INTERNATIONAL JOURNAL OF ECONOMICS AND FINANCE STUDIES
Vol: 14 **No:** 02 **Year:** 2022 **ISSN**: 1309-8055 (Online) (**pp.** 287-307) **Doi:** 10.34109/ijefs. 20220037
Received: 21.10.2021 | **Accepted:** 12.08.2022 | **Published Online:** 15.09.2022

-RESEARCH ARTICLE-

AN EXAMINATION OF THE EFFECT OF THE CORONAVIRUS PANDEMIC ON FIRM VALUE IN EGYPT: A PANEL PMG/ARDL APPROACH

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─Abstract─

This study investigates the short- and long-term consequences of coronavirus-induced declines in firm activity on firm value. This association was explored explicitly at both the market and industry levels. The panel data covers the period from March 19, 2020, to June 25, 2020, for 136 publicly traded non-financial companies. The panel pooling mean group/Autoregressive Distributed Lag estimate method is utilized to investigate the Coronavirus's short- and long-term effects on firm value. The primary findings indicate that the pandemic negatively impacted the daily stock returns of all industries besides healthcare. This outcome could be ascribed to a 24,3 percent increase in Egyptian healthcare spending in 2019/20 to assure the development of robust and adaptable healthcare systems able to withstand economic downturns like the one experienced during the epidemic. Moreover, the real estate and cyclical consumer sectors were most affected over the long term. The results may be explained by the notion that, during economic downturns, individuals prioritize spending on non-durable goods that are essential for day-to-day survival. This study contributes to the literature on financial accounting by explicating how real shocks affect the value of a company in a country with an emerging economy.

Citation (APA): Pumphrey, L., Salah, W. (2022). An Examination of The Effect of The Coronavirus Pandemic on Firm Value in Egypt: A Panel PMG/ARDL Approach. *International Journal of Economics and Finance Studies, 14* (2), 287-307. doi:10.34111/ijefs. 20220037

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Keywords Covid-19, stock price, stock market, pandemic

1. INTRODUCTION

The World Health Organization (WHO) declared the coronavirus pandemic on March 11, 2020. This declaration caused a global slump in the financial markets. From January 1, 2020, to April 1, 2020, several prominent market indexes experienced significant falls. For instance, several Morgan Stanley Capital International indexes had huge reductions in value, with the World Index falling by 25% and the Europe Index falling by 27%. Even the G7 Index was down 25%. Emerging markets were not immune to these drops, as the MSCI Emerging Markets Index fell 26%. (MSCI, 2022). The International Monetary Fund revealed in a special press release that there was an $83 billion capital drain from emerging market exchanges between January 21, 2020, and March 21, 2020. (IMF, 2021). Such a major drop in global financial markets and capital outflow from emerging market exchanges should be researched by academics throughout the next years. The above indexes represent aggregates for the world, Europe, and developing economies but do not account for decreases in specific countries or industries over the period under consideration.

A wide body of research demonstrates that natural disasters and other crises, especially health-related crises (Chen et al., 2017), have a detrimental impact on stock markets (Nguyen et al., 2021; Wang et al., 2013). Stock returns have decreased during prior outbreaks, such as the Yellow Fever epidemics in Philadelphia in 1793 and New York in 1798. They have also decreased during global pandemics, such as the 1918 Spanish flu. In recent years, the SARS pandemic in 2003 and the Ebola outbreak in 2013 had global implications on stock returns, despite their more localized health effects. While earlier pandemics affected nations globally, none touched as many nations in as many ways as the Coronavirus. During the height of the Coronavirus pandemic, country borders were shut down, international travel ceased, and the vast majority of normal economic operations were halted. Individual investors and government officials must comprehend the impact of a pandemic on a company's worth. Investors are concerned about their investments and will be interested not just in the market's performance during a pandemic but also in the performance of certain financial market sectors. As they establish public policies to mitigate the impact of global health crises on financial markets and, ultimately, their respective national economies, government regulators will consider the impact of a pandemic on markets, specific market sectors, and economies in different stages of development.

Several studies have been undertaken on the correlation between the coronavirus and stock market performance. Studies have utilized various proxies for Coronavirus, such as WHO announcements related to Coronavirus (Albulescu, 2021; Au Yong et al., 2021), the number of confirmed cases (Albulescu, 2021; Gherghina et al., 2021), the

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number of confirmed deaths (Abu et al., 2021; Ahmed, 2020; Alber, 2020; Şenol et al., 2020). Abu et al. (2021) and Albulescu (2021) discovered that the daily death statistics are the proxy that gives the most meaningful results. This study utilized the deaths attributed to the Coronavirus and the daily confirmed cases. As reported on a company's financial accounts, net income or net profit are the most commonly used performance indicators. Various stock price indexes are the most prevalent measurements of the performance of companies as a whole. This study employs the daily stock return of individual firms as a proxy for the influence of the Coronavirus on Egyptian corporate value.

