysis of how COVID-19 influenced stock market returns in developed and developing markets, highlighting the notable differences driven by structural and institutional disparities among these economies.

Table 5. Developed Economies.

Equation (1)			Equation (2)			Equation (3)		
Variable	Coef.	p-Values	Variable	Coef.	p-Values	Variable	Coef.	p-Values
indexret	−0.0073	0.3810	indexret	0.0001	0.8800	indexret	−0.0013 **	0.0270
ccases	−0.0840	0.1446	ccases	−0.1160 **	0.0280	ccasesxSI	−0.1260 **	0.0236
cdeaths	−0.0450 *	0.0654	cdeaths	−0.0400 *	0.0685	cdeathsxSI	−0.0550 *	0.0564
SI	0.1850 *	0.0622	SI	0.1530 *	0.0671			
			psev	1303.2660 ***	0.0000	psev	1303.3380 ***	0.0000
			fiscp	0.0810 **	0.0225	fiscp	0.0820 **	0.0216
			GFI	−0.0360	0.2190	GFI	−0.0360	0.2200
			VIX	1.8750 ***	0.0050	VIX	1.8710 ***	0.0050
			ex	−13.0940 ***	0.0000	ex	−13.0920 ***	0.0000
Constant	−1.3450	0.4370	Constant	−0.0440	0.9790	Constant	0.8500	0.3320
R-square	0.1000		R-square	0.1700		R-square		0.1710
N	14,720		N	14,720		N	14,720	

Notes: This table presents the dynamic panel regression with random effects on indices daily returns in developed economies. Equation (1) is the base regression for the effect of the COVID-19 pandemic on stock returns. Equation (2) repeats the process in the presence of other independent variables. Equation (3) uses the interaction term controlling for the effect of the COVID-19 pandemic during the enforcement of stringency measures. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Table 6. Developing Economies.

Equation (1)			Equation (2)			Equation (3)		
Variable	Coef.	p-Values	Variable	Coef.	p-Values	Variable	Coef.	p-Values
indexret	−0.1468 ***	0.0000	indexret	−0.0013 *	0.0770	indexret	0.0003	0.6230
ccases	−0.0690	0.1519	ccases	−0.1540	0.1619	ccasesxSI	−0.1250	0.1813
cdeaths	−0.0930 **	0.0342	cdeaths	−0.0150 *	0.0877	cdeathsxSI	−0.0280 *	0.0780
SI	−0.0480 *	0.0700	SI	−0.1390 **	0.0273			
			psev	−2035.353 ***	0.0000	psev	−1958.8950 ***	0.0000
			fiscp	−0.0140	0.7840	fiscp	−0.0170	0.7340
			GFI	−1.1890 **	0.0113	GFI	−1.2010 **	0.0110
			VIX	−0.0030 *	0.0916	VIX	−0.0040 *	0.0898
			ex	2.9560 ***	0.0000	ex	2.9530 ***	0.0000
Constant	0.1960	0.7890	Constant	−0.0190	0.9800	Constant	−0.5460	0.4090
R-square	0.6300		R-square	0.1660		R-square	0.1660	
N	38,400		N	38,400		N	38,400	

Notes: This table presents the dynamic panel regression with random effects on indices daily returns in developing economies. Equation (1) is the base regression for the effect of the COVID-19 pandemic on stock returns. Equation (2) repeats the process in the presence of other independent variables. Equation (3) uses the interaction term controlling for the effect of the COVID-19 pandemic during the enforcement of stringency measures. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

In developed markets, confirmed cases (ccases) exhibit a stronger negative impact on stock returns than deaths (cdeaths) or stringency measures (SI). This reflects heightened sensitivity to infection rates, as rising case numbers are interpreted as proxies for anticipated economic disruption. These findings align with [Davis et al. \(2021\)](#), who noted that developed markets exhibit heightened risk aversion to escalating infection rates because of their tightly integrated financial systems and reliance on global trade. During the early stages of the pandemic, developed markets, such as the United States, experienced extreme volatility, as evidenced by the unprecedented surge in the VIX to levels surpassing those of the 2008 financial crisis. This demonstrates how global financial interconnectedness amplifies fear-driven volatility even in advanced economies.

