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The Impact of COVID-19 on Individual Industry Sectors: Evidence from Vietnam Stock Exchange

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Abstract

The paper examines the impact of the COVID-19 pandemic on the stock market prices. The vector autoregression model (VAR) has been used in this analysis to survey 341 stocks on the Ho Chi Minh City Stock Exchange (HOSE) for the period from January 23, 2020 to December 31, 2020. The empirical results obtained from the analysis of 11 economic sectors suggest that there is a statistically significant impact relationship between COVID-19 and the healthcare and utility industries. Additional findings show a statistically significant negative impact of COVID-19 on the utility share price at lag 1. Analysis of impulse response function (IRF) and forecast error variance decomposition (FEVD) show an inverse reaction of utility stock prices to the impact of COVID-19 and a gradual disappearing shock after two steps. Major findings show that there is a clear negative effect of the COVID-19 pandemic on share prices, and the daily increase in the number of confirmed cases, indicate that, in future disease outbreaks, early containment measures and positive responses are necessary conditions for governments and nations to protect stock markets from excessive depreciation. Utility stocks are among the most severely impacted shares on financial exchanges during a pandemic due to the high risk of immediate or irreversible closure of manufacturing lines and poor demand for basic amenities.

Keywords: COVID-19, Vietnamese Stock Markets, Vietnamese Industries, Vector Autoregression (VAR), Market Dynamics

JEL Classification Code: G10, G15, C5, C32

1. Introduction

The COVID-19 disease causes severe acute respiratory syndrome (SARS-CoV-2) is spreading rapidly across the world and is a major threat to human health, as well as for the economies of many countries. Till date, this epidemic has spread to 218 countries and territories. According to Vietnamese Minister of Health's data updated on January 26, 2021 (Ministry of Health, 2021), the total number of acute respiratory infections (COVID-19) has surpassed 100,000, with 2,147,403 deaths.

The COVID-19 pandemic has truly impacted all economies around the world, including Vietnam's. Figure 1 shows that the stock prices of all economic sectors fell during the first three months of the year, when the true number of COVID-19 infections came to light in Vietnam. The largest drop occurred in April 2020, but the market prices of HOSE sectors recovered. The second outbreak seemed to have created an impact on stock prices when the sector's stock prices were adjusted, such as a fall in the August period, and then a very slow recovery on July 25, 2020, ending the 99-day series without community events.

The aim of this research is to look into the effect of the COVID-19 pandemic on the Vietnamese stock market. It is really worth investigating as to how the number of infections on Vietnamese territory affect the stock prices of economic sectors and the stock market in general, since the effect of COVID-19 shocks predicts security price movements on

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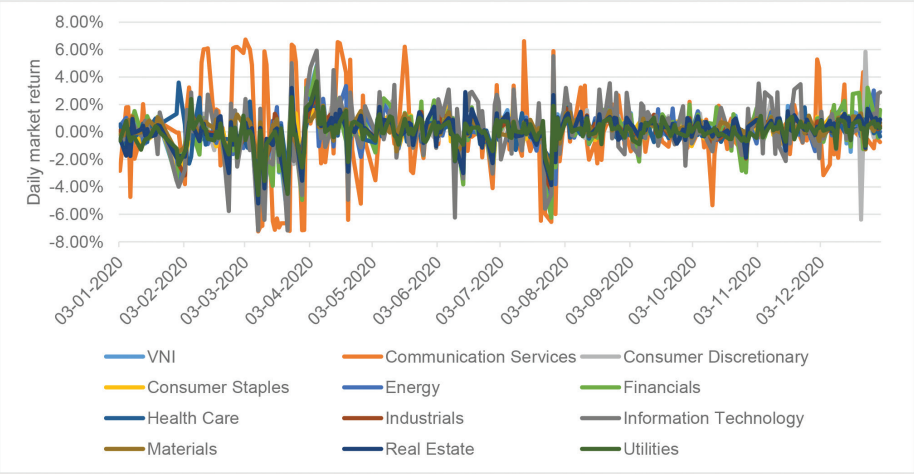