There have been numerous studies on the influence of the Coronavirus on stock returns in more established economies (Albulescu, 2021; Au Yong et al., 2021; Ramelli et al., 2020), but just a handful in less developed (emerging) economies (Albulescu, 2021; Au Yong et al., 2021; Ramelli et al., 2020). (Ahmed, 2020; Wardani et al., 2021). In addition, most research solely examines the epidemic's short-term effects. Given that previous research has been equivocal, particularly in less developed or emerging economies, this study makes numerous contributions to the accounting literature. First, we employ a PMG/ARDL estimating technique that has only recently appeared in the accounting literature. This method permits cross-sectional variation via short-run parameters and short-run causal inferences, irrespective of whether the variables are stationary at the level or first difference (Mensah et al., 2019). Second, Egypt's stock market has experienced a big shock. This study is one of the few that examines both the short-run and long-run consequences of this significant shock on company value at the market and sector levels in a developing economy. Investors make investment decisions to assess which industry offers the best investment potential. In the event of a natural disaster, investors might utilize the findings of this study to choose the most suitable investment sectors. This paper also provides advice for investors and, more crucially, for governments and their regulatory bodies to minimize the disruption of their financial markets in the event of a pandemic or other natural disaster.

The structure of the paper is as follows: Section 2 presents the literature review and creation of hypotheses. In Section 3, the data sources and empirical models are presented. The fourth section examines the empirical findings. The researchers conclude by discussing the implications they have derived from the study's findings and their recommendations based on these findings.

2. LITERATURE AND HYPOTHESES

Using a variety of techniques, Coronavirus proxies and company performance proxies, numerous researchers have examined the effect of the Coronavirus on global and regional stock markets. However, the majority of these studies reached the same conclusion: the Coronavirus has a detrimental impact on stock returns (Chaouachi et al., 2020; Karim et al., 2021; Rababah et al., 2020). Volatility in the financial markets is a

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variable of significant interest to investors and, consequently, to academics, as volatility increases risk. The price of a stock is the current value of dividends expected in the future, discounted at an acceptable discount rate. When investors modify their expectations regarding future dividends, stock prices will fluctuate, which will be reflected in variations in market volatility. Volatility information is crucial for both investors and company managers. (Albulescu, 2021) investigated the correlation between the Coronavirus and volatility in the United States (US). He examined the effect of WHO Coronavirus-related announcements on the volatility of financial markets and discovered that the number of new infection cases reported increased volatility; the death ratio had a significant positive effect on volatility, and Coronavirus data reported at the global level had a greater effect than data reported at the US level. (Gherghina et al., 2021) similarly investigated the impact of Coronavirus on market volatility. Still, they focused on the Romanian financial market using the Bucharest Exchange Trading Index and utilized the number of new cases as a proxy for Coronavirus. In the first quarter of 2020, they discovered an increase in market volatility, but volatility decreased in the second and third quarters of 2020. Höhler et al. (2021) evaluated the impact of the Coronavirus on the stock price volatility of 71 enterprises in the food supply chain across three continents (US, Japan, and Europe). From 2019 to 2020, they discovered that the supply chain firms witnessed the smallest overall rise in volatility. This is consistent with the fact that the retail sector remained untouched during the initial months of the Coronavirus outbreak. Tissaoui et al. (2021) evaluated the ability of market volatility to explain illiquidity in the Kingdom of Saudi Arabia (KSA) stock market during the early period of the Coronavirus epidemic. They discovered that market volatility has short- and long-term effects on illiquidity. Studies of the association between volatility and stock markets revealed that the Coronavirus increased volatility in global financial markets. Still, the effect was inconsistent across economic sectors and types of economies.

What measure of Coronavirus should be utilized in research is a crucial topic in the study of Coronavirus. Abu et al. (2021) evaluated the impact of the Coronavirus on Nigerian stock markets. They discovered that the number of verified Coronavirus cases negatively and substantially affected long-term stock market performance. In contrast, the number of Coronavirus deaths had a positive and significant effect. Alber (2020) examined the Coronavirus's impact on six nations' stock markets. He discovered that stock market returns are sensitive to the number of Coronavirus cases, as opposed to the number of Coronavirus deaths, and to the cumulative number of cases, as opposed to the number of new cases. Ahmed (2020) investigated how the Coronavirus affected the performance of the Pakistani stock market. He discovered that the number of recovered Coronavirus cases affected the index's performance. He discovered that there was no association between positive instances and mortality.

In addition to using various proxies for Coronavirus and various proxies for firm performance, studies of the effect of Coronavirus have used various tools to analyze the

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results, such as the wavelet coherence approach (Tissaoui et al., 2021), panel data regression analysis (Höhler et al., 2021; Karim et al., 2021; Rababah et al., 2020), GARCH (Gherghina et al., 2020; Hatmanu et al., 2021; Wardani et al., 2021). This work employed the panel PMG/ARDL estimation method established by M. Hashem Pesaran et al. (1999), which allows for cross-sectional variation via short-run parameters and both short- and long-run causal inferences, regardless of whether the variables are stationary at level or first difference (Mensah et al., 2019).

Some investigations on the effects of the Coronavirus employed cross-country analysis. For instance, Gherghina et al. (2020) utilized the ARDL model and eight nations to examine the interdependencies between financial markets from December 31, 2019, to April 20, 2020. (USA, Spain, Italy, France, Germany, UK, China, and Romania). They discovered no effect on the Romanian stock market in the short or long term. He et al. (2020) evaluated the impact of the Coronavirus on stock markets in eight nations, five of which were also employed in the study by Gherghina et al. (PRC, Italy, South Korea, France, Spain, Germany, Japan, and the USA). They discovered a negative short-term impact on the stock markets. In an intriguing study, Orhun (2021) examined the effects of the Coronavirus on the financial markets of 15 countries. He discovered that nations with greater direct foreign investment exposure to China confirmed Coronavirus illnesses, and Chinese visitors were more likely to be adversely affected. Orhun also discovered that countries with a higher GDP and better prepared to deal with health problems were less likely to be disproportionately affected. Using the number of cases and deaths, Şenol et al. (2020) analyzed the impact of the Coronavirus on worldwide markets between January 21 and April 7, 2020. They discovered a negative association between the Coronavirus and stock prices over the long haul. The research on the cross-country influence of the Coronavirus gives contradictory results.

