DETERMINANTS OF STOCK MARKET MODERN DEVELOPMENT: EVIDENCE FROM VIETNAM

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ABSTRACT

The paper estimates the macroeconomic variables affecting the stock price in Vietnam from 2009 to 2019. Based on the used autoregressive distributed lag (ARDL) model, the test shows a co-integration between stock prices and macroeconomic factors. The findings explore the optimal delay in the ARDL model as (1, 2, 1, 2, 0, 0, 2). Concretely, statistically significant evidence proves that the consumer price index, gross domestic product, interest rate, money supply, and oil price are the determinants of the stock price in Vietnam. In particular, the consumer price index and GDP have a direct relationship with the stock market, while interest rate, money supply, and oil price have opposite effects.

Keywords: stock market; VNINDEX; consumer price index; gross domestic product; interest rate; money supply; oil price

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INTRODUCTION

International investors and researchers have focused on emerging financial markets in Asia, including Vietnam. Globalization has led to economic growth, and international financial market integration, as well as the participation of foreign investors, have strengthened the relationship between the global stock market and macro-factors such as the foreign exchange rate, inflation rate and oil price (Megaravalli & Sampagnaro, 2018). However, the Vietnamese economy is currently facing many difficulties and challenges with the deficit trade balance, the inadequate strength of foreign exchange reserves, and the persistently low usage of foreign direct investment (FDI) capital. Thus, the investors' concerns about the macro environment for the stock market operation are completely baseline. Accordingly, the following question is raised: Will the macroeconomy's fluctuation affect the stock market's volatility?

Several studies focus on the influence of macroeconomic factors on the stock markets of different countries and vice versa. Concretely, Megaravalli and Sampagnaro (2018) have considered the relationship between macroeconomic indicators and the stock market. Whilde, Jareño and Negrut (2016) investigate the impact of the U.S. stock market on macroeconomic factors. Their findings demonstrate a two-way linkage between the stock market and macroeconomic factors.

However, this paper aims to estimate the effect of macroeconomic factors on the Vietnamese stock market. That objective addresses the research question, 'What are the macro-factors

affecting the Vietnamese stock market during the period 2009–2019?'.

LITERATURE REVIEW AND PREVIOUS RESEARCH STUDIES

Literature review

(i) Efficient market hypothesis (EMH):

An efficient market is a market in which the prices of securities fully and immediately reflect all available information (Fama, 1970). In other words, in this market, at any given time, the security's actual price is a reasonable estimation of its intrinsic value. The adequate market hypothesis assumes that all investors are equally aware of all the available information. Effective market hypothesis includes weak-, semi-strong, and strong-form efficiency. However, the empirical studies, in particular González, Nave, and Rubio (2018); Wei et al. (2019); Akbar, Iqbal, and Noor (2019), proved that most of the market is inefficient. That means the prices of stocks do not reflect the reality of the market because of the influence of many other factors, including macroeconomic factors.

(ii) Capital asset pricing model (CAPM)

The model describes the relationship between systematic risk and expected return (Sharpe, 1964; Lintner, 1965). In this model, the expected return of a security is equal to the risk-free return plus a risk premium based on the beta of that security. Non-systemic risks are not considered in this model because investors can build a diversified portfolio to eliminate this type of risk. CAPM is conceptually simple and has practical applications to draw useful applications. The widely used CAPM model was discussed as other financial factors can predict profitability. This finding has led to developing and testing alternative asset pricing regulations, such as the Arbitrage Pricing Theory (APT) and the Present Value Model (PVM). Various pieces of evidence of links on the effects of stock returns and macroeconomic factors are found in the literature using other asset pricing rules instead. APT assumes that several macroeconomic factors generate profits in volatile macroeconomic markets of stock returns. The finding allows many risk factors to account for asset returns. Chen, Roll, and Ross (1986) have argued that stock returns will be affected by any factor affecting future cash flows or the discount rate of those cash flows.

Although Chen et al. (1986) used observable economic time series to measure the macroeconomic factors as determinants of stock returns, the model was implemented and tested for the U.S. stock market, which belongs to a developed country. At the same time, this study is organized for a developing country, Vietnam, a stock market with a high level of asymmetric information. As a result, some macroeconomic data is unavailable in the Vietnamese stock market.