Figure 1: Stock Return Movements by Sectors in Vietnam
Source: Data Stream and Author Calculations

the stock market. The Egle Granger cointegration approach is used in this analysis to measure variables with Granger causality, the Vector autoregression model (VAR) is used to capture the interaction between variables, the impulse response function (IRF) is used to analyze the model's suitability and forecastability, and forecast error variance decomposition (FEVD) is used to investigate the effect of COVID-19 on Vietnam's stock price indices. The analytical findings from an examination of 11 economic sectors indicate a statistically important association between COVID-19 and the healthcare and utility industries. Additional results indicate that COVID-19 has a statistically significant negative effect on utility share price at lag 1. An examination of the impulse response function (IRF) and forecast error variance decomposition (FEVD) reveals an inverse reaction of utility stock prices to the effect of COVID-19, as well as a gradual absence of the shock after two steps.

2. Overview of the Research Context

2.1. Vietnamese Financial Market

The financial sector is highly regulated by the government, and half of the current ten largest banks are state-owned, accounting for 42 percent of the sector's assets (Reuters, 2017). Loans to state-owned enterprises (SOEs) account for one-third of overall bank loans, despite the fact that SOEs account for just 1% of all registered businesses. State-owned enterprises have higher debt-to-equity ratios and non-performing liabilities than private and international companies, but their yields are smaller (Pham & Nguyen, 2019).

Since 2000, the stock market has been a significant source of corporate finance. Foreign buyers are regarded as major market participants (Tran & Hoang, 2021). Foreign owners are now increasing their interest in publicly traded companies and play a significant role in corporate finance decisions (Minh Anh, 2020). The Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX), and the over-the-counter (Upcom) market, are among the Vietnamese stock exchanges (Nguyen et al., 2020). Until filing a listing application in Vietnam, Government Decree 58/2012/ND-CP requires companies to have at least a year of activity as a joint stock company (HNX) or 24 months of activity (HOSE). The minimum capital threshold for HNX listing is a book valuation of VND 30 billion (= USD 1.27 million) at the time of submission, while the threshold for HOSE is at a minimum VND 120 billion (= USD 5.1 million). The candidates must have a minimum return on equity (ROE) of at least 5%. (Hoang & Thai, 2020).

2.2. COVID-19 Pandemic

The COVID-19 pandemic has spread to every part of the globe, putting policymakers under pressure to move quickly to stem the spread of the pandemic. Developing nations, including Vietnam, have faced many difficulties in fighting the pandemic due to scarce funding and inadequate technical capabilities (Van Tan, 2021). Since the first cases were discovered on January 23, 2020, Vietnam fought hard to contain the pandemic for the next three months, with the government taking strict steps to minimize the negative consequences of the pandemic outbreak. Due to the unique and volatile nature of the COVID-19 disease outbreak, the Vietnamese government has implemented a number of policies to curb the disease transmission, which have gone stricter with the time. As a result of these timely interventions,

Vietnam had registered just over 200 confirmed COVID-19 cases and no deaths as of Monday, March 30, 2020 which is a very encouraging figure for a country of its size. However, with the strong expectation that a large outbreak might occur at any moment, the Prime Minister announced a national epidemic, and the state is seeking additional steps to ensure control, such as requesting that the local governments of Hanoi and Ho Chi Minh City carry out a plan to contain the disease (Van Cuong et al., 2020).

3. Literature Review

Stock prices in the stock market are often affected by the investor actions in the face of unpredictable market events. Fama et al. (1969) were the first to lay the groundwork for research into how stock values are influenced by real market events. The tragedy at Russia's Chernobyl nuclear power plant (Kalra et al., 1993), and the 2008 global financial crisis in the United States (Akhtar, 2021; Rjoub, 2011) caused major drops in the global stock prices. Negative events outlast optimistic events in the stock market (Anh & Gan, 2020; Salisu et al., 2020).

Many reasons are considered important for conducting studies related to the impact of public health incidents on the stock market. According to (Song et al., 2019), the 1997 Asian financial crisis and the 1998 Hong Kong avian flu epidemic had a major negative effect on the tourism industry. According to (Burdekin, 2020), the rise in avian flu had a negative effect on the price and profitability of stocks in the US stock market. The SARS epidemic has had a major effect on the Chinese stock market's financial integration (Song et al., 2021) as well as the Asian financial market (Lee & McKibbin, 2004).

