

## Empirical analysis of government interventions on Jordan's stock market during the COVID-19 pandemic: An ARDL approach



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### ABSTRACT

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#### Keywords

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The objective of this study was to examine the impact of government actions on the Amman Stock Market's performance over the period from March 1, 2020, to June 30, 2021. The research uses the ARDL technique to examine the immediate and long-term connections between the variables. The findings indicate that government actions have an impact on the Amman stock market. From a larger standpoint, the research found that government actions and the stringency index had a detrimental impact on the Amman stock market in the long term. In contrast, the Containment Health Index had a favourable impact on the Amman Stock Market. Our analysis found a negative correlation between the number of new COVID-19 cases and the performance of the Amman Stock Market. These results highlight the complex relationship between government activities, market strictness, and public health initiatives in influencing the behaviour of financial markets. This finding is consistent with and strengthens the outcomes of prior research, enhancing our comprehension of how pandemic-related variables impact the performance of the stock market. The study's results are very relevant for politicians, decision-makers, and investors, offering crucial insights to inform their decision-making processes in times of future crises and uncertainty.

**Contribution/ Originality:** This research offers valuable insights into how developing-country stock markets such as Jordan react to government interventions and how they affect equity market performance during crises. Given that it was the first publication of its type, this resource provides targeted insights tailored to the Jordanian market using empirically supported solutions.

## 1. INTRODUCTION

Due to the substantial disruptions created by the coronavirus, especially in the global financial markets, governments worldwide have been compelled to swiftly and resolutely implement measures. In light of the coronavirus, a significant amount of scholarly research has emerged, investigating the influence of the coronavirus on financial markets (Hoang, Nguyen, & Nguyen, 2022; Jabeen, Farhan, Zaka, Fiaz, & Farasat, 2022; Pu, Qamruzzaman, Mehta, Naqvi, & Karim, 2021). Governments have used many strategies to manage the spread of the

viral coronavirus. These activities include a wide range of strategies, such as preserving social isolation, shutting schools and workplaces, developing thorough testing standards, undertaking intensive contact tracking, and offering economic help. The Oxford COVID-19 Government Response Tracker (OxCGRT) is a dataset that provides accessible information for monitoring and documenting various steps taken by governments in response to the coronavirus epidemic (Hale, Webster, Petherick, Phillips, & Kira, 2020).

The exceptional challenges brought about by the coronavirus epidemic had a significant impact on Jordan's economy, like they did on many other nations (Hamshari, Alqam, & Ali, 2022; Saleh & Abu Afifa, 2020). In order to alleviate the influence of the crisis, the Jordanian government adopted several preemptive measures (Al-Kasasbeh, 2022). An in-depth analysis of the interaction between policy measures and market dynamics is crucial for a complete understanding of the relationship between these governmental actions and their impact on Jordan's stock market.

This study is unique in that it examines the impact of government interventions during the coronavirus epidemic, specifically in the context of Jordan's stock market. While previous studies have explored various aspects of Jordan's stock market (Aldomy, Al Abed, Al-Naimi, Saidat, & Dwaikat, 2022; Altarawneh et al., 2022; Elshqirat, 2021; Kharabsheh, Gharaibeh, & Mahafza, 2022; Mugableh, Malkawi, & Hammouri, 2023; Weshah, 2021; Yaser et al., 2022), none have specifically investigated the influence of government interventions during the epidemic in this particular context.

The study offers useful insights on the response of equities markets, such as Jordan, to government interventions and the resulting implications for stock market behaviour. This research aims to improve our understanding of the relationship between government actions and equity market performance in an equity market context, specifically in Jordan during periods of crisis. Being the first publication of its type, this resource provides targeted insights tailored to the Jordanian market. It serves as a valuable tool for policymakers, market regulators, and investors who are in need of empirically-supported solutions to successfully manage future crises in Jordan's stock market.

This research work contributes to the current understanding of crisis management in financial markets and serves as a valuable resource for policymakers, market regulators, and investors who are looking for evidence-based strategies to successfully navigate such crises in the future. This report offers informed ideas and practical suggestions to stakeholders by offering insights into the unique circumstances of Jordan's stock market during the coronavirus epidemic. This will help improve preparedness and resilience for future crises. Therefore, by formulating precise research questions, several areas connected to the main research topic are immediately addressed. This allows for a detailed study and provides practical answers to improve preparedness and resilience in facing future crises.

Our main questions are: How much do government initiatives during the coronavirus epidemic impact the performance of the Amman General Stock Index (AMGNRLX) between March 1, 2020, and June 30, 2021? In order to conduct a thorough examination of the impact of government interventions on the stock market in Jordan, we have formulated additional sub-questions:

1. Does the government response index (GRI) influence the Amman General Stock Market Index (AMGNRLX) negatively or positively?
2. Does the Stringency Index (SI) have a negative impact on the Amman General Stock Market Index (AMGNRLX)?
3. Does the Economic Support Index (ESI) have a positive impact on the Amman General Stock Market Index (AMGNRLX)?
4. Does the Containment Health Index (CHI) have a positive impact on the Amman General Stock Market Index (AMGNRLX)?

This is an empirical question that we intend to answer empirically. The structure of this research is as follows: Section two examines pertinent literature on governmental involvement during crises and their impact on equity markets. Section three delineates the methods used for data gathering, analysis, and empirical modelling. Section four provides the empirical results and their analysis, presenting a thorough evaluation of the impact of government actions on Jordan's stock market. Section five examines the consequences of the findings and offers suggestions for policymakers.

## 2. LITERATURE REVIEW

Government actions have a crucial influence in determining the dynamics of equity markets during times of crisis. This literature review aims to examine previous research that explores the influence of government interventions on equity markets, offering insights into the complex nature of these interventions and their consequences for market players and politicians. The focus is on the broader context of equity markets during times of crisis.

