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STOCK MARKET REACTION TO COVID-19: EVIDENCE FROM VIETNAM

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ABSTRACT

This paper examines the impact of the Coronavirus (Covid-19) epidemic on stock market returns. In particular, Covid-19 is determined through the number of confirmed cases and the number of deaths. The research data sample was collected in Vietnam, which is an emerging country with a nascent but rapidly developing stock market during the past time. For the analytical method, the Autoregressive Distributed Lag (ARDL) method is used to estimate the research model. The estimation results indicate that the stock market reacts negatively in both the short and long term to the information about the number of Covid-19 cases. In other words, stock market returns decline when the number of Covid-19 cases increases. However, the impact of Covid-19 deaths on stock market returns is negligible. This shows that the stock market usually reacts as soon as the number of Covid-19 cases is confirmed. Regarding Covid-19 deaths, it usually takes a certain time to update the number of Covid-19 deaths since the number of Covid-19 cases is confirmed. Moreover, Vietnam has treated Covid-19 cases quite well. Therefore, stock market investors often react insignificantly to the number of Covid-19 deaths. In addition, this study also finds the negative impact of inflation and interest rates on stock market returns. The results of this study are significant empirical evidence for Vietnam, especially in Covid-19 control and stock market development.

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1. Introduction

The World Health Organization (WHO) issued the first Covid-19 warning on January 30th, 2020, then declared Covid-19 a global pandemic on March 11th, 2020. With its rapid spread, Covid-19 has had a significant impact on international transactions as well as business activities within each country, causing unprecedented damage globally (Wagner, 2020). At the end of March 2020, more than 100 countries had to blockade part or all of their territory to limit the spread of Covid-19, which has made production activities as well as commercial transactions decrease sharply (Ashraf, 2020). From the perspective of investors in the stock market, they feel anxious and pessimistic about future earnings (Liu et al., 2020). This has affected their psychology when they invest in the stock market. As a result, Covid-19 could have a significantly negative impact on stock market returns.

Since the appearance of Covid-19, most countries around the world have taken many emergency measures to prevent and control the pandemic. Some of the main measures which have been commonly applied include blockading the area with confirmed cases, isolating suspected cases, increasing the treatment of confirmed cases, and especially enhancing vaccination against Covid-19 (Hung et al., 2021). In addition, many countries are actively deploying support packages to limit economic losses. This has reduced the level of the negative impact of Covid-19 on the economy as well as the stock market returns in many countries (Topcu & Gulal, 2020). In other words, the stock market's reaction to Covid-19 may vary from country to country (Ashraf, 2020; Topcu & Gulal, 2020). Therefore, through the analysis of the data sample in each country, the impact of Covid-19 on stock market returns can be examined more specifically according to the particularities of each country. Accordingly, countries will have a reliable foundation for determining appropriate measures to minimize the negative impact of Covid-19 on stock market returns. Despite such an important role, most empirical studies often examine the impact of Covid-19 on stock market returns with a sample of many countries, and the number of empirical studies analyzing the data sample of a country is limited.

In the context of the worldwide Covid-19 outbreak, what concerns countries is not only the number of Covid-19 cases, but more importantly, the reduction in the number of Covid-19 deaths. As a result, the stock market's reaction to Covid-19 cases and Covid-19 deaths may vary (Al-Awadhi et al., 2020). However, there have been few studies examining the impact of Covid-19 deaths on stock market returns.

In addition to the limitations mentioned above, empirical studies also have drawbacks when they often focus on analyzing the data from developed stock markets (such as the US, China, France, Germany, Italy, Japan, South Korea, Spain, and Canada). There have been few empirical studies examining the impact of Covid-19 on nascent stock markets like Vietnam. Some empirical studies on this issue in Vietnam include Anh and Gan (2021), Hung et al. (2021), Ngoc et al. (2021). However, these empirical studies still have shortcomings when only analyzing the data sample of a number of listed enterprises on the Vietnamese stock market, not examining the stock market comprehensively through the stock index. Furthermore, these studies also have defects because they have not examined the impact of Covid-19 deaths on stock market returns in Vietnam.