The COVID-19 pandemic is a recent public health event that is of great concern to the world and has many detrimental effects on the global economy. Many studies have been conducted on the relationship between the COVID-19 pandemic and economic and financial problems (Goodell & Huynh, 2020; Phan & Narayan, 2020). Aslam et al. (2020) has found that COVID-19 has a significant negative impact on the global economy. Narayan and Phan (2020) investigated the effect of COVID-19 on the stock market and how various countries have reacted to it. Sobieralski (2020) investigated the effect of COVID-19 on the aviation industry and job creation. Guidolin et al. (2019) discovered that COVID-19 has a negative effect on the stock market, making it increasingly difficult to avoid and monitor market risk.

Government controls and voluntary social disengagement are the primary explanations as to why the US stock market has reacted more strongly to COVID-19 than it did in the previous pandemics (Baker et al., 2020). The global fear index, which was created to forecast stock returns, demonstrates the index's significance in forecasting stock returns during COVID-19 (Salisu et al., 2020). Ali et al. (2020) examined global financial market reactions to COVID-19 outbreaks that spread from China to Europe and then to the United States has increased panic in the world. Markets have experienced a rapid decline as disease spread from one region to the other.

Some studies have also shown the negative effect of Covid-19 on specific sectors. Ozturk and Cavdar (2021) and Dhanraj and Pragati (2021) investigated the pandemic's effect on the oil market. Phan and Narayan (2020) investigated the impact of COVID-19 on financials sector shares, contrasting the situation in China and other countries while ignoring industry heterogeneity. Sharif et al. (2020) examined the effect of COVID-19 on crude oil and stock prices in the United States. He et al. (2020) investigated the effect of a pandemic on the stock prices in various industries, as well as the ability of each industry to react to a pandemic. According to the findings, the pandemic had a negative impact on the Shanghai Stock Exchange while having a positive impact on the Shenzhen Stock Exchange. The pandemic has a greater and detrimental impact on conventional Chinese industries, but it also creates opportunities for high-tech industries to flourish. The pandemic had a major impact on transportation, mining, electricity and heating, and the atmosphere. However, the manufacturing, information technology, education, and health sectors have reacted strongly to the epidemic in the stock market in a constructive, trusting manner. China's massive economy, comprehensive infrastructure, and industrial chain, as well as strong support, have aided it in quickly overcoming the negative effects of COVID-19.

Many different approaches are used to study the effect of the pandemic on the stock market. He et al. (2020) examined the impact of a single event on industry-level COVID-19 on exceptional stock returns using Brenner (1979)'s system of event studies and market model. Zhang et al. (2020) conducted a basic statistical study about the effect of the COVID-19 pandemic on the global financial markets. Pandemics and their economic consequences have been studied using tools such as the Error Correction Model (ECM), Vector Error Correction Model (VECM), and co-integration (David et al., 2021). The threshold cointegration correction model (T-ECM) has primarily been used in theoretical contexts (Enders & Siklos, 2001; Gałecki & Osińska, 2019). David et al. (2021) investigated the bilateral relationship between the incidence of recent major disease outbreaks and the growth of control trading indicators all over the world using a vector error correction model (VECM). Studies examined notable pandemics include the spread of COVID-19, Ebola virus disease (EVD) in 2013, Middle East respiratory syndrome (MERS) in 2021, and extreme acute respiratory syndrome (SARS) in 2003 to 11 indicators, including the Dow Jones (US), S&P 500 (US), Euro Stoxx (Eurozone), DAX (Germany), CAC (France),

Nikkei (Japan), HSI (Hong Kong), Kospi (Korea), S&P BMI (Brazil) (Au Yong & Laing, 2021; Sharma et al., 2021). Further, Shehzad et al. (2021) found that the disease's shocks had a huge impact on the industry. With the exception of COVID-19, stock market indices display sustained and rapid recovery while examining the same 79-day time frame. The Vector Autoregression (VAR) model is used in this study to investigate the volatility in stock prices of different industries during a pandemic to investigate the responsiveness of the sectors and how different sectors react to the COVID-19 pandemic shock.