It is crucial to remember that although government actions during crises might positively influence the equity market reaction, they can also lead to unfavourable consequences. In order to properly assess the influence of government interventions on equity markets, it is crucial to possess a comprehensive comprehension of the possible disadvantages associated with such initiatives. Multiple studies, such as [Zhuo and Kumamoto \(2020\)](#); [Scherf, Matschke, and Rieger \(2022\)](#); [Keh and Tan \(2021\)](#); [Gunawan and Nainggolan \(2021\)](#); [Shrimali and Shrimali \(2021\)](#); [Eleftheriou and Patsoulis \(2020\)](#); [Liew \(2021\)](#); [Sinaga, Wu, and Chen \(2022\)](#), and [Raifu, Kumeka, and Aminu \(2021\)](#), show that the coronavirus negatively affects the equity markets.

[Zhuo and Kumamoto \(2020\)](#) examined the reactions to the coronavirus epidemic and the measures implemented by the government to control it. The study used a panel VAR model to analyse these dynamics, focusing on 15 Northern European nations, which included prominent economic groupings such as the G7, BRICS (Brazil, China, India, and Russia), and four additional countries. The results indicated that the rise in confirmed cases and fatalities caused by the coronavirus had a greater adverse influence on equities markets compared to the influence of containment efforts. Moreover, the implementation of government intervention measures resulted in a substantial decline in equity market returns.

[Scherf et al. \(2022\)](#) investigated the influence of strict lockout measures enacted by different nations on major equities market indices from January 2020 to May 2020. An analysis encompassing organisation for Economic Cooperation and Development (OECD) and BRICS countries revealed diverse responses to these lockdown regulations. These responses included an overall adverse influence, strong indications of initial underreaction following the lockdown announcements, and subsequent overreactions that were later rectified. The trend of underreaction was particularly evident in the first phase of the data series, indicating that markets were gaining knowledge from the scenario. Remarkably, the returns of the equities market exhibited a positive response to the gradual relaxation of lockdown measures, although this effect was only seen towards the end of the observation period. Conversely, at the beginning of the period, the influence was unfavourable.

[Keh and Tan \(2021\)](#) analysed Malaysia's actions in response to the coronavirus outbreak between January 28th, 2020, and May 29th, 2020. The results indicated that the government's interventions, such as enforcing stay-at-home orders, shutting down enterprises, and offering financial aid and contractual support to families, had significant impacts on economic activity and the performance of the equities market. These findings have significant policy implications, namely indicating that offering assistance to families in terms of loans or contracts had an adverse influence on economic activity but a good one on the equities market.

[Gunawan and Nainggolan \(2021\)](#) analysed the influence of the Government Response Stringency Index for the new coronavirus on fluctuations in the equity market. They examine the monthly performance of twenty-six emerging equity markets from March 2020 to February 2021. The stock index has a strong and inverse

relationship with the performance of equity market returns. On the other hand, Shrimali and Shrimali (2021) used an event study methodology to look into how shutdown notices affected the Bank Nifty, an equity market index in India. The data indicated that both the coronavirus epidemic and the following lockdown announcements had an adverse impact on stock prices in the Indian banking industry.

Eleftheriou and Patsoulis (2020) used spatial econometric techniques to predict the influence of actions aimed at halting the spread of the coronavirus on forty-five equity market indices. The analysis found an adverse correlation between equity market performance and the severity of lockdown measures. In addition, Liew (2021) examines the influence of the extraordinary lockdown implemented in Wuhan after the emergence of the coronavirus epidemic and conducts an experiment to reveal its direct consequences on the equity market. This study presents empirical data demonstrating the immediate adverse effect of the Wuhan shutdown on the sectors comprising the Shanghai Stock Exchange Composite.

Sinaga et al. (2022) conducted a thorough examination of the short-term influence of government policies on 11 sectors of the Indonesian Stock Exchange during the coronavirus epidemic. This study explicitly examines the financial implications of several measures implemented in various sectors. It focuses on five specific government responses: economic stimulus packages, the job creation legislation, Jakarta lockdowns, limitations on Ramadan travel, and a vaccination campaign. The use of an event research methodology reveals that the preliminary economic stimulus package had a crucial influence in rejuvenating the majority of industries during the early stage of the epidemic. Although the market has adjusted to the post-epidemic situation, the Jakarta lockdowns had a limited adverse influence.

According to the research by Raifu et al. (2021), there was no impact on the performance of the equity market despite increases in the verified COVID-19 cases, deaths, and the implementation of lockdown measures. To alleviate the adverse effects of the coronavirus epidemic on the Nigerian equities market's performance, it is advisable to relax lockdown measures and adopt a coordinated approach that combines monetary and fiscal policy.

A multitude of studies have examined the potential influence of government measures on the response of the equity market (Alam, Alam, & Chavali, 2020; Bakry, Kavalanthara, Saverimuttu, Liu, & Cyril, 2022; Bouri, Naeem, Mohd Nor, Mbarki, & Saeed, 2022; Deng, Xu, & Lee, 2022; Guven, Cetinguc, Guloglu, & Calisir, 2022). Bouri et al. (2022) evaluated the influence of three primary factors—lockdowns, stimulus packages, and travel restrictions—on the performance of 14 distinct industry equity indexes in New Zealand. The research included the timeframe spanning from January 1, 2019, to August 25, 2020, which corresponds to the first phases of the coronavirus outbreak. The results demonstrated a significant rise in the interconnectivity of various industry stock indexes throughout this time. In general, these reaction techniques had a beneficial influence on the sector as a whole, although their effect differed greatly across the major stock indexes. Significantly, the rules had little influence on the technology, healthcare, and real estate industries. It is important to note that only the enforcement of lockdown measures had a beneficial influence on the overall performance of the equity market. These findings indicate that lockdowns were able to enhance investor trust in the overall equity market.

Guven et al. (2022) investigated the influence of daily mortality rises, cases, and government actions on equity market returns in 21 developing countries from January 22 to December 31, 2020. Government actions taken in response to the coronavirus were shown to have a positive influence on equity returns. The daily rise in confirmed cases and fatalities due to the coronavirus has a detrimental influence on equity market returns. However, the data indicates that government response efforts have an indirect positive effect. Furthermore, the daily rise in deaths and cases has a profound influence on the performance of the equities market.

