

The Impact of World Market on Ho Chi Minh City Stock Exchange in Context of Covid-19 Pandemic

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Abstract: The study aims to measure the impact of 4 market factors and Covid-19 including: S&P500 index, oil price, gold price and total number of infections on VN Index of Vietnam stock market (STC) in the period. Covid-19 pandemic period from January 2020 to June 2021 using ARDL model. Research results show that in the long-term S&P500, oil and gold prices have an impact on VN Index. Besides, the VN Index has a positive relationship with the S&P500 index, oil price, and inversely with the gold price. The total number of infections does not affect the VN Index because the stoppage condition is not met.

Keywords: Vietnamese stock market, VN Index, ARDL, ECM.

1. Introduction

The Covid-19 pandemic has had a negative impact on the World Economy since the financial crisis in 2008. As of Q2 2021, the total number of global infections reached 182 million cases and nearly 4 million cases of death. Currently, the epidemic has not shown any signs of cooling down because now countries are facing a wave of Covid-19 with new strains such as Delta and Delta-plus, making the health system in countries like India difficult. India and Myanmar are on the brink of collapse. In Vietnam, the number of positive cases of Covid-19 has reached 16,000 cases and shows no sign of stopping. The concentrated isolation areas in Ho Chi Minh City are showing signs of being overloaded and the Steering Committee for Disease Prevention and Control is planning to self-manage F1 at home.

Vietnam's economy has entered a new phase in the process of international integration with the signed CPTTP and EVFTA agreements to help promote production, import and export to other regions. However, the Covid-19 pandemic not only damaged the country's workforce, but also had a strong impact on the world economy, causing the supply chain to be delayed in the period from Q2 to Q3 2020. Although Vietnam's economy still shows signs of being resilient to the pandemic (GDP growth rate in 2020 is 2.91%), the consequences left by the pandemic are still too great and a new wave of Covid-19 has been invading. Importing into key economic regions of Vietnam is a huge challenge for the economy in general and the financial market in particular. In the first 4 months of 2020, the VN Index dropped from 991 points to 643 points due to the impact of social distancing measures. However, the economy had a strong recovery, helping the VN Index increase strongly until reaching the old peak at 1200 points on January 18, 2021. Now

the market has been making a new peak at the milestone of 1300 points despite the world's major indexes like S&P500, Dow Jones are being adversely affected by technology stocks. However, Covid-19 is not the main factor affecting the decline of the VN Index, because the indexes change every day and the cause can come from many factors such as government policies, bad news about the US-China Trade War, oil prices falling for days and most recently US election news. Therefore, this study aims to find out the impact of the World market such as the S&P500 index, the World oil price (WTI), the World gold price and the total number of infections in Vietnam that have a strong impact on the VN Index as in the first 6 months of 2020 and provide solutions for the Government, businesses and investors in the context of the Covid-19 pandemic.

2. Literature review

The stock price index is a price indicator that reflects the development trend of the stock price market, shows the changing trend of stock prices and the trading situation in the market (Quynh & Linh, 2019). Kieu & Diep (2013) have shown that the stock market is a statistical value that reflects the state of the stock market. Usually, stocks with the same industry, same market capitalization or listed on the same exchange will be aggregated into a portfolio.

The stock price index is of interest to many people because it reflects the health of the host country's economy. Fama (1997) has proposed the efficient market theory that policy makers can freely implement national macro policies without fear that these policies will change the stock market because they only affects the stock price index. Since then, there have been many studies focusing on the impact of macroeconomic factors on the changes of the stock market.

Dung (2013) has shown that the stock market is a constituent part of the financial market, so it is directly influenced by healthy development events or risks that may occur in the financial market. Therefore, the stock markets of all countries are influenced by the world stock market, the economic and political situation of the leading countries.

In the study on the impact of the covid 19 pandemic on the economy of Tien & Minh (2020), 7 signs of a global economic recession caused by the Covid-19 pandemic, including the stock market, gold and oil prices were found.

The impact of macroeconomic variables on the stock market is of interest to many researchers around the world. Many studies have proved that factors: inflation, consumer price index (CPI), money supply, exchange rate, interest rate, oil price, GDP all affect the stock market such as: Merton (1973); Jafffe & Melker (1976); Fama & Schwert (1977); Shin & Bacon (1997); Gjerde & Saettem (2000); Pal & Mital (2011); Phong & Van (2015).

Later, when the stock market accounted for an important part in reflecting the business situation of enterprises and national economic prospects, many researchers found a link between the domestic stock market and the world stock market such as crude oil, gold, silver, etc.