4. Data and Methods

4.1. Data

The paper uses data on daily closing prices of 393 stocks on the Ho Chi Minh City Stock Exchange (HOSE) from January 23, 2020 to December 31, 2020 from Thomson data sources. Reuters. 52 stocks were removed from the research data due to incomplete and discontinuous data during the study period. The remaining data includes 341 stocks classified into 11 sectors including media services, consumer discretionary, consumer staples, energy, finance, healthcare, industry, information technology, materials, real estate, utilities, and Vietnam's stock price index (VNI). Data on the number of COVID-19 infections in Vietnam was collected from the news site of the acute respiratory disease COVID-19 of the Ministry of Health of Vietnam from January 23, 2020 (date of commencement arising the first infection case in the territory of Vietnam) to 31/12/2020 (Ministry of Health, 2021).

The paper makes use of Datastream data on the regular closing prices of 393 stocks on the Ho Chi Minh City Stock Exchange (HOSE) from January 23, 2020 to December 31, 2020. Due to incomplete and discontinuous data during the study period, 52 stocks were omitted from the analysis data. The remaining information consists of 341 stocks divided into 11 industries, including media services, consumer discretionary, consumer staples, oil, finance, healthcare, manufacturing, information technology, materials, real estate, utilities, and Vietnam's stock price index (VNI). Data on the number of COVID-19 infections in Vietnam was collected from the Ministry of Health of Vietnam's news site of the acute respiratory disease COVID-19 from January 23, 2020 (date of emergence of the first infection case in the territory of Vietnam) to December 31, 2020.

4.2. Empirical Methods

The study examines the stationary of time series of research data by Augmented Dickey-Fuller test (ADF) (Dickey & Fuller, 1979). The series is non-stationary when unit roots exist for times and are detected by not rejecting the H0 hypothesis of the ADF test.

Next, the study will determine the optimal lag length to ensure that the residues in the regression are not correlated. After determining the optimal lag, the series satisfies the stationary property, the study will check whether there is cointegration between the series by the Engle test–Granger (Granger, 1981) in two steps. First, we take the residue and verify the stationary of the series's residues. If the residue is non-stationary, a Vector autoregression (VAR) model is used to examine the relationship between the stock prices of different economic sectors during a pandemic period and the number of cases of COVID-19 to explore how different economic sectors react to the COVID-19 pandemic shock. Conversely, if detecting non-stationary residues, i.e., there is co-integration in the two study series, the VAR model is not employed to investigate this relationship.

The Vector autoregression (VAR) model was first proposed by (Sims, 1980). The VAR model is a generalized form of the univariate autoregressive model in the prediction of a set of variables that is a vector of a time series variable. It estimates each equation of each string variable according to variable's lag lengths (p) and all remaining variables.

VAR (p) model of k^{th} stationary series, Y_{1t}, Y_{2t}, …, Y_{kt} is described as below:

$$A(L)\cdot Y_t = A_0 + \varepsilon_t \quad (1)$$

where $Y_t = \begin{bmatrix} Y_{1t} \\ Y_{2t} \\ Y_{3t} \\ \cdots \\ Y_{kt} \end{bmatrix}$, $\varepsilon_t = \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \cdots \\ \varepsilon_{kt} \end{bmatrix}$ ε_{it}: white noise ($i = 1,..., k$)

The VAR model is a combination of a univariate autoregression (AR) and a system of simultaneous equations (SEs). The VAR model combines the advantage of AR that is very easy to estimate using OLS method to do residual minimization and the advantage of SEs is to estimate multiple equations simultaneously in the same system. In addition, the VAR model can overcome the disadvantage of SEs that it does not care about the endogeneity of economic variables.

The VAR model was estimated over time series with the stationary property and no cointegration. The process of estimating the VAR model includes: determining the stopping time of the time series, examining the cointegration relationship between the series, estimating the model, testing the suitability of the model and forecasting. Next step is to check the stability of the residue by calculating the eigenvalue of the matrix. If the eigenvalue values are less than 1 then the model is considered stable. Also, we test the reliability of the model through the Lagrange Multiplier (LM) test to check the correlation of errors. If hypothesis

H0 states that no error autocorrelation is not rejected then the VAR model guarantees reliability. Causality test between series variables uses the Granger test. The Hypothesis H0 in the Granger test states no causality impact between series and, if this statement is rejected, a causality relationship exists between the variables.