In their study, Bakry et al. (2022) investigated the relationship between the daily release of information relating to the coronavirus, government measures aimed at protection, and the fluctuation in the equity market over a period of one year. By using a non-symmetrical measure of 113 volatility, they categorise equity markets as either developing or established. Subsequently, they proceed to compare the two. The response of investors to new

confirmed instances, death rates, recovery rates, and other defensive government activities differs greatly across different countries.

Alam et al. (2020) analysed the conduct of the Indian equities market before and after its closure as a result of the coronavirus epidemic. To determine how much the lockdown is affecting the market, the research used an event-study methodology. For this study, a sample of 31 businesses listed on the Bombay Stock Exchange (BSE) was selected using a random sampling method. During the 35-day timeframe of the trial, the data suggest that there was a favourable market reaction despite the continued lockdown. Significantly, there were considerably positive Average Abnormal Returns throughout this time, demonstrating investors' hopeful expectations and good response to the lockout. This is in stark contrast to the time before the lockdown, which was characterized by widespread investor concern.

Onyele and Nwadike (2020) found that prior to the implementation of the worldwide lockdown, all selected stock exchange markets had seen adverse returns. Descriptive data revealed that the New York Exchange, the Shanghai Exchange, the Toronto Exchange, and the Bombay Exchange saw considerably worse returns compared to the average stock exchange market during the shutdown. Following the lifting of the lockdown, all the analysed equity markets saw favourable returns, with positive averages across all sectors. The analysis demonstrates that the implementation of lockdown measures, aimed at curbing the transmission of the coronavirus, resulted in substantial declines in the global financial markets.

Additionally, Deng et al. (2022) looked into the ways in which national policy decisions have affected the equity market. Cross-national research is conducted with the difference-in-difference methodology. The crux of their research centers on two key policies: the statewide lockdown order implemented to mitigate the spread of the COVID-19 and the interest rate reduction strategy implemented to mitigate the economic influence of the outbreak. Both policy acts have a significant and favourable influence on the equities market. Researchers have also shown that the equity market reacts more positively to news of a drop in interest rates than to news of a lockup.

The research offers a thorough understanding of the dualistic influence of government actions on equity market behaviour during crises, showcasing both favourable and detrimental outcomes. These measures have shown their efficacy in stabilising stock markets, bolstering investor trust, and facilitating the process of economic recovery. Nevertheless, they have the potential to generate contrasting outcomes, which might have a detrimental influence on the equities market.

### 3. METHODOLOGY

#### 3.1. Research Approach

The objective of this study is to examine the correlation between government interventions and the equity market performance in Jordan. The study aims to analyse the influence of government activities on the dynamics of the equity market, with a special emphasis on Jordan's Amman stock market index. This research sets itself apart from previous examinations due to its specific emphasis. Focusing only on the Amman stock market index over the specified timeframe allows for a more thorough examination of how the Jordanian equity market especially responds to government interventions during the epidemic. The concentrated technique is beneficial for uncovering nuanced insights that are exclusive to this market and may have been overlooked or undervalued in prior research with a broader perspective.

Furthermore, the use of an Autoregressive Distributed Lag (ARDL) model in the research provides a distinct perspective that may not have been extensively explored in other works. The ARDL model offers a dynamic framework to analyse the short-term and long-term relationships between variables, with a special emphasis on the influence of government efforts and coronavirus dynamics on the Amman stock market index. This methodological choice presents a novel approach to understanding the interaction and influence of these factors on the stock market's behaviour over time, providing a more comprehensive assessment compared to models used in prior

research. ARDL methodology boosts the analytical depth, allowing for a thorough investigation of the relationship between government activities and the performance of the Amman stock market index.

### 3.2. Model Specification

In order to establish a connection between the stock market and government interventions, we construct a straightforward model using the research conducted by Habibullah, Lau, Din, Abd Rahman, and Shah (2022); Habibullah, Saari, Safuan, Din, and Mahomed (2021); Obiakor, Okere, Muoneke, and Nwaeze (2022); Dreger and Gros (2021) and Safuan, Habibullah, and Sugandi (2022) as follows:

$$sm_t = \xi_0 + \xi_1 GRI_t + \xi_2 Z_t + \varepsilon_t \quad (1)$$

The dependent variable, denoted as  $sm_t$ , represents the Amman general stock index. The variable  $GRI_t$  refers to the Jordan government reaction index, while  $Z_t$  represents the control variables.

### 3.3. Method of Estimation

The Autoregressive Distributed Lag (ARDL) approach for cointegration is a statistical technique used in this work to evaluate the long-run associations between variables. The ARDL technique is an alternative name for this strategy, which is used to analyse cointegration. Pesaran, Shin, and Smith (2001) first proposed the idea.

In order to assess the long-term effects described in Equation 1, it is advisable to use the ARDL model to analyse the relationships between GRI and the Jordan stock market across different time periods, including both short-term and long-term. This would enable the prediction of the long-term performance of the Jordanian stock market. Pesaran et al. (2001) stated that the long-term model, represented by Equation 1, may be obtained from the short-term ARDL.

$$sm_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} sm_{t-i} + \sum_{i=0}^n \alpha_{2i} GRI_{t-i} + \sum_{i=0}^n \alpha_{3i} Z_{t-i} + \omega_t \quad (2)$$