Overall, the impact of Covid-19 on stock market returns is a research topic with some explorable gaps and is essential for countries with nascent stock markets like Vietnam. Accordingly, this study focuses on analyzing the impact of Covid-19 on stock market returns in Vietnam. This is an emerging country with a nascent but rapidly developing stock market (Hung et al., 2021). Moreover, Vietnam has been controlling Covid-19 successfully (Anh & Gan, 2021). Therefore, the research results are

expected to provide many new and meaningful findings for Vietnam, especially in the control of Covid-19 and the development of the stock market.

The rest of this research paper is organized as follows: part 2 presents the literature review and hypothesis development, part 3 describes the econometric methodology and data, part 4 reports the empirical results and the last part draws the conclusion.

2. Literature review and hypothesis development

The stock market often reacts sensitively to major events in the economy (Al-Awadhi et al., 2020), especially the events related to epidemics, such as: severe acute respiratory syndrome – SARS (Chen et al., 2009; Chen et al., 2007; Nippani & Washer, 2004), H7N9 influenza virus (Jiang et al., 2017), Ebola virus (Ichev & Marinč, 2018), Covid-19 (Al-Awadhi et al., 2020; Ashraf, 2020). Accordingly, the Covid-19 pandemic was first reported in the world at the end of 2019 (He et al., 2020). Although the short outbreak, Covid-19 has caused great havoc to most countries and territories all over the world, especially to the stock markets in these countries (Ashraf, 2020). Therefore, the impact of Covid-19 on the stock market is a research topic that has received much attention in recent empirical studies.

Most of the empirical studies on this topic usually analyze the data sample of many countries. For example, Ashraf (2020) found the negative impact of Covid-19 cases on stock market returns in 64 countries. However, the stock market's reaction to Covid-19 can vary over time and depend on the stage of the outbreak. Meanwhile, stock market returns respond insignificantly to the news of Covid-19 deaths. Goodell (2020) concluded that Covid-19 has a significant impact on socio-economic activities globally, especially those in the financial sector. He et al. (2020) reported that Covid-19 has the negative short-term impact on stock market returns in China, Italy, South Korea, France, Spain, Germany, Japan and the US. In particular, the negative impact of Covid-19 on the stock market returns of these countries is often higher than the global average impact. Liu et al. (2020) believed that 21 stock indexes in economies around the world have dropped rapidly after the appearance of Covid-19. Accordingly, the level of negative impact of Covid-19 on stock market returns in Asian countries is often greater than the impact level in other countries. Topcu and Gulal (2020) found the negative impact of Covid-19 on emerging stock markets; however, the level of this negative impact gradually decreased from April 2020 onwards. By regional classification, Covid-19 has generally impacted emerging stock markets in Asia more than those in Europe. Furthermore, the time and size of the government's stimulus packages are of great significance to countries in offsetting the negative effects of the pandemic on the stock market. In another study, Xu (2021) found the negative impact of Covid-19 on stock market returns in Canada and the US. However, this impact is considerably different between the two countries in the sample. Specifically, the stock market's reaction has been disproportionate to the increase and decrease in the number of Covid-19 cases in Canada, which is attributed to the uncertainties of Covid-19 in this country. Meanwhile, the stock market's reaction is relatively proportionate in the US. In addition, Zhang et al. (2020) believed that Covid-19 has a negative impact on the stock markets of Japan, South Korea, Singapore and 10 countries with the highest number of Covid-19 cases in March 2020.