For the Hong Kong market (HSI – Hang Seng Index), Garefalakis et al (2011) have suggested that the factors S&P500, CRUDE, GOLD have an impact on the stock market in Hong Kong. Where the S&P500 has an impact on the HSI with a lag of 1 unit, the HSI at a delay of 1,2,3 affects itself; CRUDE AND GOLD have an immediate effect on HSI.

For the Chinese market, Abdulrahman Adnan Alqattan & Ahmed Alhayky demonstrated the impact of WTI oil on 300 Chinese energy company stocks using time series analysis for the January 2005 to February period. 2017.

For the Pakistani stock market, Akbar et al (2019) showed that the exchange rate (RUP/USD), stock market, and gold price have a relationship in the short term. The results show that adverse movements of the exchange rate cause stock prices and gold prices to fall and vice versa. The stock market decline caused the gold market to boom but it caused the rupee to depreciate and vice versa. Therefore, gold is not only seen as a safe haven but also as a better alternative investment when financial markets are volatile.

In Vietnam, studying the impact of macroeconomic factors on Vietnam's stock market in the period 12/2000 to 12/2008 using the VECM model has shown that not only macroeconomic factors such as inflation but also interest rates and exchange rates have an impact, gold and oil prices also have a certain influence on the Vietnamese stock market, although not significantly (Quynh & Linh, 2019). Research on the influence of world price index on Vietnam stock market in the period 2008 to 2013 using ARDL model has shown that the S&P 500 index has an immediate impact on Vietnam's stock market and lasts until the next day. The oil price also had an impact on Vietnam's stock market, but the impact was not as strong as the S&P500. The gold price has almost no impact on Vietnam's stock market (Hue & Duy, 2015).

Studies have shown a certain influence of world markets on Vietnam's stock market even with or without major events. In particular, the situation of the Covid-19 epidemic is a factor that causes the growth of countries to slow down, and it is imperative to use many measures and fiscal policies to maintain or turn it around. Therefore, this factor leads to the economic growth index of each country and region will be very different. That is why Vietnam is said to be the country with the fastest growing economy in the ASEAN region even though other developed countries are still struggling with the risk of an outbreak. In many trading sessions, the Vietnamese stock market went against the world trend, especially the event that technology stocks listed on the S&P 500 fell, causing the S&P 500 to fall for two consecutive weeks. However, Vietnam's stock market had a prosperous session and set a new peak. Therefore, this study wants to focus on whether the world markets still have a stronger impact on the VN Index than when Vietnam was affected by the first and second wave of the Covid-19 pandemic.

3. Research methodology

The study selects 3 market factors and 1 epidemic factor that can affect the VN Index, including: S&P500 Index (SP5), World oil price (WTI), World gold price (GOL)) and the total number of infections in Vietnam (TTC – total_cases).

The observed sample was collected low by day, from January 1, 2020 to June 30, 2021 (350 observations). Data of daily indexes are taken according to the price at the end of the day (Adjust close). Details of research data are taken from Investing page (<https://www.investing.com/>), finance securities website vietstock (<https://finance.vietstock.vn/>), US Energy Information

Administration -EIA (<https://www.eia.gov/>), World Gold Council (<https://www.gold.org>) and Worldometer (<https://www.worldometers.info/>).

This study uses the quantitative analysis approach to the Autoregressive Distribution Lag (ARDL: Autoregressive Distribution Lag) method proposed by Pesaran, Shin and Smith (2001) to determine the impact of the world market on the world market. Vietnam stock market. The ARDL model (p, q_1, q_2, \dots, q_n) has the following form:

$$\begin{aligned} \Delta \ln VNI_t = & \alpha + \underset{p}{h_1 \ln VNI_{t-1}} + \underset{q_1}{h_2 \ln SP5_{t-1}} + \underset{q_2}{h_3 \ln WTI_{t-1}} + h_4 \ln GOL_{t-1} + h_5 \ln TCC_{t-1} \\ & + \sum_{\substack{l=1 \\ q_3}} a_{1l} \Delta \ln VNI_{t-l} + \sum_{\substack{i=1 \\ q_4}} a_{2i} \Delta \ln SP5_{t-i} + \sum_{i=1} a_{3i} \Delta \ln WTI_{t-i} \\ & + \sum_{i=1} a_{4i} \Delta \ln GOL_{t-i} + \sum_{i=1} a_{5i} \Delta \ln TCC_{t-i} + \varepsilon_t \end{aligned}$$

According to Pesaran, Shin and Smith (2001), the process of running the ARDL model is performed in the following sequence:

First, the envelope test (ARDL Bound test) aims to determine the cointegration – the long-run relationship between the variables. In this study, the author will use Engle Granger and Philip Outliers test to test cointegration.