The estimation results of the VAR model, after being tested for the stability of the model, without autocorrelation, ensure the reliability and clearly define causal relationships between the variables, analyze the shock by impulse response function (IRF) and forecast error variance decomposition (FEVD) analysis was performed.

5. Results and Findings

Table 1 provides the stationary test of time series including VNI stock index series, average stock price series of 11 industries including media services, consumer discretionary, Consumer staples, energy, finance, healthcare, industrials, information technology, materials, real estate, utilities, and acute respiratory infections series. All original time series are not stationary, but their first difference series or integration of order one, $I \sim (1)$, is stationary. The verification of the co-integration relationship of stock price series with the series of acute respiratory infections (COVID-19). The results show that only the median stock price's residue of communication services with COVID-19 is stationary at the integration of order zero, $I \sim (0)$, and a co-integration exists between the two series. There is no cointegration relationship of the remaining series with COVID-19 when the residual error is not stationary, which is examined by the Engle-Granger test. The VAR model is used for the remaining series where cointegration does not exist.

With *p*-value significance <1%, trade openness variable has a positive impact on tax revenue, consistent with the model's sign expectation. When other factors remain unchanged, if trade openness increases by 1%, tax revenue increases by 0.0489%. Mohanty et al. (2020), Marakbi and Villieu (2020), and Gupta, Aggarwal, Champaneri, and Narayan (2020) also shows that trade openness, in particular exports and imports, positively affect tax revenues. Import and export is not only individual trading activities, but also a system of trading relationships in organized trade with the aim of boosting commodity production, transforming economic structure stably and step by step improving people's mental and spiritual life.

The Granger causality test, which relies on the past information of a variable and helps predict other variables, can be used to determine if the variables used in the VAR model are optimal. Table 2 shows that there is an effect on the number of cases of COVID-19 disease with a *p*-value of 5% of Consumer staples and industry in Vietnam. The consumer discretionary and healthcare industries have an impact on the number of infections, and the number of COVID-19 infections has an effect on the utility industry at a 10% significance level.

According to AIC, FPE (final prediction error), and HQIC, lag 4 of the variables is consistently chosen. In Table 2, the analysis estimates regression models with lag 4 for pairs of impact variables. Table 3 estimates the regression coefficients for various lag lengths.

Table 1: Stationary Test and Co-Integration Relationship of Time-Series

Time-Series	Integration of Order Zero $I \sim (0)$	Integration of Order One $I \sim (1)$	Error Series (Residuals)
VNI-index	0.047	–18.565***	–1.949
Communication services industry	–2.398	–12.477***	–2.945**
Consumer discretionary industry	0.175	–17.323***	–2.005
Consumer staples industry	0.732	–17.452***	–2.194
Energy industry	–0.228	–17.268***	–2.506
Financials sector	1.825	–18.852***	–0.610
Health care industry	0.003	–18.442***	–1.959
Industrials sector	1.547	–17.363***	–1.409
Information technology industry	1.516	–19.048***	–1.414
Materials industry	1.681	–17.971***	–0.906
Real estate industry	2.326	–18.448***	–0.765
Utilities industry	–0.466	–17.744***	–2.050
Number of COVID-19 infections	1.921	–7.756***	

Note: *Significance level < 10%; **Significance level < 5%; ***Significance level < 1%.

Table 2: Granger Causality Test

Dependent Variables	Impact Variable	X^2	Prob > X^2
VNI-index COVID-19	COVID-19 VNI-index	5.4726 6.0491	0.2420 0.1960
Consumer discretionary industry COVID-19	COVID-19 Consumer discretionary industry	2.1292 7.9721*	0.7120 0.0930
Consumer staples industry COVID-19	COVID-19 Consumer staples industry	6.5547 9.7538**	0.1610 0.0450
Energy industry COVID-19	COVID-19 Energy industry	7.3949 6.4327	0.1160 0.1690
Financial sector COVID-19	COVID-19 Financial sector	4.8776 5.5571	0.3000 0.2350
Health care industry COVID-19	COVID-19 Health care industry	2.6687 8.2101*	0.6150 0.0840
Industrials sector COVID-19	COVID-19 Industrials sector	6.2114 10.392**	0.1840 0.0340
Information technology industry COVID-19	COVID-19 Information technology industry	5.1487 5.9109	0.2720 0.2060
Materials industry COVID-19	COVID-19 Materials industry	5.6043 8.3811*	0.2310 0.0790
Real estate industry COVID-19	COVID-19 Real estate industry	3.9832 6.5690	0.4080 0.1600
Utilities industry COVID-19	COVID-19 Utilities industry	8.7088* 6.3603	0.0690 0.1740

Note: *Significance level < 10%; **Significance level < 5%; ***Significance level < 1%.