The Equation 1 represents the long-term model, which may be obtained from Equation 2 under the following conditions,  $\xi_0 = \frac{\alpha_0}{1 - \sum \alpha_{1i}}$ ,  $\xi_1 = \frac{\sum \alpha_{2i}}{1 - \sum \alpha_{1i}}$ ,  $\xi_2 = \frac{\sum \alpha_{3i}}{1 - \sum \alpha_{1i}}$ , and  $\varepsilon_t = \frac{\omega_t}{1 - \sum \alpha_{1i}}$ . Cointegration may also be deduced from the short-run Error Correction Model (ECM) by examining the residuals of the long-run model, as shown below,

$$\Delta sm_t = \gamma_0 + \sum_{i=1}^m \gamma_{1i} \Delta sm_{t-i} + \sum_{i=0}^m \gamma_{2i} \Delta GRI_{t-i} + \sum_{i=0}^m \gamma_{3i} \Delta Z_{t-i} + \lambda ECM_{t-1} + \eta_t \quad (3)$$

The variable  $ECM_{t-1}$  denotes the remainder derived from the long-term model with a one-period delay (i.e., Equation 1). Mathematically, it is stated as,

$$ECM_{t-1} = \varepsilon_{t-1} = sm_{t-1} - [\xi_0 + \xi_1 GRI_{t-1} + \xi_2 Z_{t-1}] \quad (4)$$

The speed at which the variables adjust to achieve the long-term balance may be quantified by the error-correction term ( $ECM_{t-1}$ ) parameter lambda ( $\lambda$ ). Cointegration is said to be established when it exhibits statistical significance, a negative coefficient, and typically falls within the range of 0 to -2 (Samargandi, Fidrmuc, & Ghosh, 2015). After the completion of the cointegration step, the model will identify the long-run connections between the stock market and the regressors. The ARDL technique has an advantage over other cointegration approaches since it is capable of accommodating both stationary ( $I(0)$ ) and non-stationary ( $I(1)$ ) variables in the model. The conditional error-correction model is used to ascertain the enduring association between the variables under scrutiny, with specific attention given to the impact of government actions on Jordan's stock market during the coronavirus epidemic. The conditional error-correction (ECM) model is defined in the following manner:

$$\Delta sm_t = \delta_0 + \sum_{i=1}^p \delta_{1i} \Delta sm_{t-i} + \sum_{i=0}^p \delta_{2i} \Delta GRI_{t-i} + \sum_{i=0}^p \delta_{3i} \Delta Z_{t-i} + \beta_1 sm_{t-1} + \beta_2 GRI_{t-1} + \beta_3 Z_{t-1} + \mu_t \quad (5)$$

Equation 5, which is,  $H_0: \beta_1 = \beta_2 = \beta_3 = 0$ , in oppose to the alternative hypothesis,  $H_a: \beta_1 \neq \beta_2 \neq \beta_3 \neq 0$ . The Bounds F-test is used to examine the null hypothesis that there is no cointegration among the variables. Additionally, Anindya Banerjee, Dolado, and Mestre (1998) developed the t-statistic cointegration test based on earlier studies by Banerjee, Dolado, Hendry, and Smith (1986) and Kremers, Ericsson, and Dolado (1992). This test is based on the lagged dependent variable coefficient in a conditional error correction model  $ECT_{t-1}$ .

### 3.4. Sources of Data

In this study, data were gathered from two secondary sources. The daily stock market data was obtained from the [www.datastream.com](http://www.datastream.com) website, ensuring uniformity by specifically choosing the Amman general stock index. Furthermore, data on government response index was acquired from the [OxCGRT](http://OxCGRT.com) website. The data collection period ranged from March 1, 2020, to June 30, 2021.

In this work, we use the equation  $\log y_t = \log \left[ y_t + \sqrt{(y_t^2 + 1)} \right]$  to transform the variables onto a logarithmic scale (Busse & Hefeker, 2007). The study used daily tallies of new COVID-19 cases to quantify the impact of daily fluctuations in the virus's transmission on the stock market. Table 1 provides a concise overview of the factors used in this research. The dependent variable used to reflect the stock market's performance in Jordan is the closing price of the stock index. The Government Response Index (GRI) is a metric that assesses the efficacy of government actions and policies in addressing a range of challenges, such as public health emergencies, economic problems, and social concerns (Hale et al., 2021). The government's implementation of measures aimed at social isolation, such as the closure of public places like parks and schools and the imposition of travel restrictions, is seen in the stringency index (Geng, Innes, Wu, & Wang, 2021).

Table 1. Descriptions of variables.

No.	Variables	Abbreviation	Data source	Measurements of variables	Role
1	Amman general stock index	AMGNRLX	Eikon.refinitiv.com	Close price	Dependent
2	Government response index	GRI	OxCGRT.com	Indicator 0-100	Independent
3	Stringency index	SI	OxCGRT.com	Indicator 0-100	Independent
4	Economic support index	ESI	OxCGRT.com	Indicator 0-100	Independent
5	Containment health index	CHI	OxCGRT.com	Indicator 0-100	Independent
6	New cases	NC	OxCGRT.com	Daily new cases	Control

This ranking assesses the extent to which the government has implemented measures to mitigate the transmission of the virus. The containment and health index evaluates government measures related to public education campaigns, testing protocols, and contact tracing. This grade emphasises the government's efforts to restrict the spread of illness and uphold public health safety (Djalante et al., 2020). The economic support index relies on official government pronouncements about financial aid for households and measures to alleviate debt and contractual obligations. The indicator quantifies the level of economic support that the government offers to people and companies in order to alleviate the financial strain caused by the epidemic (Demir & Danisman, 2021). The tally of confirmed coronavirus cases is used to determine the count of newly reported cases. These characteristics function as control variables and provide crucial contextual information on the intensity and progression of the epidemic. Figure 1 and Figure 2 depict the daily trend in Amman stock index, government response index, stringency index, containment health index, economic support index, and new cases for the period January 2019 to December 2021.

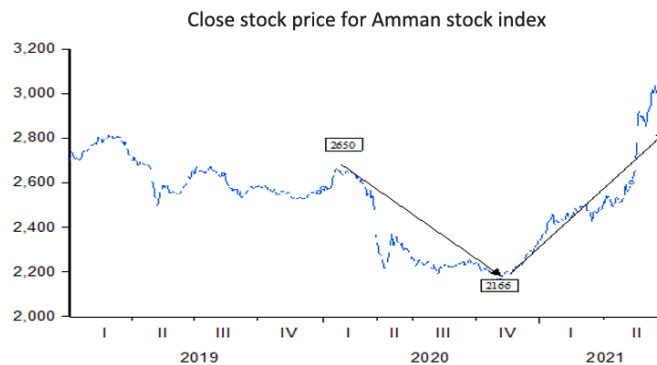


Figure 1. Trend in Jordan's stock market index, 2019 – 2021.