Second, find the optimal lag of the variables in the model.

Third, run the ARDL model with defined lags to test the short-run relationship between the variables.

Fourth, run error correction model (ECM) based on ARDL approach to test the long-term relationship between variables with cointegration phenomenon. The ECM model has the following form:

$$\begin{aligned} \Delta \ln VNI_t = & a + \sum_{\substack{l=1 \\ q_4}} \Delta \ln VNI_{t-l} + \sum_{i=1} a_{1i} \Delta \ln SP5_{t-i} + \sum_{i=1} a_{2i} \Delta \ln WTI_{t-i} + \sum_{i=1} a_{3i} \Delta \ln GOL_{t-i} \\ & + \sum_{i=1} a_{4i} \Delta \ln TCC_{t-i} + \lambda_0 ECT + \varepsilon_t \end{aligned}$$

According to Pesaran, Shin and Smith (2001), the ARDL method has many advantages over other cointegration methods:

First, the ARDL model allows flexibility for variables with different stationary properties I(0) or I(1) or I(0) and I(1).

Second, the variables in the ARDL model can tolerate different optimal lags in the tests.

Third, the model is suitable for research with a small research data file, but still ensures high accuracy.

Fourth, the ARDL model can distinguish independent and dependent variables or exogenous and endogenous variables. While the VAR model only accepts endogenous variables.

4. Research results

Unit root test: The results show that the variables LVNI, LSP5, LWTI, LGOL all have the same

integration of order 0 - $I(0)$, but the total_cases variable does not stop because the trend is too

strong. According to Pesaran, Shin and Smith (2001), stationary variables at I(0) and I(1) are used to test the next steps. Therefore, the total_cases variable will not be added to the regression model used for contour testing (ARDL Bound test).

Assumption:

H₀: Unit root (Unit root) – Non-stationary.

H₁: No unit root (Unit root) – Stationary.

Table 1: Test for stationarity (ADF)

Variable	Link	ADF Statistics	Statistical value of significance levels			Prob
			1%	5%	10%	
lnVNI	I(0)	-5.8767	X	X	X	0.000004
lnSP5		-5.0771	X	X	X	0.000149
lnWTI		-3.4513		X	X	0.04899
lnGOL		-10.086730	X	X	X	0.000000
total_cases		2.6903				1.000000
Total_cases	I(1)	3.2391				1.000000

Source: Author calculated on software

Multicollinearity test for the variable LVNI, LSP5, LWTI AND LGOL is to find the long-run relationship between the variables. We have the following assumption:

H₀: $\gamma_p = \omega_q = 0$. No multicollinearity occurs

H₁: $\gamma_p \neq \omega_q \neq 0$. The variables have a multicollinearity relationship

Table 2: Engle Granger’s multicollinearity test

Biến	EngleGranger value	t-	Level of significance			Prob
			1%	5%	10%	
Cointegration test with no trend						
L(res,1)	-8.0481		X	X	X	0.0000
L(d(res),1)	-0.8686					0.3857
L(d(res),2)	0.4861					0.6272
L(d(res),3)	0.2126					0.8318
L(d(res),4)	-1.6532		X			0.0992
Cointegration test with trend						
L(res,1)	-12.03		X	X	X	0.0000
L(d(res),1)	-2.075			X	X	0.0387

Source: Author calculated by software

In this study, because the variables are all trending, the author decided to test in both the trending and non-trending cases for the Engle-Granger test (Engle & Granger, 1987). The results show that in both cases, the hypothesis H_0 is rejected. And that is also the weakness of the Engle Granger test, when the OLS model chooses the most optimal lags, it is easy to cause H_0 to be rejected quite often. Therefore, the date test is said to have low power because it does not give a consistent cointegration conclusion (Kremer, Ericsson & Juan, 1992).

To be more certain about the cointegration relationship between variables, the Philip Outliers test is appropriate because it does not matter which variable is on the left (Philip & André, 1997).

Table 3: Philip Outliers' cointegration Test

Philip t-value	1,366.31		
Critical values of Pz	10pct	5pct	1pct
Critical values	163.105	175.9902	201.0905

Source: Author calculated on software.