Fiscal policy measures (fiscp) have a significant positive effect on stock returns in developed markets, illustrating the effectiveness of coordinated interventions in stabilizing investor sentiment. These economies benefit from robust fiscal capacity, enabling substantial government spending and rapid implementation of fiscal measures. Deeper financial systems and institutional robustness further enhance their ability to absorb shocks and recover swiftly. Additionally, regional integration frameworks, such as those within the European Union, provide an added layer of resilience by enabling synchronized policy responses and reducing uncertainty ([Zaremba et al., 2021](#)).

In developing markets, the negative impact of stringency measures (SI) is more pronounced than that of infections (ccases) or deaths (cdeaths). Stringent policies, such as lockdowns and travel restrictions, have disrupted economic activities, exacerbated volatility, and undermined investor confidence. These findings align with those of [Ozili and Arun \(2020\)](#), who observe that such interventions often lead to prolonged market instability in economies with weaker institutional frameworks and limited policy tools. Developing markets, characterized by less diversified economies and heavy reliance on external capital flows, are more vulnerable to restrictive measures that curtail economic activity. However, there are some exceptions. For example, ASEAN economies demonstrated resilience due to financial cooperation frameworks, such as the Chiang Mai Initiative, which buffered economic shocks despite fragile institutional foundations.

Interestingly, fiscal policy measures (fiscp) have a limited or negligible impact on developing markets. This outcome reflects the challenges these economies face in mobilizing sufficient fiscal resources and deploying them effectively to stabilize markets. Their

limited fiscal space, weak governance, and structural inefficiencies constrain their ability to implement impactful policy responses. External pressures, including capital flights and heightened exposure to commodity price fluctuations, further amplify these challenges. However, sectoral composition played a role; for instance, developing markets with significant technology sectors, such as India, exhibited greater resilience than poverty-dependent economies did.

The lagged dependent variable ($\text{indexrett} - 1$) is significant in both developed and developing markets, confirming the presence of mean reversion tendencies in stock returns. However, the strength of this effect varies. On the one hand, developed markets exhibit a stronger mean reversion effect due to deeper market liquidity and more robust institutional frameworks that facilitate faster corrections to shocks. These findings are consistent with [Gormsen and Koijen \(2020\)](#), who emphasize that advanced economies recover more rapidly due to greater investor confidence and market efficiency. On the other hand, developing markets display weaker mean-reversion tendencies, as persistent volatility driven by fear indices (GFI and VIX) disrupts recovery patterns. These indices, which capture investor sentiment and global risk aversion, exert prolonged and destabilizing effects in less stable markets. [Makun \(2021\)](#) similarly observed that fear-driven volatility is more persistent in developing economies with weaker governance structures and less integrated financial markets.

The interaction terms included in the analysis underscore the nuanced relationship between policy response and market dynamics. In developed markets, fiscal interventions moderated the adverse effects of the pandemic, demonstrating the importance of coordinated policy responses in mitigating economic shocks. In developing markets, the interaction terms reveal that the effectiveness of stringency measures in stabilizing markets is constrained by structural weaknesses and policy misalignments. However, the relative stability of the financial systems in some parts of Asia, supported by regional trade or financial integration frameworks, underscores the potential benefits of enhanced cooperation.

These findings emphasize the critical role of institutional quality, fiscal capacity, and market integration in shaping the stock market responses to global crises. Developed markets leveraged their structural advantages to recover swiftly, while developing markets faced significant vulnerabilities that prolonged their instability. Addressing these disparities requires targeted interventions to strengthen institutional frameworks, improve policy coordination, and enhance market resilience in the face of future shock. Furthermore, a nuanced understanding of sectoral dynamics and regional interconnectedness is essential to identify strategies to mitigate these vulnerabilities.

4.3. Regional Analysis

The regional analysis (Appendix C, Appendix D, Appendix E, Appendix F, and Appendix G, summarized in Table 7) offers a nuanced understanding of the COVID-19 pandemic's impact on stock markets across Africa, Asia, Europe, the Middle East, and the Americas. The results reveal significant regional variations in the drivers of market behavior shaped by structural, institutional, and policy differences.