There have been few studies examining the impact of Covid-19 on stock market returns with the data sample of a country. For example, Al-Awadhi et al. (2020) assumed that the stock market in China reacts negatively to the number of Covid-19 cases, and this level of reaction is higher than that to the number of Covid-19 deaths. Sharing the same view, Duan et al. (2020) stated that the Chinese economy was seriously affected by Covid-19, especially the activities of

small and medium-sized companies. In another study, Alfaro et al. (2020) found the negative impact of Covid-19 on stock market returns in the US. What's more, this study shows that the prediction for the number of Covid-19 cases can reduce the level of the negative impact of Covid-19 on stock market returns. Recently, Hatmanu and Cautisanu (2021) concluded that Covid-19 has a negative impact on the Romanian stock market in the long term.

In Vietnam, the impact of Covid-19 on stock market returns is rarely found in empirical studies. Particularly, the study of Anh and Gan (2021) found the negative impact of Covid-19 on the stock prices of 723 listed enterprises on the Vietnamese stock market. Accordingly, the impact level of Covid-19 on the stock prices of non-financial enterprises is lower than that of Covid-19 on the stock prices of financial enterprises. Recently, Hung et al. (2021) have also found the negative impact of Covid-19 on the stock prices of 733 listed enterprises on the Vietnamese stock market. This negative impact was strongly demonstrated for the enterprises in the financial sector, especially in the pre-lockdown period. In another study, Ngoc et al. (2021) reported that Covid-19 had the negative impact on the stock prices of 714 listed enterprises on the Vietnamese stock market. However, this impact level depends on the business line of the enterprises in the data sample. Specifically, the stock prices of the enterprises in the service industry are often affected dreadfully by Covid-19, whereas the stock prices of the healthcare industry are often affected less dreadfully.

Overall, the stock market's reaction to the Covid-19 pandemic is an interesting research topic and has been found in many empirical studies. Accordingly, most of these studies have concluded that the number of Covid-19 cases has the negative impact on stock market returns. However, empirical studies still have limitations when they often analyze the data sample of many countries in developed stock markets, such as the US, China, France, Germany, Italy, Japan, South Korea, Spain, and Canada. There are not many studies that analyze the sample data of a country, especially for countries with nascent stock markets. In reality, the impact of Covid-19 on the economy as well as the stock market in each country can vary. Therefore, analyzing the data sample of a country will have great implications for that country, especially in adjusting policies to limit the negative effects of Covid-19 on the stock market. On the other hand, the stock market's reaction to the number of Covid-19 cases and the number of Covid-19 deaths can be different, which has been stated in the study by Al-Awadhi et al. (2020). However, there have been few studies that examine the impact of Covid-19 deaths on stock market returns. The Vietnamese stock market is still relatively nascent and can react significantly to the Covid-19 pandemic (Hung et al., 2021). Nevertheless, there are very few empirical studies examining this impact in Vietnam, such as the studies by Anh and Gan (2021), Hung et al. (2021), Ngoc et al. (2021). In particular, these studies usually measure Covid-19 through the number of Covid-19 cases, and almost no studies examine Covid-19 through the number of Covid-19 deaths. As for the stock market, empirical studies in Vietnam still have limitations when they have not been able to measure the stock market comprehensively. These studies just examine the stock prices of some listed enterprises on the stock market.

From the gaps mentioned above, it can be seen that the impact of Covid-19 on stock market returns in Vietnam is a vital research topic and there are some gaps to be explored. This study will fill the gaps in previous studies by measuring the stock market through the stock index. Furthermore, Covid-19 is defined by the number of Covid-19 cases and the number of Covid-19 deaths. By this measurement, Covid-19 will be fully defined in different aspects. The existing literature reveals that Covid-19 can have a negative impact on stock market returns; however, the level of this impact can vary in Covid-19 cases and Covid-19 deaths. Accordingly, the study proposes the following hypotheses:

Hypothesis H_1: the number of Covid-19 cases has a negative impact on stock market returns.

Hypothesis H2: the number of Covid-19 deaths has a negative impact on stock market returns.