Some investigations of the effects of Coronavirus have been limited to a single country but have utilized a variety of analytical methods. Chaouachi et al. (2020) analyzed the impact of the Coronavirus on the Saudi Arabian stock market (KSA). They discovered that the Coronavirus only had a detrimental impact on the stock market over the long run. Contuk (2021) investigated the impact of the Coronavirus on the Turkish stock exchange (Borsa Istanbul—BIST). He discovered that metal and machinery, as well as products that satisfied fundamental requirements and the real estate industry, were least affected. Hatmanu et al. (2021) analyzed the impact of the Coronavirus on the Romanian stock market from March 11, 2020, to April 30, 2021. They discovered a strong detrimental long-term impact on the BET index in Romania. Karim et al. (2021) examined the effects of the Coronavirus on several sectors of the Bangladeshi economy between March 8, 2020, and September 15, 2020. They discovered that most industries responded negatively to the rise in confirmed cases. Rababah et al. (2020) analyzed the impact of the Coronavirus on the financial performance of Chinese publicly traded companies. They discovered that small to medium-sized businesses were hardest hit and that the travel and tourism industries, as well as the companies that service the travel and

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tourist industries, were the most severely affected. Wardani et al. (2021) analyzed the correlation between the Coronavirus and the number of Indonesian stock trades. They discovered that the Indonesian market is only affected by its lag in the short term but not in the long run. However, neither the long-term nor the short-term effects were substantial.

The US capital markets are, without a doubt, among the world's largest. Investigating the Coronavirus's impact on business value in the United States is essential. Ramelli et al. (2020) examined the effect of the Coronavirus on stock returns in the US financial markets. They discovered that the effect was greater the more internationally oriented the company was. Yong and Laing analyzed the reaction of the American stock market to the WHO's declaration that the Coronavirus was a pandemic 2021. In the short-term, there is a negative correlation between the announcement and stock returns, but in the long-term, this is reversed. While global studies of the influence of the Coronavirus on company value produced contradictory results, investigations undertaken in individual nations revealed that the Coronavirus harmed stock prices in the first two quarters of 2020.

Depending on the industry, US stocks reacted differently to COVID-19. In the S&P 1,500 sample, natural gas, food, healthcare, and software stocks had significantly better returns than petroleum, real estate, entertainment, and hospitality equities, which declined significantly (Mazur et al., 2021). However, there is reason to believe that the impact on the hospitality sector (consumer cyclicals) in Egypt and other developing/emerging economies will be less than in the countries included in the Mazur study because airlines are privately owned and publicly traded in the United States.

Historically, pandemics have resulted in a decline in stock prices. Few studies have attempted to distinguish Coronavirus's short-term effects from its long-term effects. Au Yong et al. (2021) discovered that stock market prices fell in the first quarter following the introduction of Coronavirus but recovered in the second and third quarters. It is reasonable to expect that the decline in share prices would not be uniform across all sectors of the economy and that the sectors most affected by the pandemic will be those for whom the government has enacted new laws or regulations. For instance, Egypt, like many other nations, prohibited all air travel after discovering Coronavirus infections. Since airline revenues would decline rapidly, but cost reductions could not be accomplished as quickly, it seems logical to hypothesize that share prices would respond swiftly to the anticipated operating losses. How quickly airlines could recover from the financial impact of Coronavirus would depend on how long air travel is restricted. Egypt Air, the country's largest airline, is owned by the government and hence will not be listed on the stock exchange. In nations with developing/emerging economies, it is typical for the government to own the country's primary or sole airline. The government of Romania owns 99.7% of TAROM; the Kingdom of Saudi Arabia owns Saudia; Morocco owns Royal Air Morac; the royal families of the United Arab Emirates own Emirates Air and

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Etihad; Air China Group owns Air China and several regional Chinese carriers; Turkish Air is approximately 50% privately owned and traded on the stock exchange. We anticipate that the Coronavirus will have less of an impact on the stock market and the cyclical consumer sector in Egypt and other developing/emerging economies than it did in industrialized economies, where airlines are often privately held. Using a panel technique, Ozili et al. (2020) examined the influence of social distancing policies on the stock markets of Japan, the United Kingdom, the United States, and South Africa. From March 23, 2020, to April 23, 2020, the number of lockdown days and international travel restrictions harmed the stock market, while limits on internal movement had a favorable impact. We anticipate that the effect would be less pronounced in Egypt than in the industrialized nations employed in the Ozili study but the same general direction.

Only take-out orders were permitted during the initial few months of the Coronavirus lockdown in Egypt. It is reasonable that the loss of inside dining would diminish the restaurant's overall earnings. Yet, fulfilling take-out orders would necessitate the same expenditures as before (except for wait staff, who were often used to packaging the take-out orders). Numerous small businesses are service-based, and many service-based enterprises (hair salons, nail salons) were forced to close within the first few months. It is reasonable to suppose that the opening hours of the major retail establishments, many of which are listed on stock exchanges, reduced their profitability, which would have harmed share prices. Food markets would be the only retail operation whose operating profitability (and consequently share values) would be expected to remain relatively stable (grocery stores or food markets). People will need to eat whether or not there is a pandemic. Hence, grocery shop profits are anticipated to remain relatively stable throughout time.