Confirmed cases (*ccases*) had the most significant negative effect on stock returns in Africa, Asia, and the Americas, with the strongest impact observed in the Americas. This aligns with prior research ([Zaremba et al., 2021](#)), which emphasized the vulnerability of the Americas due to their deep integration into global financial networks and the high infection rates reported during the pandemic. Conversely, deaths (*cdeaths*) exerted the greatest influence on stock returns in Europe and the Middle East, reflecting the dependence of these regions on tourism and travel sectors, which were disproportionately affected by pandemic-

related disruptions. These findings highlight the region-specific sensitivities of markets to pandemic-related shocks, driven by their economic structures and sectoral dependencies.

Table 7. Matrix of The Regional Ranking of the COVID-19 Impact on Stock Returns.

	Ccases	Cdeaths	SI
Africa	3		
Asia	2		2
Europe		1	
Americas	1		1
Middle East		2	3

Note: This table ranks the COVID-19 variables affecting each region's stock returns. The ranking goes from 1 to 3, with 1 being the region most negatively impacted by the variables and 3 the lowest. The ranking is based on the coefficients retrieved from Equations (2) and (3) from the regression analysis.

Government stringency measures negatively impacted stock returns in Asia, Europe, and the Americas, with the most severe effects being recorded in the Americas. These results corroborate those of [Zaremba et al. \(2021\)](#), who noted that, while stringent measures were essential for controlling public health risks, they intensified market volatility, especially in interconnected regions. In contrast, Africa experienced a milder impact from stringency measures, reflecting its limited integration into global trade and financial networks. This relative insulation aligns with [Makun \(2021\)](#), who observed that less interconnected financial markets such as those in Africa were partially shielded from the economic turbulence of global crises.

The lagged dependent variable confirms significant mean reversion tendencies in the Americas and Europe, where stock markets stabilized more effectively after the initial shocks. This stability is supported by deeper market liquidity and robust institutional frameworks, particularly in Europe, where the Union's coordinated fiscal and monetary interventions mitigate volatility and foster investor confidence. Conversely, Africa and the Middle East showed weaker mean reversion tendencies, reflecting market inefficiencies and slower recovery trajectories due to limited policy coordination and weaker institutional support. Asia also demonstrated mixed patterns of mean reversion, with stabilization observed primarily during periods of heightened government intervention. This underscores the critical role of policy measures in stabilizing investor sentiment in the region.

Fear indices, including the Global Fear Index (GFI) and the CBOE Volatility Index (VIX), have the strongest influence on stock returns in Asia and the Americas, contributing to sustained volatility. These regions have experienced heightened uncertainty due to varying policy responses and disparities in healthcare infrastructure. Surprisingly, Europe exhibits lower levels of fear-driven volatility, likely due to stronger investor confidence in its financial systems and the efficacy of coordinated policy measures. These observations align with those of [Broadstock and Zhang \(2019\)](#), who emphasized the role of effective governance in mitigating the psychological drivers of market instability.

This integrated analysis highlights the interplay among public health measures, fiscal interventions, and stock market responses during the COVID-19 pandemic. While global markets are universally affected, the magnitude and nature of the impact vary significantly across regions, reflecting differences in structural, institutional, and psychological factors. Regions with coordinated policy frameworks, such as the European Union, demonstrated greater resilience and faster recovery, providing a blueprint for enhancing market stability during future crises. Conversely, regions with weaker integration, such as Africa and parts of the Middle East, have experienced prolonged instability, underscoring the need for strengthened institutional frameworks and regional cooperation.

The regional analysis underscores the critical importance of tailored interventions and regional cooperation in managing market stability during crises. Policymakers can draw valuable lessons from the relative success of highly integrated regions, emphasizing the role of fiscal coordination, robust governance, and effective communication in mitigating volatility and fostering investor confidence. Simultaneously, addressing the structural vulnerabilities of less integrated markets remains paramount for enhancing resilience and achieving sustainable financial stability in the face of future global disruptions.

5. Conclusions

This study provides a comprehensive analysis of the impact of the COVID-19 pandemic on global stock markets, offering nuanced insights into the divergent responses of developed and developing economies and highlighting critical regional variations. Using a dynamic panel model, this study integrates pandemic-related variables, fiscal policies, and investor sentiment to explore the drivers of market performance during a global crisis. These findings emphasize the importance of economic integration, coordinated policy frameworks, and institutional robustness in mitigating volatility and promoting market stability during disruptions.