The results show that $1,366.31 > 201.0905$, so we have enough grounds to reject the hypothesis H_0 , the variables in the model have cointegration. Therefore, it is reasonable to test long-term effects by error correction model (ECM).

Figure 1: Testing the ARDL model

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                        OLS Regression Results
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Dep. Variable:          d(RVNI)      R-squared (uncentered):      0.552
Model:                 OLS          Adj. R-squared (uncentered): 0.540
Method:                Least Squares F-statistic:                 46.03
Date:                  Wed, 30 Jun 2021 Prob (F-statistic):         3.93e-59
Time:                  16:57:01      Log-Likelihood:              1121.1
No. Observations:     383           AIC:                         -2222.
Df Residuals:         373           BIC:                         -2183.
Df Model:              10
Covariance Type:      nonrobust
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	coef	std err	t	P> t	[0.025	0.975]
L(ci res)	-0.8202	0.069	-11.841	0.000	-0.956	-0.684
L(d(RVNI), 1)	-0.1595	0.050	-3.184	0.002	-0.258	-0.061
L(d(RVNI), 4)	-0.0835	0.035	-2.375	0.018	-0.153	-0.014
d(RSP5)	0.1842	0.038	4.882	0.000	0.110	0.258
L(d(RSP5), 1)	0.2480	0.054	4.563	0.000	0.141	0.355
L(d(RSP5), 2)	0.2251	0.053	4.245	0.000	0.121	0.329
L(d(RSP5), 3)	0.0849	0.038	2.234	0.026	0.010	0.160
d(RWTI)	-0.0111	0.009	-1.259	0.209	-0.029	0.006
L(d(RWTI), 4)	0.0184	0.008	2.174	0.030	0.002	0.035
d(RGOL)	-0.0864	0.044	-1.981	0.048	-0.172	-0.001

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Omnibus:                86.180      Durbin-Watson:              2.009
Prob(Omnibus):          0.000      Jarque-Bera (JB):           280.513
Skew:                   -0.995     Prob(JB):                   1.22e-61
Kurtosis:                6.690     Cond. No.                   11.6
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Notes:

- [1] R² is computed without centering (uncentered) since the model does not contain a constant.
- [2] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Source: Author calculated on software.

The results from the ARDL model(1,1,0,0) show that the VN Index is affected in the same way by the S&P500 index of the day and yesterday with the significance level of 1% and 10%, respectively. The price of gold has an immediate (reverse) impact on the VN Index at 1% significance level. All other variables have no impact on VN Index in the short term at all significance levels.

Figure 2: ECM model testing

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(<statsmodels.regression.linear_model.RegressionResultsWrapper at 0x15763ff0>,
 <class 'statsmodels.iolib.summary.Summary'>
  """
      OLS Regression Results
  =====
  Dep. Variable:          RVNI    R-squared:                0.056
  Model:                 OLS      Adj. R-squared:           0.044
  Method:                Least Squares  F-statistic:              4.530
  Date:                  Wed, 30 Jun 2021  Prob (F-statistic):      0.000504
  Time:                  16:44:54     Log-Likelihood:           1105.6
  No. Observations:     387         AIC:                      -2199.
  Df Residuals:         381         BIC:                      -2176.
  Df Model:              5
  Covariance Type:      nonrobust
  =====
                coef    std err          t      P>|t|    [0.025    0.975]
  -----
  Intercept            0.0009      0.001      1.190     0.235    -0.001     0.002
  RVNI_1              -0.0029      0.055     -0.052     0.958    -0.111     0.106
  RSP5                 0.1917      0.046     4.142     0.000     0.101     0.283
  RSP5_1               0.0797      0.044     1.831     0.068    -0.006     0.165
  RWTI                 0.0118      0.013     0.913     0.362    -0.014     0.037
  RGOL                 -0.0982      0.065    -1.521     0.129    -0.225     0.029
  =====
  Omnibus:                120.260   Durbin-Watson:            2.005
  Prob(Omnibus):           0.000     Jarque-Bera (JB):         506.175
  Skew:                    -1.298     Prob(JB):                  1.22e-110
  Kurtosis:                 7.965     Cond. No.                   96.0
  =====

  Notes:
  [1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
  """)
    