3. Econometric Methodology and Data

After the research problem is identified, this study proceeds to build a theoretical framework, research hypotheses and a research model. The research model is formulated on the basis of the results of previous studies and the actual situation, which will ensure the appropriateness of the research model in solving the research objectives. Next, the study will conduct the data collection and estimate the research model. Based on the model estimation results, the study will discuss the research results and make recommendations

The existing literature confirms that the number of Covid-19 cases has a negative impact on stock market returns. Besides, the stock market may react negatively to the number of Covid-19 deaths (Al-Awadhi et al., 2020). In addition, a number of macroeconomic factors may act as control variables in the model for the impact of Covid-19 on stock market returns. These control variables (CV) include inflation (Hussainey & Ngoc, 2009) and interest rates (Hatmanu & Cautisanu, 2021; Hussainey & Ngoc, 2009). Accordingly, the research model is proposed as follows:

$$RE = f(COVID, CV) \quad (1)$$

In order to analyze the impact of Covid-19 on stock market returns in both the short and long term, this paper uses the Autoregressive Distributed Lag (ARDL) method to estimate the research model. This estimation method was proposed by Pesaran et al. (2001), and was also used in the study by Hatmanu and Cautisanu (2021). The ARDL method proved to be suitable for research models with short data series (Pahlavani et al., 2005), especially the data series which are not stationary in the same order (Türsoy, 2017). Therefore, model 1 will be developed specifically as follows:

$$\Delta RE_t = \alpha_0 + \sum_{j=1}^{k} \beta\, \Delta RE_{t-j} + \sum_{j=0}^{k} \lambda\, \Delta COVID\text{-}19_{t-j} + \sum_{j=0}^{k} \delta\, \Delta CV_{t-j} + \varphi\, RE_{t-1} + \gamma\, COVID\text{-}19_{t-1} + \psi\, CV_{t-1} + \varepsilon_t \quad (2)$$

If there is cointegration between the variables in the research model, this paper will proceed to estimate the short-run behavior of the variables by using the error correction model below:

$$\Delta RE_t = \alpha_0 + \sum_{j=1}^{k} \beta\, \Delta RE_{t-j} + \sum_{j=0}^{k} \lambda\, \Delta COVID\text{-}19_{t-j} + \sum_{j=0}^{k} \delta\, \Delta CV_{t-j} + \phi\, ECM_{t-1} + \varepsilon_t \quad (3)$$

Where RE represents stock market returns, measured through the monthly change of Vietnam stock index (VNI), and calculated with the formula: $RE_t = (VNI_t - VNI_{t-1})/VNI_{t-1}$. Covid-19 is defined through the number of confirmed Covid-19 cases (COVID_CO) and the number of Covid-19 deaths (COVID_DE) during the month. The control variables (CV) in the research model include inflation (INF) and lending interest rates (IR).

The research data sample was collected on a monthly basis during the period from January 2020 to April 2022. Vietnam confirmed the first Covid-19 case on January 23, 2020; therefore, the data were collected in this period to achieve the maximum sample size. In addition, the data on control variables (INF and IR) are only published on a monthly, quarterly and yearly basis; accordingly, this study cannot collect the data on the basis of a shorter period (i.e. on a weekly or daily basis). The data on stock index were collected from Vietstock's source (https://finance.vietstock.vn/). Regarding the data on Covid-19, this paper collected from the source

of Vietnam's Ministry of Health (https://ncov.vncdc.gov.vn/). The control variables (INF and IR) were collected from the IMF source (https://www.imf.org/en/Data).

4. Empirical results

The results of the correlation analysis between the variables in the research model are presented in Table 1 below:

Table 1. The results of correlation matrix

	RE	COVID_CO	COVID_DE	INF	IR
RE	1.000				
COVID_CO	-0.100	1.000			
COVID_DE	-0.042	0.160	1.000		
INF	-0.381	-0.058	-0.124	1.000	
IR	-0.196	-0.213	-0.333	0.004	1.000

Table 1 shows that Covid-19 and control variables are negatively correlated with stock market returns. This result is consistent with the expectation in the research hypothesis.