At least three factors limited manufacturing's production: a limit on the number of employees who could work due to social distancing requirements; the number of employees who were healthy enough to work; and a decrease in demand for their products as a result of restrictions on the operating hours of retail establishments through which their products were sold. The consequent decline in operational earnings is anticipated to have a detrimental impact on the stock values of manufacturing and assembly companies. The only industry anticipated to experience greater profits during a pandemic would be healthcare, as the demand for healthcare would increase dramatically. Given the lack of empirical studies on the long-term effect of the Coronavirus on company value in developing nations, there is a need for additional research on the pandemic's effects, particularly at the sector level. This study aims to quantify these effects using the panel PMG/ARDL estimate approach. Based on logic and previous study, it is anticipated that the Coronavirus will have a considerable negative impact on Egypt's overall stock returns. Even though earlier research has demonstrated that a pandemic harms the overall stock return, this effect is not expected to be constant across all industries. This study investigates the short- and long-term

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consequences of Coronavirus-induced activity reductions and lockdowns on firm value in a developing nation. This study seeks to examine the following hypotheses:

H1: In the short run, the Coronavirus pandemic in Egypt harms stock market returns.

H2: In the long run, the Coronavirus pandemic in Egypt harms stock market returns.

3. DATA AND METHODOLOGY

Before describing the empirical results, we will present the sample and the methods used, citing relevant literature.

3.1 Data Source and Description

The PMG/ARDL estimate technique is utilized to examine the relationship between the Coronavirus pandemic and the daily stock return in Egypt between March 17, 2020, and June 25, 2020, encompassing solely trading days on the Egyptian stock market. This timeframe was chosen because it was during this time that Egypt implemented extreme steps to restrict the spread of the virus. The financial data is obtained from the Refinitiv Eikon database, while the daily number of Coronavirus deaths is obtained from the WHO website (https://covid19.who.int/). This analysis included all non-financial industries listed on the stock exchange to provide a more comprehensive view of the epidemic's effects on the value of Egyptian enterprises. All financial institutions and institutions with missing data were eliminated from the sample. The total sample is composed of 8975 observations listed in Table 1. The sample companies were categorized into the six sectors shown in Table 1. Basic Materials, Consumer Non-Cyclicals, Industrials, and Real Estate have the most firms, with 30, 28, 23, and 23 firms, respectively. Consumer Cyclicals has 21 companies, while healthcare only has 11.

The response variable (LSR) is the natural logarithm of daily stock returns, a proxy for company value; the regressor variable (ND) is the daily number of deaths caused by the Coronavirus. Figures 1 and 2 provide a graphical illustration of the data. Figure 1 depicts a nonlinear trend for LSR, whereas Figure 2 depicts a linear trend for ND. This shows that these variables may not be stationary, so their stationarity must be examined. Figure 1 illustrates that daily stock returns follow a virtually similar average trend. This is known as a "random walk pattern." Figure 2 depicts the progression of the virus's dissemination during the duration of the investigation.

Table 2 shows the descriptive statistics for the study variables. The natural logarithm of the LSR is employed to mitigate the problem of heteroscedasticity. The average LSR is 0.005184, with a standard deviation of 0.0364. On the other hand, ND has an average of 25.712 with an SD of 28.203. For a normally distributed series, skewness and kurtosis should be 0 and 3, respectively. Table 2 reveals that none of the study variables are normally distributed based on skewness and kurtosis output. The LSR and ND are skewed to the right. Moreover, kurtosis reveals that the LSR and ND distributions are

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nearly spherical (kurtosis-value > three). The Jarque-Bera test for normality, which considerably rejected the null hypothesis that all variables are normally distributed, supports this conclusion.

Table 1. Sample Description

Sector	Number of firms	Number of observations	Percent
Basic Materials	30	1979	22.1
Consumer Cyclicals	21	1386	15.4
Consumer Non-Cyclicals	28	1848	20.6
Healthcare	11	726	8.1
Industrials	23	1518	16.9
Real Estate	23	1518	16.9
Total	136	8975	100.0

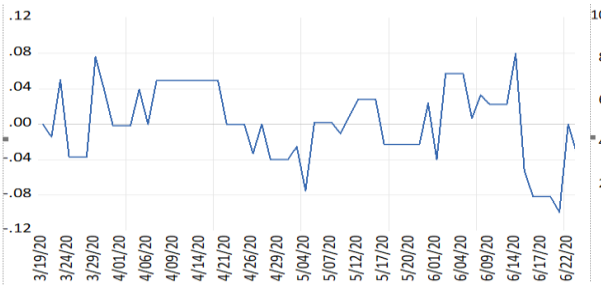

Figure 1. Daily stock Return (LSR)

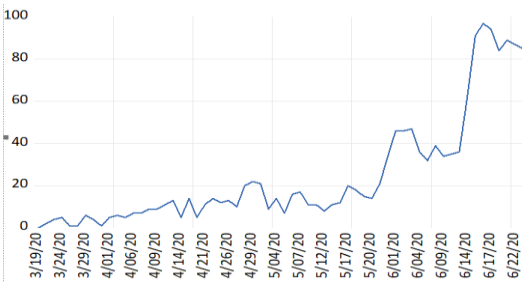

Figure 2. Number of new death cases (ND)