```

Source: Author calculated on software

The results show that Vietnam stock market is affected by itself at 1% significance level. The S&P 500 has a positive impact on the VN Index in the long term at 1% and 5% significance level, which proves that the Vietnamese stock market is still dependent on the larger market in both the short and long term. Oil price has a positive impact on Vietnam stock market at 5% significance level but relatively late, unlike the S&P500 index. Gold price has a negative impact on VN Index at 5% significance level, so gold is considered a haven investment channel for investors during the Covid-19 outbreak.

5. Research results discussion

The study has shown the short-term and long-term impact of the world market on Vietnam's stock market during the Covid-19 pandemic. The VN Index still has a long way to go before it can withstand the fluctuations of the world market even though it has recently shown strong positive signs when continuously setting new peaks in June 2021. The results also proved that the gold market is a safe haven investment channel for investors during this epidemic period and that is shown by the negative impact of the gold price market on the VN Index. The oil price market has a correlation with the S&P500 index but has no impact on the VN Index in the short term, in the long term, this market still has an impact at the 4th lag.

Only the total number of infections is not included in the model because the increasing trend is too strong to stop at $I(0)$ and $I(1)$. Besides, the fact that the total number of cases increased sharply but still did not adversely affect the stock market in the period of May and June 2021, shows that the market has adapted to the shock of the previous Covid-19 epidemic (March 2020). Investor sentiment has improved thanks to the expectation of the Government when it continuously takes timely measures to prevent the epidemic, focusing on areas with high risk of infection such as industrial parks and ensuring that the virus has just been extinguished. translation that the enterprise can continue to produce. Now, when the city enters the biggest vaccination campaign in history, businesses and investors expect that society will return to normal and business and production activities will be allowed, so the Vietnamese stock market in the South is constantly in green in recent days (June) and the focus is on continuously setting new peaks at 1300 and 1400 points.

Due to time limitations, the author only considers the model in the second case (Case 2: Unrestricted intercept and no trend) according to Pesaran, Shin and Smith (2001), this is the most commonly considered case in the test. determine ARDL. However, if we look at the data, it is clear that all variables have a trend, so running the 2nd case test may not seem promising, but the results are still acceptable. Therefore, this model should consider case 4 (Case 4: Unrestricted intercepts; restricted trends) and case 5 (Case 5: Unrestricted intercepts; unrestricted trends) for better results. The study collects data from many sources, but there are still many limitations. Although the sample size of 383 observations is suitable for quantitative research, if used to study long-term effects, the number will certainly not stop there. The study only stops at 4 variables (S&P 500, WTI, GOLD); but in fact there are many world market variables affecting Vietnam stock market such as NIKKEI index, Dow-Jones index, silver price, copper price, etc; and other macroeconomic variables such as import-export index, consumer price index (CPI), inflation, interest rates, etc. Therefore, the following studies can be expanded to close the research gap.

6. Conclusion and recommendation

The Covid-19 pandemic has caused economic losses in general and Vietnam's stock market in particular in the period of 2020. Although from the end of 2020 to the present, Vietnam's stock market has made a clear breakthrough, but the negative impact of The pandemic is still there and we are preparing to face the 4th wave of outbreaks when many regions and provinces across the country, including Ho Chi Minh City, implement directives 15 and 16. This is damaging to Vietnam's economic growth if the upcoming Covid-19 wave scenario develops strongly. In particular, economic growth will be more difficult if Ho Chi Minh City - the economic locomotive of the country is witnessing a significant increase in the number of infections from the new strain and many sources of infection have yet to be detected.

In the current situation, the Government should take supportive and preventive measures, focusing on high-risk areas. Priority is given to industrial parks because of the concentration of personnel from many places and also the areas that have an impact on economic growth.

The Ministry of Finance should run fiscal policies carefully during the pandemic in order to reduce the budget deficit as much as possible. At the same time, the State Bank of Vietnam (SBV) should adjust interest rates and provide a reasonable loan package so that business owners can maintain their operations.

Besides, the impact of the pandemic on domestic markets has made investors worried about continuous volatility. The State should establish an effective monitoring mechanism for Vietnam's stock market and domestic gold price in order to provide timely stabilization policies.

The State Securities Commission should make adjustments to the operation, especially should fix/improve the circulation of trading orders because recently there has been an increase in order congestion due to an increase in the number of trading orders in a time frame. spike up. Besides, it is necessary to control the quality of information, to avoid adverse information that confuses investors.

The impact of the World stock market, specifically the S&P 500, on the Vietnamese stock market in the short and long term should be a topic of concern for investors to make the right investment decision. The Ministry of Finance can also view the volatility of these markets and make policies to stabilize the market.

Investors are not only interested in the world market but also have to constantly update information and macro policies at home and abroad. Combined with the previous world market trading sessions, it is possible to predict the shocks that will or may happen to the Vietnam stock market.

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