Next, the study will test the stationarity of the data series in the research model. This test was proposed by Dickey and Fuller (1979).

Table 2. The results of stationarity test

Variable	At level	At Δ
	I(0)	I(1)
RE	-5.247*** (0.000)	-6.413*** (0.000)
COVID_CO	-3.298** (0.015)	-7.661*** (0.000)
COVID_DE	-2.535 (0.107)	-5.171*** (0.000)
INF	-4.939*** (0.000)	-6.295*** (0.000)
IR	-3.471*** (0.009)	-6.311*** (0.000)

Note: **, *** indicates significance at 5%, 1%.

Table 2 shows that COVID_DE is stationary at the first differential series I(1). Meanwhile, the remaining data series in the research model are stationary at the original data series I(0). **Accordingly**, the data series in the research model are not stationary in the same order, which is one of the important conditions for using the ARDL method in estimating the research model.

Table 3. The results of bound test

F = 9.706	10%	5%	1%	p-value
I(0)	2.847	3.531	5.265	0.000***
I(1)	4.150	5.049	7.315	0.002***

Note: *** *indicates significance at 1%.*

In order to confirm the appropriateness in the use of the ARDL method to estimate the research model in both short and long term, this study uses bound test proposed by Pesaran et al. (2001). The results show that there is a cointegration relationship between the data series in the research model (Table 3). In other words, the ARDL method can be used to estimate the research model of the impact of Covid-19 on stock market returns.

Table 4. The estimation results of the research model

Variable	RE
Long run results	
COVID_CO	-0.0003**
	(0.039)
COVID_DE	-0.0028
	(0.779)
INF	-1.8939***
	(0.002)
IR	-5.2479*
	(0.095)
Short run results	
△RE (-1)	0.4665**
	(0.015)
△COVID_CO	-0.0005**
	(0.050)
△COVID_DE	-0.0047
	(0.778)
△INF	-3.2686***
	(0.003)
△IR	-9.0571*
	(0.078)
ECM (-1)	-1.7259***
	(0.000)
Constant	83.3337**
	(0.041)

Variable	RE
R-squared	76.48%
Significance level	10.30***
	(0.000)
Skewness/ Kurtosis tests	3.23
	(0.199)
White's test	26.00
	(0.408)
Breusch-Godfrey LM test	3.447
	(0.178)
Ramsey reset test	1.31
	(0.301)

Note: *,**,*** *indicates significance at 10%, 5%, 1%.*

The estimation results of the impact of Covid-19 on stock market returns in Table 4 prove to be appropriate. Indeed, the estimation results of the research model are significant at the 1% level. Furthermore, 76.48% of the volatility of stock market returns can be explained by Covid-19 and the control variables in the research model. Besides, the Skewness/ Kurtosis, White's, Breusch-Godfrey LM and Ramsey reset tests are all satisfactory. In addition, CUSUM and CUSUM squared show that the model has stability within the standard range at 5% significance level (Figure 1).