Table 3: Regression Coefficients of the VAR Model for Series of Stock Price and COVID-19

Time-series	β_0	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8
Consumer discretionary industry	0.815	0.070	–0.073	0.129**	0.044	–1.950	1.750	–0.939	2.859
COVID-19	0.695**	–0.001	–0.003	–0.003***	–0.004	0.407***	0.201***	0.094	0.153***
Consumer staples industry	3.831	0.031	0.117**	0.111**	–0.016	–3.331	-0.429	–0.618	7.422**
COVID-19	0.718**	–0.001	0.001	–0.002**	–0.001	0.411***	0.196***	0.088	0.160***
Health care industry	10.700	–0.001	0.033	0.128**	–0.029	–2.289	0.765	–1.276	4.641
COVID-19	0.693**	0.001	0.001	–0.001	–0.002**	0.399***	0.215***	0.087	0.153***
Industrials sector	3.542	0.017	0.090*	0.181***	0.056	–2.021	0.331	–0.139	3.500**
COVID-19	0.727**	0.000	0.002	–0.003**	–0.004**	0.404***	0.213***	0.085	0.151***
Materials industry	15.19*	0.008	–0.014	0.130**	0.038	–2.349	0.706	0.889	1.982
COVID-19	0.758**	–0.001	0.003*	–0.004**	–0.002	0.417***	0.209***	0.077	0.147***
Utilities industry	–2.343	0.021	0.020	0.126**	0.056	–4.126**	1.210	0.688	3.664**
COVID-19	0.687**	0.000	0.013	–0.002	–0.003*	0.406***	0.211***	0.086	0.148***

Note: *Significance level < 10%; **Significance level < 5%; ***Significance level < 1%.

After the VAR model has been estimated, a number of tests need to be conducted to check the suitability of the model. The first condition is to test the stability of the model. Table 4 shows that all the models guarantee the stability of the residue, the eigenvalue values <1. Table 5 examines the cointegration of errors. The study performed Lagrange multiplier test with 4-lag models. The model has autocorrelations if the hypothesis H0 states that no correlation of errors is rejected. The research results show that, there are only 2 models of Healthcare industry–COVID-19 and Utility industry–COVID-19 with no correlation of errors.

Table 4: The Model's Stability Test

Time series	Lag 1	Lag 2	Lag 3	Lag 4
Consumer discretionary industry COVID-19	+	+	+	+
Consumer staples industry COVID-19	+	+	+	+
Health care industry COVID-19	+	+	+	+
Industrials sector COVID-19	+	+	+	+
Materials industry COVID-19	+	+	+	+
Utilities industry COVID-19	+	+	+	+

Note: *Significance level < 10%; **significance level < 5%; ***significance level < 1%.

Table 5: Test for Autocorrelated Errors

Time-series	Lag 1	Lag 2	Lag 3	Lag 4
Consumer discretionary industry COVID-19	–	+	–	–
Consumer staples industry COVID-19	–	–	+	–
Health care industry COVID-19	–	–	–	–
Industrials sector COVID-19	–	+	+	–
Materials industry COVID-19	–	+	–	–
Utilities industry COVID-19	–	–	–	–

Note: *Significance level < 10%; **significance level < 5%; ***significance level < 1%.