Key insights emerged from this analysis. In developed markets, heightened sensitivity to confirmed cases exacerbates volatility. However, robust fiscal interventions effectively stabilize investor sentiment and facilitate recovery. These findings underscore the stabilizing influence of institutional resilience and policy flexibility in advanced economies. In contrast, developing markets face heightened volatility due to stringent government interventions, structural constraints, and weaker institutional frameworks. These disparities highlight the pressing need for deeper economic integration and institutional strengthening in less developed regions to enhance their resilience against external shocks.

Psychological factors, including fear and uncertainty, significantly shaped market dynamics, as evidenced by indices such as the Global Fear Index (GFI) and Volatility Index (VIX). Fear-induced volatility disproportionately affects regions with weaker integration and institutional fragility, underscoring the necessity of managing investor sentiment alongside economic policies. Effective communication, transparent governance, and targeted measures to bolster confidence are crucial for stabilizing markets, particularly in economies with less diversified financial systems.

From a regional perspective, this study reveals stark differences in the market responses to the pandemic. The Americas have experienced profound disruptions driven by high infection rates and fragmented policy responses. Europe demonstrated greater resilience by leveraging coordinated fiscal and monetary policies within the European Union to stabilize markets and accelerate recovery. Conversely, Africa and parts of Asia, while less integrated into global financial systems, experienced milder immediate disruptions, but faced prolonged recovery challenges due to limited access to international financial support and weaker institutional capacities. These regional disparities highlight the critical importance of developing robust cooperative frameworks and enhancing economic integration to mitigate the adverse effects of global crises.

The findings further reveal that stock markets in more integrated regions, such as Europe, display mean reversion tendencies, reflecting their ability to absorb shocks and recover. Conversely, regions with weaker integration, such as Africa and parts of Asia, face prolonged instability, reflecting the persistent challenges in restoring investor confidence. Strengthening regional cooperation and fostering deeper financial integration can bolster resilience and support a faster recovery in the face of future crises.

A key takeaway from this study is the importance of regional financial cooperation mechanisms in stabilizing stock markets during crises. Economic alliances such as the Association of Southeast Asian Nations Free Trade Area (AFTA), Asia-Pacific Economic Cooperation (APEC), the G20, and the BRICS coalition offer platforms for coordinated policy responses that mitigate economic shocks. For instance, ASEAN's Chiang Mai Initiative provides a regional liquidity safety net that enhances financial stability during a crisis. Similarly, the G20's collective fiscal interventions during the pandemic demonstrated the effectiveness of synchronized economic policies in cushioning global financial disruptions. In developing economies, leveraging regional economic cooperation can help counteract capital outflows, stabilize exchange rates, and restore investor confidence.

For policymakers, this study underscores the value of coordinated fiscal and monetary policies within integrated economic frameworks to reduce volatility and foster stability. The lessons drawn from Europe's resilience during the pandemic can serve as models for other regions. Investments in healthcare infrastructure, transparent communication strategies, and effective management of investor sentiment are pivotal for enhancing resilience and promoting financial stability. For investors and business owners, understanding regional integration levels and institutional robustness is critical to navigating uncertainty and making informed decisions during global disruptions.

While this study provides important contributions, it is not without its limitations. The analysis is constrained by the data set's timeframe, which primarily captures short- to medium-term pandemic impacts. Additionally, this study does not account for the nuanced interactions between fiscal and monetary policies or potential outliers that may skew the findings. The role of financial and trade linkages as well as systemic contagion effects remains an area for further exploration. Future research could incorporate network analysis, detailed trade and financial flow data, or advanced contagion models to better quantify the interconnectedness and its influence on market dynamics during crises.

This study advances the understanding of pandemic economics by providing a comparative perspective on global stock market responses to COVID-19. This underscores the pivotal role of economic integration, coordinated policy responses, and regional cooperation in promoting resilience and ensuring sustainable recovery. Future studies could explore the evolution of regional frameworks in a post-pandemic world and delve deeper into the interconnectedness of global economies through trade, finance, and systemic linkages to enrich our understanding of global market dynamics in the face of external shocks.