Table 2. Variables' Descriptions

	LSR	ND
Description	Log of daily stock return calculated as (stock price in time t less stock price in time t-1)/ stock price in time t-1 (Gherghina et al., 2020; Höhler et al., 2021)	The number of daily deaths caused by the pandemic (Alber, 2020; Şenol et al., 2020; Tissaoui et al., 2021).
Mean	0.0052	25.712
Standard Deviation(SD)	0.0364	28.203
Maximum	0.366	97
minimum	-0.165	0
Skewness	0.240	1.424
Kurtosis	5.523	3.689
Jarque-Bera	2466.084***	3210.128***
Dickey and Fuller	-20.52***0	-44.4***1

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Pesaran 2007 CIPS	-3.927***1	-10.765***1

Note: that 0 and 1 indicate stationary at the level and first difference, respectively, and *** denotes statistical significance at 0.01.

3.2 Empirical Model

The M Hashem Pesaran (2004) cross-section dependence (CD) test and the Lagrange multiplier (LM) test for heteroscedasticity were used to identify the models used in the study, such as stationarity. The CD test developed by M Hashem Pesaran (2004) can be utilized when cross-sectional data surpasses time, as is the situation with the research sample. To employ the PMG/ARDL model, all variables must be stationary on a mixture of level or first difference and cointegrated. Consequently, the stationarity of the study variables is evaluated using M Hashem Pesaran (2004)'s CIPS panel unit root test, which allows for cross-sectional dependence. In addition, for cross-section independence, the Dickey et al. (1981) model is utilized, which postulates independent unit root processes across cross-sections. The null hypothesis states that the panel time series has a unit root for all tests. In addition, the bootstrap cointegration test developed by Westerlund et al. (2007) was used to assess the long-run structural association between daily stock performance and CORONAVIRUS daily death cases. This test is appropriate for heterogeneous and cross-sectionally dependent panel data. The PMG/ARDL model developed by M. Hashem Pesaran et al. (1999) is then utilized to estimate both short- and long-run coefficients and causal relationships between variables. Combining ARDL (m, s) models with PMG estimators. It has recently acquired prominence due to its capacity to create short-run and long-run parameters simultaneously. It requires long-run coefficients to be homogeneous but permits short-run coefficients and error variances to differ between enterprises (M. Hashem Pesaran et al., 1999). In addition, it can be used to determine if a series is stationary at the level or the first difference (Hotak et al., 2020; Mensah et al., 2019). It overcomes the serial correlation problem associated with least square regression for mixed-stationary and non-stationary series. According to M. Hashem Pesaran et al. (1999), an ARDL dynamic heterogeneous panel regression is written using the ARDL (m, s) method. Several researchers, including Mensah et al. (2019) and Hotak et al. (2020), employ and present the model as follows:

$$LSR_{it} = \mu_i + \sum_{n=1}^{m} \beta_{in} LSR_{i,t-n} + \sum_{n=0}^{s} \lambda_{in} ND_{i,t-n} + \varepsilon_{it} \quad (1)$$

Where i and t represent firm and day, respectively; LSR is the daily stock return; ND is the daily number of death cases; λ and β are the regression coefficients; μ is the mean stock return across firms and over time; m and s are the number of lags in the response and regressor variables, respectively; ε_{it} is the error. The above model allows for different coefficients across firms. Table 2 displays definitions of the study variables.

The cointegrated variables' time paths are determined by the degree of divergence from their long-run equilibrium (Hotak et al., 2020). The divergence from equilibrium may

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explain the short-run adjustment of the variables in an error correction model, as shown below:

$$\Delta LSR_{it} = \pi_i COINTEQ_{it} + \sum_{n=1}^{m-1} \beta_{in} \Delta LSR_{i,t-n} + \sum_{n=0}^{s-1} \lambda_{in} \Delta ND_{i,t-n} + \mu_i + \varepsilon_{it} \quad (2)$$

$$COINTEQ_{it} = LSR_{i,t-1} - ND_{it}¥_t \quad (3)$$

Where Δ represents the first difference, ¥ represents the long-run coefficients, $COINTEQ_{it}$ is the error correction term, and π_i denotes the rate at which the parameters are adjusted. It represents how much of the preceding period's disequilibrium is being adjusted at the current time, indicating the convergence rate of firm stock returns to long-run equilibrium because of the CORONAVIRUS pandemic shock. If $\pi_i = 0$ or $\pi_i > 0$, then there is no evidence of a long-run correlation among variables. The negative sign, on the other hand, represents cointegration between the regressor and response variables.

4. EMPIRICAL RESULTS AND DISCUSSIONS

This section contains the study's findings. Before utilizing the PMG/ARDL estimate method, the stationarity of the study variables must be verified. If non-stationary variables are included in the ARDL model, inaccurate estimates will ensue. Table 2 displays the results of panel unit root tests utilizing Pesaran's CIPS and Augmented Dickey-Fuller (ADF). To estimate hidden traits, this study uses a constant plus a trend. ND is non-stationary at level and stationary at the first difference for both tests. However, LSR is stationary, utilizing ADF and Pesaran at first. This discrepancy may be attributable to Peasaran's resistance to heterogeneity and cross-sectional dependence. As long as the stationarity level does not exceed the initial difference, the panel ARDL model is suitable for mixed-stationary and non-stationary series (Salisu et al., 2022).