Through the tests on the suitability of the model, the 4-latency VAR model Utilities–COVID-19 satisfies diagnostic conditions and can be used for prediction. The utility industry is a collection of companies that provide basic amenities such as electricity, water, natural gas, waste services and dams. In the sample is the average share prices of 18 utility stocks (Song Ba JSC, Southern Hydropower Joint Stock Company, Hydropower Joint Stock Company No. 3, Vietnam Gas Corporation, Joint Stock Company) Thu Dau Mot Water, Vietnam Electricity Development Joint Stock Company, Sesan 4A Hydropower Joint Stock Company, Gia Lai Electricity Joint Stock Company, Binh Duong Water Environment Joint Stock Company, Petrovietnam Power Corp, Petro Center Corp, Joint Stock Company Vinh Son Song Hinh Hydroelectricity, Pha Lai Thermal Power Joint Stock Company, Can Don Hydropower Joint Stock Company, Thacba Hydropower Joint Stock Company, Baria Thermal Power Joint Stock Company, PetroVietnam Low Pressure Gas Distribution Joint Stock Company, JSC Nhon Trach Oil and Gas Electricity 2). The results from Table 3 also show that with the significance level of 5%, the number of COVID-19 infections at lag 1 increased by 1, the stock price decreased –4,126.

The IRF chart shows the numbers for the utility industry and the COVID-19 based on the forecasted future growth of the series (Figure 2). In both the case of the utility series and the COVID-19 both shut down quickly to 0. In the Figure 3, the left corner of the IRF chart shows the reaction of utility stock prices to the effects of COVID-19. The results showed that there is a negative effect under the COVID-19 influence. A shock for a standard deviation of COVID-19 reduces approximately 5 standard deviations in utility stock prices. This change reduces to zero from the first lag.

Forecast error variance decomposition (FEVD) was analysed to measure the unexplained excitation in each variable (Table 6). The results show that there is no predictive error at lag 0. At lag 2 onward, shocks generated by COVID-19 can influence 1.36% variation in utilities. The contribution of the shocks caused by COVID-19 in the past helps forecast the utility price of about 1.36%. This is partly due to the confidence of investors in the prevention and good control of the epidemic of the Government of Vietnam.

6. Conclusion and Implications

This study uses the Engle Granger cointegration method to test variables with Granger causality, Vector autoregression model (VAR) to capture the relationship between variables, the impulse response function (IRF) to examine the model's suitability and forecastability, and forecast error variance decomposition (FEVD) to investigate the impact of COVID-19 on Vietnam's stock price indexes.

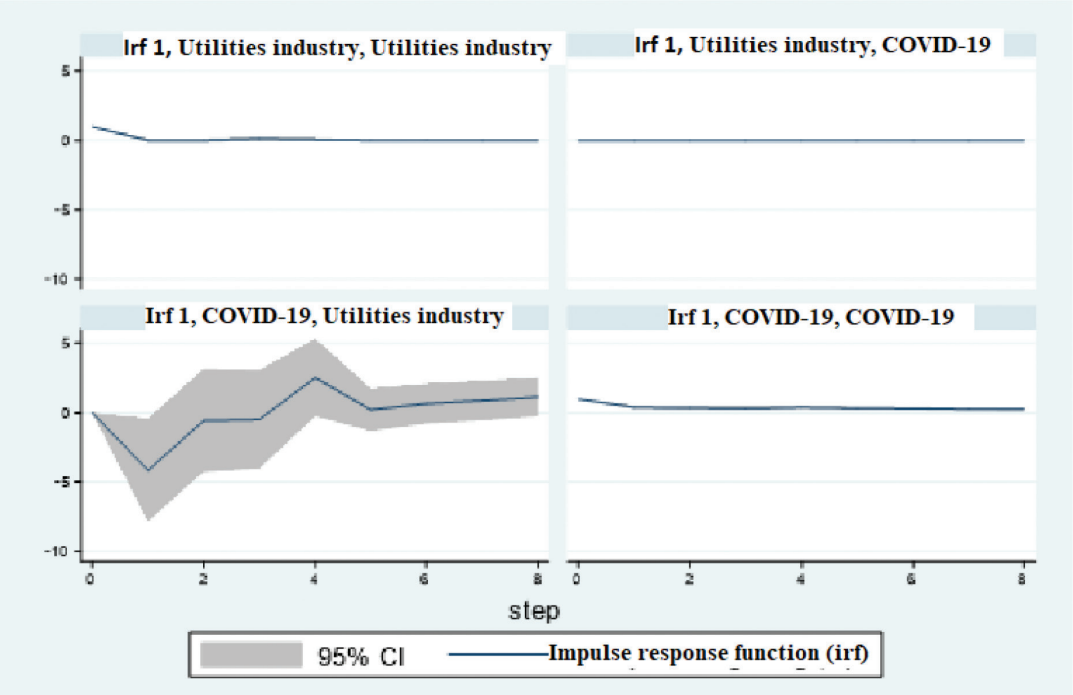

Figure 2: Impulse Response Function (IRF)
Source: Author Calculations

Table 6: Forecast Error Variance Decomposition (FEVD)