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Appendix A. Selected Countries

Developed Markets		Developing Markets
Africa	-	Botswana, Egypt, Kenya, Mauritius, Morocco, Namibia, Nigeria, Rwanda, South Africa, Tanzania, Tunisia, Uganda, Zambia, Zimbabwe.
Asia	Hong-Kong (China SAR), Japan, Singapore.	Bangladesh, China, India, Indonesia, Iraq, Kazakhstan, Malaysia, Mongolia, Pakistan, Philippines, South Korea, Sri Lanka, Taiwan, Thailand, Vietnam.
Europe	Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland, the UK.	Bulgaria, Croatia, Czech Republic, Greece, Hungary, Iceland, Malta, Montenegro, Poland, Romania, Russia, Serbia, Slovenia, Ukraine.
Americas	Canada, the United States of America (USA).	Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Jamaica, Mexico, Peru.
Middle East/Oceania and Pacific	Australia, Israel, New Zealand.	Bahrain, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Turkey, United Arab Emirates (UAE).

Source: Authors' computation based on MSCI, Investing.com, S&P, and STOXX's classification. Notes: Australia and New Zealand will be later removed from the regional analysis to avoid biases due to short sample. Thus, only the Middle East Countries will be kept. Therefore, the final data contains observations for 86 countries. Also, the WAEMU (West African Economic and Monetary Union) is an African developing market not included in the present study, as it is composed of eight countries sharing and represented by a unique stock exchange, while they each had a different number of COVID-19 confirmed cases and deaths and at different periods. Further, countries such as Ghana, Malawi, Latvia, Luxembourg, Bosnia-Herzegovina, Estonia, and Lithuania had no updated stock market data available at the time of the study.

Appendix B. Details for Selected Countries

Country Name	Selected Indices	1st COVID Case	Country Name	Selected Indices	1st COVID Case
Argentina	S&P Merral (MERV)	3-Mar-20	Mongolia	MNE Top 20 (MNE TOP20)	10-Mar-20
Australia	S&P/ASX 200 (AXJ0)	25-Jan-20	Montenegro	MNSE 10	17-Mar-20
Austria	ATX (ATX)	25-Feb-20	Morocco	Moroccan All Shares (MASI)	2-Mar-20
Bahrain	Bahrain All Share (BAX)	24-Feb-20	Namibia	FTSE NSX Overall (FTN098)	14-Mar-20
Bangladesh	Dhaka Stock Exchange 30 (DS30)	8-Mar-20	Netherlands	AEX (AEX)	27-Feb-20
Belgium	BEL 20 (BFX)	3-Feb-20	New Zealand	NZX 50 (NZ50)	28-Feb-20
Botswana	BSE Domestic Company (DCIBT)	30-Mar-20	Nigeria	NSE 30 (NGSE 30)	27-Feb-20
Brazil	Bovespa (BVSP)	25-Feb-20	Norway	OSE Benchmark (MSX 30)	26-Feb-20
Bulgaria	BSE SOFIX (SOFIX)	8-Mar-20	Oman	MSM 30 (MSX 30)	24-Feb-20
Canada	S&P/TSX Composite (CSPTSE)	25-Jan-20	Pakistan	Karachi 100 (KSE)	26-Feb-20