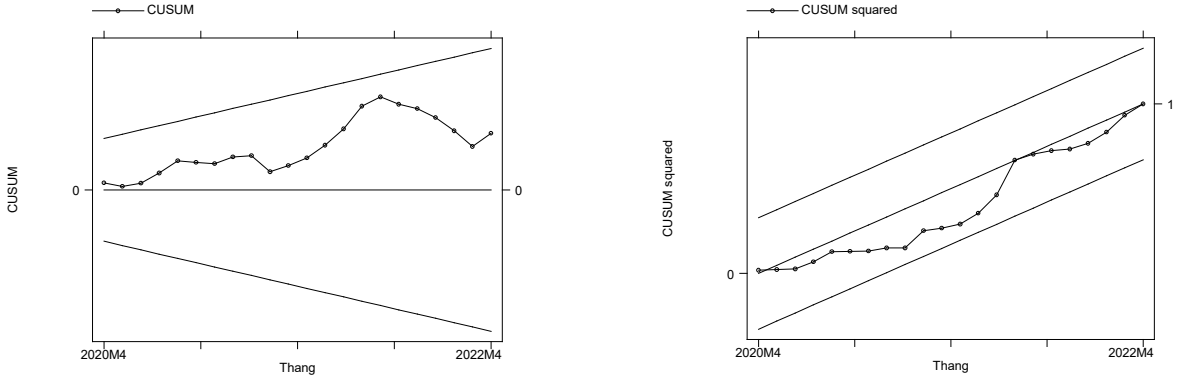

Figure 1. Stability tests

Table 4 shows that the number of Covid-19 cases has a negative impact on stock market returns in both the short and long term, which accepts hypothesis H_1. However, the stock market's reaction to the number of Covid-19 deaths is insignificant. This result is consistent with the previous statement of Ashraf (2020). Accordingly, stock market returns decline as the number of Covid-19 cases increases. In other words, the stock market reacts immediately to the number of confirmed Covid-19 cases. Regarding Covid-19 deaths, it usually takes a period of treatment; moreover, Vietnam has been relatively successful in treating Covid-19 cases. Therefore, the investors in the stock market often react insignificantly to the number of Covid-19 deaths.

This paper finds the negative impact of inflation and interest rates on stock market returns in both the short and long term. Accordingly, when inflation is high, the production and business activities of enterprises face many difficulties. There may be even a mood of pessimism among the investors in the stock market; therefore, the decline in stock market returns is understandable. This result is consistent with the previous statement of Hussainey and Ngoc (2009). Furthermore, stock market returns also decrease significantly when interest rates increase, which is also found in the studies by Hatmanu and Cautisanu, (2021), Hussainey and Ngoc (2009). This is completely in accordance with reality because the increase in interest rates cause many difficulties for companies in raising capital as well as in production and business. In addition, stock market returns in the past can have a positive short-term impact on the current stock market returns. This reveals that the stock market in the past can be used to predict the variation trend of the current stock market.

5. Conclusion and recommendations

This paper focuses on examining the stock market's reaction to the Covid-19 pandemic. In particular, Covid-19 is determined through the number of confirmed cases and the number of deaths. The estimation results through the ARDL method show that the stock market reacts negatively to the number of confirmed Covid-19 cases. This means that stock market returns decline as the number of Covid-19 cases increases. Meanwhile, the impact of Covid-19 deaths on stock market returns is negligible. This indicates that the stock market usually reacts immediately to the number of confirmed Covid-19 cases. However, the stock market's reaction to the number of Covid-19 deaths is insignificant. In addition, this study also finds the negative impact of inflation and interest rates on stock market returns. Besides, in the short term, the stock market returns in the past can have a positive impact on the current stock market returns. Therefore, the stock market can react significantly to the number of Covid-19 cases, the control variables representing macroeconomics and the stock market returns in the past. Accordingly, the study proposes some recommendations as follows:

For the government and functional agencies: It is necessary to implement measures effectively and quickly to prevent and control the Covid-19 pandemic, and simultaneously, to support enterprises in the removal of difficulties and the restoration of production and business in the context of the pandemic.

For enterprises: Covid-19 has seriously affected the production and business activities of enterprises. Therefore, enterprises need to be proactive in production and business, in combination with focusing on the prevention of Covid-19 and ensuring the health of labourers.

For investors: Investors should actively grasp the information about Covid-19, macroeconomic developments and developments of the stock market in the past before making investment decisions because the research results show that the stock market can react significantly to this information. In addition, the effectiveness of measures to prevent the Covid-19 pandemic may change the level of the negative impact of Covid-19 on stock market returns. For this reason, investors should also consider this issue before making investment decisions.

The stock market can be influenced by domestic factors as well as global macroeconomic factors. However, this study only analyzes the stock market's reaction to the domestic factors of Vietnam, without examining global macroeconomic factors. That is the limitation of this study. Future studies can overcome this limitation by examining the reaction of the domestic stock market to the developments of the global macroeconomics.

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