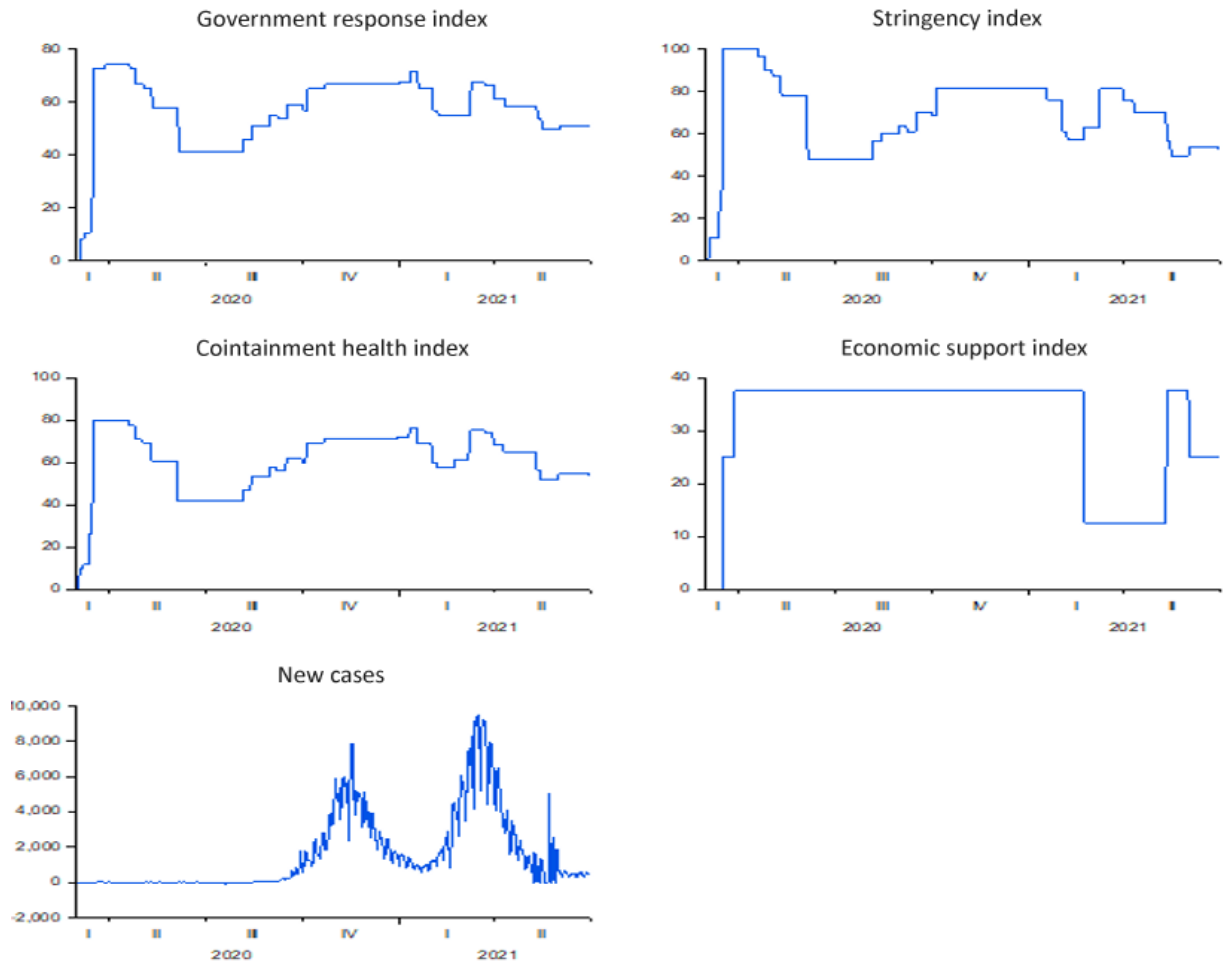


Figure 2. Trends in government response index, stringency index, containment health index, economic support index and COVID-19 new cases in Jordan, March 1, 2020 to June 30, 2021.

#### 4. THE EMPIRICAL RESULTS

##### 4.1. Descriptive Statistics

Table 2 displays the descriptive statistics for the daily logarithmic values of the variables examined in Jordan. Several variables examined exhibit a negative skewness, consistent with the findings of Agarwalla, Varma, and Virmani (2021); Banerjee (2021); Malik, Sharma, and Kaur (2022), and Youssef, Mokni, and Ajmi (2021).

Table 2. Descriptive statistics.

Series	AMGNRLX	GRI	SI	CHI	ESI	NC
Mean	8.472	4.607	4.767	4.668	3.336	6.277
Median	8.443	4.750	4.947	4.801	4.828	7.568
Maximum	8.712	4.962	5.160	5.028	5.165	9.856
Minimum	8.374	0.000	0.000	0.000	0.000	-5.394
Std. dev.	0.085	0.625	0.654	0.631	2.012	3.020
Skewness	1.227	-5.845	-5.613	-5.836	-0.834	-0.856
Kurtosis	3.881	41.562	39.635	41.867	2.058	2.736
Jarque-Bera	83.244***	19891.2***	17985.4***	20174.5***	44.996***	36.465***

Note: Asterisk \*\*\* denotes statistically significant at the 1% level. All variables are in logarithms.