Country Name	Selected Indices	1st COVID Case	Country Name	Selected Indices	1st COVID Case
Chile	S&P CLX IPSA (SPIPSA)	3-Mar-20	Palestinian Territory	Al-Quds (PLE)	5-Mar-20
China	CSI 1000 (CSI 1000I)	1-Dec-19	Peru	S&P Lima General (SPBLPGPT)	6-Mar-20
Colombia	COLCAP (COLCAP)	6-Mar-20	Philippines	Philippines PSEi Composite (PSI)	30-Jan-20
Costa Rica	Costa Rica Indice Accionario (IACR)	6-Mar-20	Poland	WIG20 (WIG20)	4-Mar-20
Croatia	CROBEC (CR BEX)	25-Feb-20	Portugal	PSI 20 (PSI20)	2-Mar-20
Cyprus	Cyprus Main Market (CYMAIN)	9-Mar-20	Qatar	QE General (QSI)	29-Feb-20
Czech Republic	PX (PX)	1-Mar-20	Romania	BET (BETI)	26-Feb-20
Denmark	OMX Copenhagen 20 (OMXC20)	27-Feb-20	Russia	MOEX Russia (IMOEX)	31-Jan-20
Ecuador	Guayaquil Select (BVG)	29-Feb-20	Rwanda	Rwanda All Sahres (ALSIRW)	14-Mar-20
Egypt	EGX 30 (EGX30)	14-Feb-20	Saudi Arabia	MSCI TADAWUL 30 Price Return (MISAT0002PSA)	2-Mar-20
Finland	OMX Helsinki 25 (OMXH 25)	29-Jan-20	Serbia	Belex 15 (BELEXIS)	6-Mar-20
France	CAC 40 (FCHI)	24-Jan-20	Singapore	MSCI Singapore (MISG0000FPSG)	23-Jan-20
Germany	DAX (GDAXI)	27-Jan-20	Slovakia	SAX (SAX)	6-Mar-20
Greece	Athens General Composite (ATG)	26-Feb-20	Slovenia	Slovenia Blue-Chip SBITOP (SBITOP)	4-Mar-20
Hong Kong	Hang Seng (HIS)	22-Jan-20	South Africa	South Africa Top 40 (JTOPI)	5-Mar-20
Hungary	Budapest SE (BUX)	4-Mar-20	South Korea	KOSPI (KSII)	20-Jan-20
Iceland	ICEX Main (OMXIPi)	28-Feb-20	Spain	IBEX 35 (IBEX)	31-Jan-20
India	BSE Sensex 30 (BSEN)	30-Jan-20	Sri Lanka	CSE All-share (CSE)	27-Jan-20
Indonesia	Jakarta Stock Exchange Composite Index (JKSE)	2-Mar-20	Sweden	OMX Stockholm 30 (OMXS30)	31-Jan-20
Iraq	ISX Main 60 (ISX60)	24-Feb-20	Switzerland	SMI (SSMI)	25-Feb-20
Ireland	ISEQ Overall (ISEQ)	29-Feb-20	Taiwan	Taiwan Weighted (TWII)	21-Jan-20
Israel	TA 35 (TA35)	21-Feb-20	Tanzania	Tanzania All Share (DSEI)	16-Mar-20
Italy	Investing.com Italy 40 (invit40)	30-Jan-20	Thailand	SET Index (SETI)	13-Jan-20
Jamaica	JSE Market (JSEMI)	10-Mar-20	Tunisia	Tunindex (TUNINDEX)	2-Mar-20
Japan	Nikkei 225 (N225)	16-Jan-20	Turkey	BIST 100 (XU100)	11-Mar-20
Jordan	Amman SE General (AMGNRLX)	2-Mar-20	Uganda	Uganda All Share (ALSIUG)	20-Mar-20
Kazakhstan	Kase (KASE)	13-Mar-20	Ukraine	PFTS (PFTSI)	3-Mar-20
Kenya	Kenya NSE 20 (NSE20)	13-Mar-20	United Arab Emirates	DFM General (DFMGI)	29-Jan-20
Kuwait	Kuwait Main Market 50 (BKM50)	24-Feb-20	United Kingdom	Investing.com United Kingdom 100 (invuk100)	31-Jan-20
Lebanon	BLOM Stock (BLSI)	21-Feb-20	United States	S&P 500 (SPX)	20-Jan-20

Country Name	Selected Indices	1st COVID Case	Country Name	Selected Indices	1st COVID Case
Malaysia	FTSE Malaysia KLCI (KLSE)	25-Jan-20	Venezuela	Bursatil (IBC)	13-Mar-20
Malta	MSE (MSE)	7-Mar-20	Vietnam	HNX 30 (HNX30)	23-Jan-20
Mauritius	Sandex (MDEX)	18-Mar-20	Zambia	LSE All Share (LASILZ)	18-Mar-20
Mexico	S&P/BMV IPC (MXX)	28-Feb-20	Zimbabwe	ZSE All Share (ALSZI)	20-Mar-20

Source: Authors' computation.