The p-values of various cross-section dependence tests are significant at the 0.01 level, rejecting the null hypothesis of cross-section independence in residuals, as shown in Table 3. This indicates that the study variables are sufficiently cross-sectionally dependent among Egyptian enterprises. In addition, the homogeneity LR test p-value is significant at the 0.01 level, rejecting the null hypothesis of homoscedastic residuals. This necessitates applying diverse panel techniques, each with its own parameters.

Table 3. Cross-Section Dependence and LR in Panel Data

Cross-Section Dependence Test	Statistics
Pesaran scaled LM	510.3410***
Breusch-Pagan LM	78330.73***
Pesaran CD	192.2285***
Homoscedasticity LR test	
Likelihood ratio LR test	1999.007***

Note: that *** denotes statistical significance at 0.01.

Due to the observed heterogeneity and cross-sectional dependence, the panel data estimate method utilized in this study considers these obstacles to produce reliable and accurate results.

The next stage is to determine whether the variables under study display any long-term association. Table 4 displays the results of Westerlund et al. (2007)'s bootstrap cointegration test. The robust p-value supports cointegration between the regressor variable LSR and the response variable ND, as the null hypothesis of no cointegration is rejected at a significance level of 0.01 for the statistics Gt, Ga, Pt, and Pa. Consequently, the variables in the research demonstrate a long-term association across all sectors and within each sector.

Table 4. Results of Panel Cointegration Test

Industries	Gt	Ga	Pt	Pa
All industries	-3.843***	-29.060***	-48.209***	-31.162***
Basic Materials	-3.846***	-28.390***	-20.771***	-30.785***
Consumer Cyclicals	-3.787***	-29.505***	-29.505***	-33.283***
Consumer Non-Cyclicals	-4.092***	-31.648***	-22.797***	-32.161***
Healthcare	-3.302***	-26.058***	-13.164***	-29.369***
Industrials	-3.847***	-28.413***	-19.960***	-30.139***
Real Estate	-3.841***	-28.284***	-19.846***	-29.617***

Note: *** denote statistical significance at the 0.01(robust p-value).

Table 5 displays the key findings from the PMG/ARDL estimation approach. It shows the long-run coefficients and short-run dynamics of stock returns concerning the number of Coronavirus death cases for all sectors and each sector individually. The PMG/ARDL used the first difference for the study variables to solve the stationarity problem. The best model for all sectors is ARDL (1,3), which has the lowest Akaike Information Criteria (AIC) (see Figure 3). AIC determines optimal lag lengths.

Concerning the whole market level, ND has a significant negative effect on LSR in the short run in terms of current and past periods. For instance, a 1% increase in daily death cases on day t **(Δ ND)** results in a decrease of about 0.052% in day t stock returns, on average, ceteris paribus. Additionally, a 1% increase in the daily death cases on day t results in an increase of about 0.1063% in day t+1 stock returns, on average, ceteris paribus. Moreover, a 1% increase in the daily death cases on day t results in a decrease of about 0.127% in day t+2 stock returns, on average, ceteris paribus.

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Table 5. PMG/ARDL Results (Response Variable: LSR)

	All sectors (whole market)	Basic Materials	Consumer Cyclicals	Consumer Non-Cyclicals	Healthcare	Industrials	Real Estate
Long-run coefficients							
ND	-0.0008***	-0.0005**	-0.0011***	-0.0007***	0.0001	-0.0008***	-0.0014***
Short-run coefficients							
COINTEQ	-0.4673***	-0.4250***	-0.4621***	-0.4668***	-0.5394***	-0.4869***	-0.4685***
ΔLSR(-1)			0.034503			0.101933***	
Δ ND	-0.00052**	-0.00112***	-0.00046	-0.000299	0.000760	-0.00115**	-0.00011
ΔND(-1)	0.001063***	0.000553	0.001924**			0.00247***	0.0011
ΔND(-2)	-0.00127***		-0.00252**				
C	-0.7395***	-0.6786***	-0.7282***	-0.74278***	-0.8663***	-0.7680***	-0.7310***

Note: *, **, and *** denote statistical significance at the 0.1, 0.05, and 0.01 levels, respectively. AIC is used for lag selection.

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Furthermore, ND has a significant long-run negative effect on LSR. When all other factors are held constant, a 1% increase in daily death cases decreases daily stock returns by 0.08%, on average, ceteris paribus. This result was reported in the literature by Şenol et al. (2020) study, who found that the stock markets around the world reacted quickly to the risk caused by the pandemic by rapidly depreciating. However, the results are inconsistent with the study of Gherghina et al. (2020), who found no effect of the pandemic on the Romanian stock market in the short or long run.

As shown in Table (5), the sector-level impact of ND on LSR can vary. For instance, the short- and long-term effects of ND on the healthcare industry are minor. This result could be attributable to a 24,3 percent rise in Egyptian healthcare spending in 2019/2020 to ensure that robust and adaptable healthcare systems can endure pandemic-related economic downturns. In contrast, the long-term impacts of ND on LSR in the remaining five sectors were negative and statistically significant. This indicates that a 1% increase in deaths is connected with a decline in stock returns of 0.05%, 0.11%, 0.07%, 0.08%, and 0.14% for basic materials, consumer cyclical, consumer non-cyclical, industrials, and real estate, respectively.