The Kurtosis indicator assesses the degree of extremity in a dataset by examining the dispersion of its values. Our investigation revealed that the kurtosis of many variables exceeded a value of 3. This result suggests that the tails of the return series exhibit a higher degree of thickness compared to what would be expected under a normal distribution, comparable to the findings of Banerjee (2021); Bourghelle, Jawadi, and Rozin (2021); Fakhfekh, Jeribi,



and Salem (2023); and Ftiti, Ameer, and Louhichi (2021). Leptokurtosis refers to this trait, which may occur when variables cluster owing to inadequate stability. In addition, as shown in Table 2, the p-values for the Jarqura-Bera test for normalcy are all zero, indicating strong statistical significance at the 1% level. The results align with the conclusions drawn in earlier investigations conducted by Curto and Serrasqueiro (2022);Malik et al. (2022) and Youssef et al. (2021).

4.2. Correlation Matrix

Table 3 displays the correlation matrix between the Amman stock market index and the other regressors. The Amman stock market index (AMGNRLX) has a negative correlation with the government response index (GRI), stringency index (SI), economic support index (ESI), and containment health index (CHI), while showing a positive correlation with new cases (NC). All of them demonstrate statistical significance, with a minimum significance level of 10%.

Table 3. Correlation matrix.

Variables	AMGNRLX	GRI	SI	CHI	ESI	NC
AMGNRLX	1					
GRI	-0.1680**	1				
SI	-0.233***	0.994***	1			
CHI	-0.141**	0.999***	0.992***	1		
ESI	-0.455***	0.200***	0.229***	0.173***	1	
NC	0.114*	0.520***	0.505***	0.540***	-0.278***	1

Note: Asterisks \*\*\*, \*\* and \* denote statistically significant at the 1%, 5% and 10% level, respectively.

4.3. Result of Unit Root Tests

The results of the unit root test in Table 4 demonstrate the stationarity characteristics of the variables. More precisely, the Containment Health Index, Stringency Index, and Government Response Index are determined to be stable at a constant level, indicating that they do not show any discernible pattern or random fluctuations. However, the Amman General Stock Index, the Economic Support Index, and the New Cases variables exhibit stationarity when considering their first difference.

The distinction between stationary variables at the level and those in the first difference is of utmost importance when determining the suitable econometric methodology. The outcomes in this example provide evidence in favour of using an Autoregressive Distributed Lag (ARDL) model. ARDL models are appropriate for analysing time series data that includes a combination of variables with different levels of integration, such as some variables being integrated of order (I(0)) and others being integrated of order (I(1)). This model enables a thorough examination of the long-term and short-term connections between the variables, making it a great instrument for comprehending the dynamics of this research.

Table 4. Results of unit root test.

Variables	Level:		First-difference:		Integration order
	Constant	Constant+trend	Constant	Constant+trend	
AMGNRLX	0.509	-2.411	-12.099***	-12.687***	I(1)
GRI	-8.894***	-8.426***	-	-	I(0)
SI	-8.488***	-8.055***	-	-	I(0)
CHI	-8.855***	-8.428***	-	-	I(0)
ESI	-2.231	-2.849	-17.857***	-17.868***	I(1)
NC	-2.217	-1.739	-15.133***	-15.220***	I(1)

Note: Asterisk \*\*\* denotes statistically significant at the 1% level.

#### 4.4. Results of Lag Length Selection Method

The study used the Akaike Information Criteria (AIC) to ascertain the most suitable lag length for the Autoregressive Distributed Lag (ARDL) model. These criteria are essential for making decisions and determining the most appropriate lag duration that accurately depicts the underlying dynamics and linkages in the data. The findings of the lag length selection procedure are summarised in Table 5, presenting the results based on the information criterion obtained from the Vector Autoregression (VAR) model. The purpose of these criteria is to find a middle ground between the complexity of the model and its ability to accurately represent the data. To do this, consider various lag lengths and how well they explain the data. The lag duration picked based on AIC has a substantial impact on how well the ARDL model can understand the dataset's complicated patterns and how they relate to each other. The meticulous selection procedure improves the overall robustness and dependability of the statistical analyses performed in the research, hence enhancing the comprehension of the study results. Our study's analysis indicates that a lag of 7 periods is the most appropriate choice for modelling the connections between our variables.

Table 5. VAR lag order selection criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	300.313	NA	5.18E-09	-2.051	-1.975	-2.020
1	2595.853	4479.102	7.52E-16	-17.797	-17.261*	-17.582
2	2656.622	116.034	6.33E-16	-17.970	-16.975	-17.571
3	2769.551	210.906	3.70E-16	-18.506	-17.052	-17.923
4	2838.510	125.904	2.95E-16	-18.735	-16.823	-17.969
5	2883.509	80.277	2.78E-16	-18.798	-16.426	-17.848
6	2923.891	70.357	2.70E-16	-18.829	-15.998	-17.694
7	3029.801	180.085*	1.67e-16*	-19.315*	-16.0260	-17.997*

Note: Table outlines the criteria used for selecting the lag order. '\*' indicates the lag order selected by the criterion these criteria, including log likelihood (LogL), likelihood ratio (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC), and Hannan-Quinn information criterion (HQ), provide different measures to evaluate the optimal lag orders.

#### 4.5. Results of Cointegration Tests

The statistic of F-Bound test result in Table 6 is 4.5547, which is statistically significant at the 5% level. This signifies the existence of a long-run relationship between the variables over an extended period of time. Put simply, these variables are not independent entities, but rather, they are interrelated throughout a prolonged duration. Comprehending this enduring relationship is crucial for our study, as it enables us to investigate the complex dynamics and interconnections among these factors, revealing how they together impact the economic and financial environment.

Also, to make the points about how the integration connection is linked stronger, Table 6 shows the Bound t-statistic result of -5.2771, which is statistically significant at the 1% level. This result substantially substantiates and verifies the presence of a cointegration among the variables. Essentially, it emphasises the notion that various factors are cointegrated, exhibit long-term relationships, and move together over long periods of time.

#### 4.6. Results of ARDL Model

The coefficient of determination, R-square, in the ARDL model is 0.9962, indicating an excellent fit of the model. The modified R-square value of 0.9958, which takes into account the number of independent variables and degrees of freedom, provides further evidence of the model's good fitting ability.