Appendix C. Africa Region

Equation (1)			Equation (2)			Equation (3)		
Variable	Coef.	p-Values	Variable	Coef.	p-Values	Variable	Coef.	p-Values
indexret	−0.0005	0.9570	indexret	−0.0057 ***	0.0000	indexret	−0.0002	0.8780
ccases	−0.0220 *	0.0939	ccases	−0.0190 *	0.0945	ccasesxSI	−0.0370 *	0.0890
cdeaths	0.1640 *	0.0543	cdeaths	0.1330 *	0.0621	cdeathsxSI	0.1450 **	0.0586
SI	0.0520 *	0.0882	SI	0.0060 *	0.0986			
			psev	1661.5660 ***	0.0070	psev	1664.5770 **	0.0070
			fiscp	0.1420 **	0.0378	fiscp	0.1390 **	0.0385
			GFI	−1.3400 **	0.0309	GFI	−1.3440 **	0.0307
			VIX	−0.0020 *	0.0976	VIX	−0.0020 *	0.0974
			ex	−13.3390 ***	0.0000	ex	−13.3390 ***	0.0000
Constant	−0.9030	0.6080	Constant	−0.6570	0.7050	Constant	−0.9420	0.5150
R-square	0.1000		R-square	0.3600		R-square	0.3600	
N	8960		N	8960		N	8960	

Notes: This table presents the dynamic panel regression with random effects on indices daily returns in Africa. Equation (1) is the base regression for the effect of the COVID-19 pandemic on stock returns. Equation (2) repeats the process in the presence of other independent variables. Equation (3) uses the interaction term controlling for the effect of the COVID-19 pandemic during the enforcement of stringency measures. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Appendix D. Asia Region

Equation (1)			Equation (2)			Equation (3)		
Variable	Coef.	p-Values	Variable	Coef.	p-Values	Variable	Coef.	p-Values
indexret	−0.3395 ***	0.0000	indexret	−0.0015	0.2440	indexret	−0.0005	0.7400
ccases	−0.0700 *	0.0634	ccases	−0.0600 *	0.0694	ccasesxSI	−0.0620 *	0.0686
cdeaths	0.0570 *	0.0666	cdeaths	0.0460 *	0.0735	cdeathsxSI	0.0390 *	0.0773
SI	−0.2590 *	0.0510	SI	−0.2560 *	0.0514			
			psev	−315.1760	0.7600	psev	−308.9040	0.7640
			fiscp	0.0120 *	0.0841	fiscp	0.0140 *	0.0809
			GFI	−2.5420 **	0.0133	GFI	−2.5510 **	0.0131
			VIX	−0.0360 *	0.0588	VIX	−0.0360 *	0.0590
			ex	1.8460 ***	0.0070	ex	1.844 ***	0.0070
Constant	1.2870	0.4760	Constant	1.3140	0.4750	Constant	0.4190	0.6960
R-square	0.1460		R-square	0.1470		R-square	0.1470	
N	11,520		N	11,520		N	11,520	

Notes: This table presents the dynamic panel regression with random effects in Asia. Equation (1) is the base regression for the effect of the COVID-19 pandemic on stock returns. Equation (2) repeats the process in the presence of other independent variables. Equation (3) uses the interaction term controlling for the effect of the COVID-19 pandemic during the enforcement of stringency measures. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Appendix E. Europe Region

Equation (1)			Equation (2)			Equation (3)		
Variable	Coef.	p-Values	Variable	Coef.	p-Values	Variable	Coef.	p-Values
indexret	0.0012	0.8610	indexret	−0.0006	0.4040	indexret	0.0007	0.3130
ccases	0.0600 *	0.0662	ccases	0.2260 **	0.0109	ccasesxSI	0.2260 **	0.0109
cdeaths	−0.0450 *	0.0737	cdeaths	−0.2410 *	0.0860	cdeathsxSI	−0.2400 *	0.0860
SI	−0.1720 **	0.0189	SI	−0.0120 *	0.0932			
			psev	−462.5910 **	0.0290	psev	−463.0270 **	0.0280
			fiscp	0.1840 **	0.0150	fiscp	0.1840 **	0.0120
			GFI	−0.0230	0.4260	GFI	−0.0230	0.4260
			VIX	1.1470 *	0.0790	VIX	1.1470 *	0.0790
			ex	5.9480 ***	0.0000	ex	5.9480 ***	0.0000
Constant	−1.1640	0.1840	Constant	−1.2850	0.1480	Constant	−1.2800	0.1230
R-square	0.1000		R-square	0.1200		R-square	0.1200	
N	19,200		N	19,200		N	19,200	