Moreover, the real estate and cyclical consumer sectors were most affected over the long term. Consumer cyclicals consist of companies that produce durable consumer goods. Consumer cyclicals include airlines, furniture, autos, luxury goods, and discretionary spending. During this study, Egypt halted all flights and prohibited face-to-face instruction in schools and universities. It closed all public areas due to the pandemic, which harmed the economy, particularly the consumer cyclical and real estate sectors, putting pressure on their stock returns. The findings are consistent with those of Pandini et al. (2018), who found that cyclical enterprises are more susceptible to economic volatility than other sectors. They contend that during economic downturns, the populace purchases fewer durable consumer items because spending is prioritized on non-durable things that are more essential for survival.

The Egyptian real estate market is regarded as a generally secure investment, and its demand is always growing. Real estate comprises a quarter and a third of the wealth of middle- and high-income Egyptian households. However, many middle-class families lost their jobs due to the pandemic. Families facing unemployment will typically rely on their savings to survive. Investments of any kind are uncommon among unemployed families. Because the Coronavirus lowered the savings of families with middle- to upper-middle-class incomes and, as a result, their investment in Egyptian real estate, the real estate market was significantly impacted in the long term and not in the near run. The study's findings are congruent with the previous study which discovered that the Coronavirus pandemic harmed project development and sales operations in the Turkish real estate market. This explains why Egypt's real estate and cyclical sectors have a larger negative link with the pandemic than other sectors.

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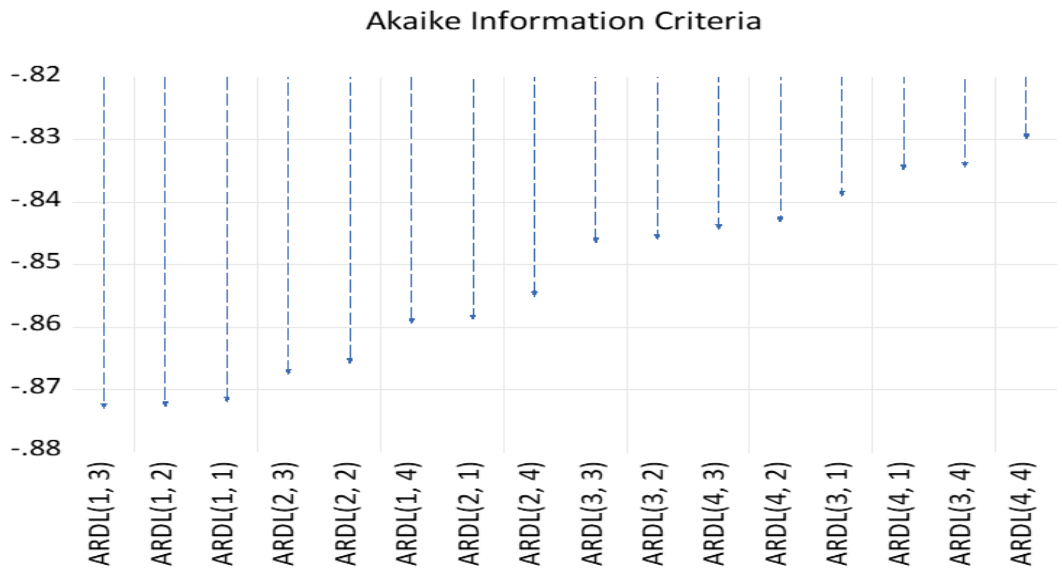
Table 5 reveals a significant negative association between the study variables for the basic materials and cyclical consumer sectors based on the short-run adjustment results. Nonetheless, the first lag of the LSR has a substantial beneficial impact on the present LSR for consumer cyclical and industrial sectors. In other words, if the LSR increases by 1% in time t-1, the LSR increases by 3% for consumer cyclical and 10% for industrial sectors in time t. This indicates that the stock's strength influences its return more than the pandemic's negative news.

In the near term, the death rate does not affect the non-cyclical healthcare, real estate, and consumer sectors. Food, cigarettes, and household items are non-cyclical examples of products. During economic downturns, the populace consumes things that are essential for survival in the near term. In Egypt, as in many Arab countries, smoking sheesha is both a social pastime and an attempt to relieve a tobacco craving. Sheesha shops were one of the measures used by the Egyptian authorities to curb the spread of the virus. These closures partially explain the reduction in the value of companies whose profits are derived from selling tobacco products. This explains why the Consumer Non-Cyclicals sector is unaffected in the short term but has a weak negative coefficient in the long term (-0.007). This conclusion is consistent with the findings of Höhler et al. (2021), who found that the food retail sector witnessed the smallest increase in volatility from 2019 to 2020.

Concerning the entire market, the results demonstrate significant negative coefficients on the error correction terms, COINTEQ, indicating a convergence rate of 46.7% toward the long-run equilibrium route. In addition, mistake correction terms were found to be statistically significant and unfavorable across all industries.

Figure 3. Model Selection Summary Graph



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5. ROBUSTNESS TEST

To examine the robustness of the PMG/ Panel ARDL results, 756 observations were chosen at random for robustness tests (see Table 6). The PMG/ARDL technique generates sub-panel estimates consistent with the global panel's findings. In the short- and long-term, the pandemic substantially negatively impacts stock returns. Concerning the subsample, the results reveal statistically significant negative coefficients on the error correction terms COINTEQ, indicating a 38.9% convergence rate toward the long-run equilibrium route.