Furthermore, the Akaike Information Criteria (AIC) selection criteria determines the most suitable lag orders for variables, such as ARDL (3,0,0,7,2,6). The use of this notation offers useful insights into the temporal relationship of each variable in our investigation.

Table 6. Short-run and long-run relationship for GRI and stock market for Jordan.

ARDL (3,0,0,7,2,6)		
Model selection method: Akaike info criterion (AIC)		
Part A:	Selected model: (3,0,0,7,2,6)	
R <sup>2</sup> and adj. R <sup>2</sup>	0.996/0.996	
Part B:	Residual diagnostic	
LM $\chi(1)$	[0.821]	
LM $\chi(2)$	[0.958]	
Part C:	Long-run cointegration models for GRI and stock market	
Variables:	Coefficients:	t-statistics:
Government response index	-3.165**	-2.525
Stringency index	-2.465*	-1.883
Containment health index	6.519***	2.637
Economic support index	0.014	0.676
New cases	-0.084**	-2.186
Part D:	Conditional ECM bounds F-statistic:	
F-stat	4.5547**	
K	5	
Part E:	Short-run ECM regression models for GRI and stock market:	
ECM*	-0.019***	-5.277***
R-squared	0.418	
Adjusted R-squared	0.379	
S.E. of regression	0.005	
Part F:	ECM regression bounds t-stat:	
Bounds t-statistic	-5.277***	

**Note:** Asterisks (\*\*\*, \*\*, \*) indicate statistically significant levels of 1%, 5%, and 10%, respectively. R<sup>2</sup> and adjusted R<sup>2</sup> measure model fit, while LM  $\chi(1)$ , LM  $\chi(2)$ , examine Lagrange multiplier test for serial correlation in ARDL equations. SER denote the standard error of regression. Figures in square bracket, [...] are p-values. Variable descriptions are detailed in Table 1. Cointegration is evaluated using the bounds F-test, and a related bound T-test, as proposed by Anindya Banerjee et al. (1998) focuses on long-run relationships based on lagged dependent variables.

The short-run model, as shown in Table 6, displays an error correction term (ECM) with an estimated coefficient of -0.0136. This result indicates that the process of adjustment steadily moves towards a state of long-term balance. As indicated in Table 6, the highly significant adverse ECM is what propels the movement towards equilibrium. The study uncovers the adverse influence of government reaction and the higher stringency index, which is particularly important in the context of the coronavirus epidemic. These findings may provide helpful insights for making future decisions in difficult situations. Amidst the outbreak, governments throughout the globe employed several measures, including lockdowns and economic stimulus packages, to tackle the situation. These moves had an unavoidable influence on financial markets, notably the Amman Stock Market Index. The rises in both indexes have negatively impacted the decline of the Amman stock market. The long-term adverse influence of these policies on the market suggests that investors and governments must thoroughly evaluate the repercussions of such interventions during times of crises or economic instability. This highlights the need to adopt a well-rounded approach to policymaking, in which the immediate need for crisis management is carefully considered in relation to the possible long-term consequences on the market. This research provides valuable insights for decision-makers, enabling them to achieve a more sophisticated and well-informed equilibrium in their future crisis responses. They should strive to implement policies that effectively address current issues without excessively suppressing long-term market opportunities. Essentially, the study's results provide a helpful insight into effectively managing crises for the advantage of both investors and policymakers. An important metric examined during the outbreak was the Containments Health Index, which, interestingly, has been seen to have a beneficial influence on the stock market. These findings indicate that when the Containments Health Index, which presumably assesses the efficacy of health-related containment efforts during the outbreak, rose, it corresponded with enhanced stock market performance. One possible reason for this correlation might be that successful health control measures boost trust among investors and the general population. When these efforts effectively controlled the propagation of the virus and safeguarded public health, they probably played a role in promoting economic stability and optimism. Consequently, this might have enhanced investor confidence and resulted in favourable

fluctuations in the stock market. The Containment Health Index's beneficial influence on the stock market highlights the interconnectedness of public health results and economic success within the epidemic. This emphasises the need to take early and efficient health measures to preserve market stability and investor confidence. It also has wider implications for policymakers and investors in dealing with similar crises in the future. The Amman Stock Market seems to be impervious to the influence of the Economic Support Index. Put simply, fluctuations in this indicator do not seem to have a noticeable influence on the performance or conduct of the Amman stock market. The control variable of new coronavirus infections has an adverse influence on the Amman Stock Market. This observation demonstrates the market's reaction to the prevalent attitude throughout a worldwide epidemic. The adverse influence of new coronavirus infections on the stock market suggests that investors respond unfavourably to a rising number of instances. This response may be attributed to several sources. For example, a rise in coronavirus infections might result in heightened ambiguity and apprehension over the economic consequences of the epidemic, such as possible lockdowns or decreased consumer activity. These concerns might result in a decline in investor confidence and subsequently cause a fall in the stock market. This discovery highlights the interdependence between health crisis advancements and financial markets, emphasising the substantial influence that investor sentiment might experience due to the changing dynamics of a worldwide epidemic.

#### 4.7. Diagnostics and Stability Tests

We ran a thorough series of diagnostic and stability tests to assure the accuracy and reliability of the data in our research. These tests function as verifications to ensure the statistical analysis is robust and the findings are reliable. One of the diagnostic tests, specifically, emphasised the analysis of serial correlation. Serial correlation pertains to the presence of associated error terms in a regression model over time, suggesting that the model may not adequately capture some crucial characteristics of the data. In order to evaluate this, the Breusch-Godfrey Serial Correlation LM Test was used. The diagnostic test findings, as shown in Table 6, showed p-values over 5%. A p-value over 5% indicates a lack of statistically significant evidence for serial correlation in the data. Put simply, the model's mistakes do not display a consistent pattern or association over time. This validation is crucial as it ensures the dependability of the statistical model used. In addition, the cumulative sum (CUSUM) graph, which is another diagnostic tool, displays the CUSUM statistics inside the crucial borders when a significance threshold of 5% is chosen. This is seen in Figure 3. The CUSUM graph is used to evaluate whether there have been any changes in the coefficients or parameters of the model over time. A stable CUSUM graph indicates that the model stays consistent and reliable throughout the whole research period.