Notes: This table presents the dynamic panel regression with random effects on indices daily returns in Europe. Equation (1) is the base regression for the effect of the COVID-19 pandemic on stock returns. Equation (2) repeats the process in the presence of other independent variables. Equation (3) uses the interaction term controlling for the effect of the COVID-19 pandemic during the enforcement of stringency measures. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Appendix F. Americas Region

Equation (1)			Equation (2)			Equation (3)		
Variable	Coef.	p-Values	Variable	Coef.	p-Values	Variable	Coef.	p-Values
indexret	−0.0467 ***	0.0000	indexret	0.0019	0.4010	indexret	−0.0035	0.1300
ccases	−0.0310 *	0.0933	ccases	−0.4190 **	0.0293	ccasesxSI	−0.3410 **	0.0394
cdeaths	0.0380 *	0.0914	cdeaths	0.2910 **	0.0417	cdeathsxSI	0.2480 **	0.0490
SI	−2.1810 ***	0.0000	SI	−2.3760 ***	0.0000			
			psev	4696.4290 ***	0.0000	psev	4374.0580 ***	0.0010
			fiscp	−0.0050	0.9670	fiscp	−0.0250	0.8340
			GFI	−2.3940 **	0.0182	GFI	−2.4360 **	0.0175
			VIX	−0.0050 *	0.0955	VIX	−0.0010 *	0.0991
			ex	8.4740 ***	0.0000	ex	8.5090 ***	0.0000
Constant	9.406 ***	0.0040	Constant	12.3670 ***	0.0010	Constant	2.3270	0.3880
R-square	0.1600		R-square	0.2500		R-square	0.2200	
N	7029		N	7029		N	7029	

Notes: This table presents the dynamic panel regression with random effects on indices daily returns in Americas. Equation (1) is the base regression for the effect of the COVID-19 pandemic on stock returns. Equation (2) repeats the process in the presence of other independent variables. Equation (3) uses the interaction term controlling for the effect of the COVID-19 pandemic during the enforcement of stringency measures. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Appendix G. Middle East Region

Equation (1)			Equation (2)			Equation (3)		
Variable	Coef.	p-Values	Variable	Coef.	p-Values	Variable	Coef.	p-Values
indexret	−0.0017	0.8910	indexret	−0.0014	0.3350	indexret	0.0008	0.5570
ccases	0.1400 *	0.0616	ccases	0.1810 *	0.0523	ccasesxSI	0.1420 *	0.0615
cdeaths	−0.1640 *	0.0520	cdeaths	−0.2190 **	0.0395	cdeathsxSI	−0.2330 **	0.0367
SI	1.1350 *	0.0570	SI	1.1850 **	0.0500			
			psev	−440.7490	0.3830	psev	−339.3150	0.5000
			fiscp	0.0760 *	0.0517	fiscp	0.0860 **	0.0462
			GFI	−0.4760 *	0.0684	GFI	−0.4620 *	0.0693

Equation (1)			Equation (2)			Equation (3)		
Variable	Coef.	p-Values	Variable	Coef.	p-Values	Variable	Coef.	p-Values
			VIX	−0.0260 *	0.0642	VIX	−0.0270 *	0.0632
			ex	−1.1690 *	0.0710	ex	−1.1260 *	0.0820
Constant	−5.3770	0.1090	Constant	−5.6420	0.1010	Constant	0.1240	0.9540
R-square	0.1500		R-square	0.1000		R-square	0.1000	
N	7040		N	7040		N	7040	

Notes: This table presents the dynamic panel regression with random effects on indices daily returns in the Middle East. Equation (1) is the base regression for the effect of the COVID-19 pandemic on stock returns. Equation (2) repeats the process in the presence of other independent variables. Equation (3) uses the interaction term controlling for the effect of the COVID-19 pandemic during the enforcement of stringency measures. **, and * denote significance at 5%, and 10% levels, respectively.

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