Step	(1)	(1)	(1)	(2)	(2)	(2)	(3)	(3)	(3)	(4)	(4)	(4)
	FEVD	Lower	Upper	FEVD	Lower	Upper	FEVD	Lower	Upper	FEVD	Lower	Upper
0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	0.001	–0.005	0.006	0	0	0	0.999	0.994	1.005
2	0.987	0.963	1.011	0.001	–0.005	0.006	0.013	–0.011	0.037	0.999	0.994	1.005
3	0.986	0.962	1.010	0.003	–0.101	0.016	0.014	–0.010	0.038	0.997	0.984	1.010
4	0.986	0.963	1.010	0.004	–0.006	0.015	0.014	–0.010	0.037	0.996	0.985	1.006
5	0.982	0.956	1.008	0.108	–0.008	0.029	0.018	–0.008	0.044	0.989	0.971	1.008
6	0.982	0.956	1.007	0.113	–0.010	0.032	0.018	–0.007	0.044	0.989	0.968	1.010
7	0.981	0.955	1.007	0.118	–0.119	0.035	0.019	–0.007	0.045	0.988	0.965	1.012
8	0.981	0.954	1.007	0.132	–0.152	0.042	0.019	–0.007	0.046	0.987	0.958	1.015

Note: 95% Lower and upper bounds reported.
(1) Irfname = irf1, impulse = ΔUtilities, and reponse = ΔUtilities.
(2) Irfname = irf1, impulse = ΔUtilities, and response = Δ (confirmed Covid-19 cases).
(3) Irfname = irf1, impulse = Δ (confirmed Covid-19 cases), and response = ΔUtilities.
(4) Irfname = irf1, impulse = Δ (confirmed Covid-19 cases), and response = Δ (confirmed Covid-19 cases).

The empirical results from an analysis of 11 economic sectors suggest a statistically significant impact relationship between COVID-19 and the healthcare and utility industries. The undeniable negative impact of the COVID-19 pandemic on stock returns, as well as the daily rise in the number of reported cases, mean that, in later infectious disease outbreaks, early containment steps and constructive responses are required conditions for governments and

nations to shield stock markets from extreme degradation. As a result, the effect is minimal, owing in large part to the government's commitment in avoiding outbreaks and the people's willingness to work together to avoid the COVID-19 epidemic.

However, if investors appear to be concerned and fearful about the future, a lockdown will have a negative impact on market performance (Alexakis et al., 2021). As a result, in order to assist financial markets in overcoming a recession and recovering sustainably, policymakers should be vigilant in containing virus outbreaks in order to boost public trust. Because of an accurate assessment and forecast of the situation, the Government of Vietnam made the correct decisions early on to minimize the negative effects of the disease and help Vietnam's 2020 economy end with positive and impressive progress. According to Dabla-Norris and Zhang (2021), Vietnam's economy will develop at a rate of 2.4 percent, making it one of four economies in the world with the fastest GDP per capita growth (Vietnam, Taiwan, Egypt and China).

Further, the estimation results show a statistically significant negative impact of COVID-19 on utility share price at lag 1. Analysis of impulse response function (IRF) and forecast error variance decomposition (FEVD) show an inverse reaction of utility stock prices to the impact of COVID-19 and a gradual disappearing shock after two steps. These findings imply that utilities stocks are among the most severely impacted shares on financial exchanges during a pandemic due to the high risk of immediate or irreversible closure of manufacturing lines and unusually poor demand of basic amenities. To prevent the major impacts of a COVID-19-like epidemic and potential unforeseen events on utilities demand, investors should select stocks of utilities companies that show long-term strong corporate practices and management, and expanding stock portfolios across both financial and non-financial industries.

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