Overall, the diagnostic and stability tests, such as the fact that there is no serial correlation and the CUSUM graph is stable, show that the results are strong and reliable. They ensure that the statistical analysis faithfully represents the underlying connections in the data, so bolstering the trustworthiness of the findings and conclusions.

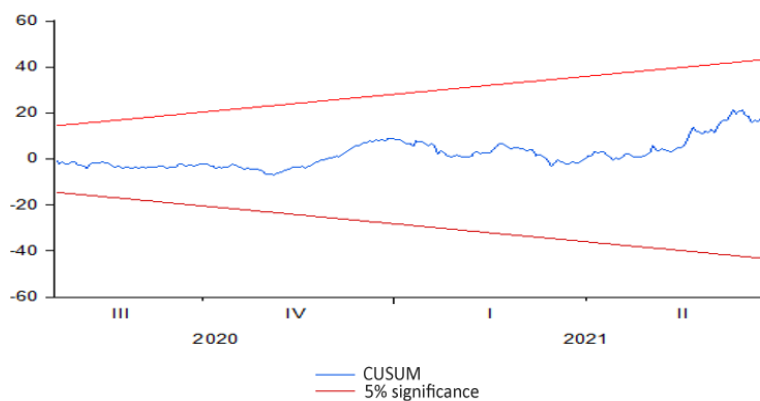


Figure 3. Plot of CUSUM test for parameter stability.

The results of this analysis are consistent with the findings of Zhuo and Kumamoto (2020); Scherf et al. (2022); Keh and Tan (2021); Gunawan and Nainggolan (2021) and Sinaga et al. (2022) who discovered that the government intervention index had an adverse influence on stock markets. In our research, we found that the stringency index (SI) and government reaction index (GRI) had an adverse influence on the Amman stock market. This indicates a link between greater levels of the stringency index and government reaction index, and adverse impacts on the performance of the Amman stock market. Conversely, the Containment Health Index has a positive correlation with the Amman general stock market index.

This aligns with previous studies that discovered a favourable influence of some government intervention indices on stock markets (Alam et al., 2020; Bakry et al., 2022; Bouri et al., 2022; Guven et al., 2022). The consistent findings across several studies suggest that government actions, as measured by the Containment Health Index, may have positive effects on equity markets. This discovery strengthens the idea that some forms of government intervention may have a positive influence on the performance of the stock market, as shown by earlier studies.

## 5. CONCLUSION

The research used the Autoregressive Distributed Lag (ARDL) technique to analyse the influence of government initiatives during the coronavirus epidemic on the Amman Stock Market in Jordan, considering both short-term and long-term connections. In order to assess the influence of the epidemic on the stock market, the analysis used new coronavirus cases as a controlled variable. The ARDL model is a statistical method used in this context to examine the temporal dynamics and interrelationships among various variables. The researchers used this model to investigate the influence of government interventions, such as lockdowns, stimulus packages, and other measures implemented in response to the epidemic, on the performance of the Amman Stock Market.

The inclusion of new coronavirus cases as a controlled variable indicates that the researchers took into account the possibility that the number of new cases may influence the performance of the stock market. By including this variable, their objective was to investigate the correlation between fluctuations in the pandemic's trajectory and stock market performance, allowing them to determine the degree to which the stock market was impacted by the changing coronavirus crisis. This enhances the comprehension of how government initiatives during the epidemic influence the dynamics of the stock market, promoting a more profound knowledge of their linkage.

The presence of a strong error correction term in the short-run indicates a long-term relationship between government activities and stock market performance. This suggests that any deviations from equilibrium are progressively corrected over time. According to the study's long-term research, both the government reaction index and the stringency index had a negative influence on the Amman Stock Market. In contrast, the Containment Health Index had a positive influence. Government activities and the severity of epidemic control measures had a detrimental influence on the stock market, but a higher Containment Health Index, indicating superior epidemic control, had a favourable influence on market performance. The research demonstrated that the outbreak had a negative impact on the Amman Stock Market, with new coronavirus cases serving as a controlling factor. This discovery is consistent with the results of previous research, which cumulatively reinforces the evidence of the negative influence of the coronavirus on the stock market in Amman.

### 5.1. Policy Implications and Recommendations

The results of this research are very important for both investors and decision-makers, offering crucial knowledge for effectively dealing with uncertainty and future crises. Investors may use this study to enhance their decision-making process, adapting their investment strategies based on elements like government policies and characteristics associated with the epidemic. These insights provide assistance to decision-makers in developing crisis management strategies that effectively balance urgent requirements with long-term economic stability. This work improves our comprehension of the intricate relationship between government interventions, health

emergencies, and financial markets, enabling stakeholders to actively tackle obstacles and make choices that promote economic resilience and stability during periods of unpredictability.

The research suggests that the government of Jordan should adopt a balanced strategy for resolving emergencies such as the coronavirus epidemic. Although the rapid government reaction index and the stringency index control measures are crucial for public health, it is essential to implement policies that provide stability and support to the financial markets. This may include implementing strategies to alleviate the negative effects on the Amman Stock Market, guaranteeing its ability to withstand challenging circumstances. In addition, the government could consider implementing measures that enhance the Containment Health Index, which has had a positive impact on market performance. This may include allocating resources towards the development of healthcare infrastructure and implementing efficient measures for epidemic control.

### 5.2. Recommendations for Further Research

To further future studies, it is crucial to thoroughly investigate the precise processes by which government actions impact stock markets in times of crisis. Furthermore, examining the interaction between different financial markets and government interventions in the face of health emergencies, together with the enduring economic repercussions, would provide a more thorough comprehension.

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