In addition, confirmed occurrences of the Coronavirus are utilized as an alternate regressor variable. It is determined by the number of daily confirmed cases of Coronavirus in Egypt. The measurement is consistent with Albulescu and Gherghina's investigations from 2021. The outcomes are consistent with the study's conclusions (see Table 6). The epidemic has a severely detrimental impact on short- and long-term stock performance. Concerning the entire sample, the results indicate significant negative coefficients on the error correction terms, COINTEQ, indicating a 43.9% convergence rate toward the long-run equilibrium route. The cumulative number of Coronavirus deaths and new cases did not affect the stock return. The data demonstrate that market returns are more sensitive to new cases and deaths of Coronavirus than to accumulated numbers.

Table 6. PMG/ARDL Results

	All sectors (756 observations) Regressor Variable: New Death		**All sectors (8975 observations) Regressor Variable: New Cases**
Long-run coefficients		Long-run coefficients	
ND	-0.001086**	NC	-0.0000113**
Short-run coefficients		Short-run coefficients	
COINTEQ	-0.3892**	COINTEQ	-0.439217***
ΔND	-0.001713**	ΔNC	-0.0000217*
ΔND(-1)	0.001438	ΔNC(-1)	0.0000660*
ΔND(-2)	-0.003083***	ΔNC(-2)	-0.000184***
C	-0.6161***	C	-0.706015***

Note: ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.1 levels, respectively.

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6. CONCLUSIONS AND POLICY RECOMMENDATIONS

The stock market is influenced by numerous economic, political, and social factors. When the WHO proclaimed the Coronavirus a pandemic, global financial markets plummeted significantly. Due to the rapid reaction of the financial markets to new information, this process diminishes the wealth of publicly listed companies and investors. This is the first study to empirically analyze the long-term impact of the epidemic on Egypt's economy at the sectoral level. This study examines the short- and long-term relationship between corporate value and the Coronavirus pandemic. Thus, the PMG/ARDL model was implemented. The response variable is the firm's daily stock return, and the regressor variable is the daily number of deaths caused by the Coronavirus.

The study sample comprised 136 publicly traded non-financial companies between March 19, 2020, and June 25, 2020. On a market-wide scale, the study results indicate a negative link between the daily stock return and the daily number of deaths attributed to the Coronavirus in both the short- and long-term. On a sector-by-sector basis, the results revealed a substantial negative short-run connection between daily stock returns and the daily number of fatalities in all sectors except healthcare, real estate, and consumer non-cyclical, where the beta coefficients of the ARDL model were not significant. Regarding the long-term correlation, the healthcare industry remained unaffected by Coronavirus mortality. On the other hand, the most hit sectors are real estate and consumer cyclicals. The results may be explained by the fact that, during economic downturns, the public focuses its expenditure on non-durable items that are more essential to survival. Our results are consistent across various Coronavirus pandemic metrics and sample sizes. Because the utilized econometric techniques are effective for heterogeneous and cross-sectional response panel data, the policies proposed in this work can be regarded as robust.

We recognize that combating a pandemic requires striking a balance between deploying steps to limit the spread of the virus and allowing commercial operations to continue as normally as feasible. Based on our analysis, we recommend the following government steps to mitigate the pandemic's long-term impact on the Egyptian stock market. When the disease spreads in Egypt, the government, central bank, and regulators must work together. They must design a thorough plan to counteract the negative financial effects and implement measures to stop the disease's spread. One of the undesirable side effects of the numerous steps adopted to control the spread of the Coronavirus is unemployment. Unemployment diminishes citizens' disposable income and indirectly affects stock returns. Governments should consider economic relief measures when it becomes essential to close or drastically restrict the operations of specific commercial activity to mitigate the negative effects on the affected businesses. These initiatives may include the implementation of 0% interest loans, the provision of tax exemptions, and the restructuring of current loans. Consideration should be given to providing enterprises

with grants to meet certain government objectives. A subsidy to a company to cover payroll expenses so that they do not lay off existing staff is one example. Since many businesses that closed in the early months of the Coronavirus epidemic were small- to medium-sized businesses and not huge, publicly traded corporations, direct economic relief for the owners and employees of these businesses should be considered.

We also provide investors with recommendations. Individual investors should diversify their portfolios across industries to safeguard their wealth against future unanticipated catastrophes and pandemics similar to the Coronavirus. Moreover, investors should consider employing short- and long-term hedging tools to limit the risk of a significant loss. Lastly, asset managers must change their trading techniques to prevent catastrophic losses. During the early phases of a pandemic, it may be prudent to maintain existing stocks. According to research, even though the market initially experiences unfavorable effects, these short-term losses will be recovered.

There are several problems with the study results that are worth highlighting. This study explores the influence of the pandemic on stock performance as its first objective. Future research may benefit from including additional variables, such as firm performance, disclosure, and reporting quality. Second, this research focuses mostly on assessing the Egyptian environment. It would be beneficial to expand the literature to include different developing nations impacted by the pandemic and to conduct a comparative analysis of how each nation dealt with this formidable obstacle. Lastly, the findings are restricted to non-financial industries. Future research may investigate the pandemic's impact on the financial industry.

7. STATEMENTS AND DECLARATIONS

Funding

The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

Competing Interests

The authors have no relevant financial or non-financial interests to disclose.

Author Contributions

Both authors contributed equally to the study conception and design.

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