Previous Research Studies

Previous empirical studies have tested the effect of macroeconomic factors on the stock market. In particular, Suriani et al. (2015), and Wahyudi et al. (2017) claim that the stock market can be significantly affected by macroeconomic factors. They investigate whether any co-integration exists between the stock index and macroeconomic variables such as the exchange rate, money supply, inflation, industrial production, long-term government bond rate, and crude oil price. Mukherjee and Naka (1995) and Wahyudi et al. (2017) 's findings confirm the existence of co-integration. Also, Paul and Mallik (2014) explore the relationship between macroeconomic factors and the stock market in the banking and finance sector. All three macroeconomic variables, such as inflation, interest rate, and real gross domestic product (GDP) growth, are cointegrated with the stock market. Hosseini et al. (2011), Umer (2016), and Wahyudi et al. (2017) confirm that given macro factors impacts the stock market by analyzing the effect of macroeconomic variables on the stock market, such as inflation, interest rate, and exchange rate, gross domestic product, crude oil price, and primary commodity price in some Asian countries.

In Vietnam, Nguyen and Nguyen (2013) examined the relationship between macroeconomic factors and stock market volatility in Vietnam. Similarly, Than and Vo (2015) and Vuong and Le (2017) explore the impact of macroeconomic factors on the stock price of the Ho Chi Minh Stock Exchange (HOSE). Especially, Vuong and Le (2017) reveal that the market price index, inflation, money supply, and exchange rate are the main determinants of the stock market in Vietnam.

Based on the literature review and previous

research studies, the author proposes the factors affecting the Vietnamese stock market, such as exchange rate, consumer price index, interest rate, oil price, economic growth, money supply, and industrial production index.

Exchange Rate

The exchange rate has an impact on the stock market from two perspectives (Issahaku et al., 2013), namely, the financial environment and the businesses themselves, especially those that import raw materials or consume products abroad. The high exchange rate has profoundly affected the stock market. Foreign capital sources have been substantially invested in the stock market, but the sharp increase in the exchange rate has provided investors a reason to invest in the stock market. Foreign investors withdraw capital from the market. A large amount of capital is quickly withdrawn from the market, which will cause stock prices to decrease.

Boonyanam (2014) and Suriani et al. (2015) have confirmed the relationship between the exchange rate and the stock market. In addition, Mukherjee and Naka (1995) admitted that changes in exchange rates would be positively correlated with stock market returns, while Umer (2016) pointed out that the stock index has a negative long-run relationship with the exchange rate. Other studies have found no link between stock price and exchange rate (Nguyen & Nguyen, 2013; Suriani et al., 2015).

In this paper, the exchange rate is measured by Official exchange rate (LCU per US$, period average), which is taken from the World Bank website.

From the above discussions, **Hypothesis 1** is proposed as folows: Exchange rate has affected the Vietnamese stock market.

Consumer Price Index

Gallagher and Taylor (2002a; b) show that stock prices are negatively correlated with the consumer price index (CPI) through economic shocks. Al-Khazali and Pyun (2004) support the negative relationship in the short run but find it favorable in the long run. Hosseini et al. (2011); Ouma & Muriu (2014); Umer (2016); Alam (2017); Wahyudi et al. (2017) show the positive relationship between inflation and the stock market (Fama, 1977). However, Rapach (2002) demonstrates that there is no connection between inflation and the actual value of stocks in the long run.

Jaffe and Mandelker (1976), Fama and Schwert (1977), Fama (1981), Wahyudi et al. (2017) investigate the negative relationship between inflation and the stock market. Considering that the stock market reflects a company's future earnings potential, a downturn in the economy predicted by an increase in inflation will worsen stock prices (Paul & Mallik, 2014). So, the research results of Umer (2016) find a positive long-run relationship between the Stock Index and CPI. However, the study by Nguyen and Nguyen (2013) highlights the negative effect of inflation on VNINDEX.

This paper calculates CPI as a percentage to show the relative change in commodity prices over time. The CPI Index is an inflation indicator taken from the World Bank website.

Following the analyses, **Hypothesis 2** is proposed as follows: The consumer price index affects the Vietnamese stock market.

Interest Rate

The government bond interest rate is considered the benchmark rate, and its changes will affect the stock market. When the benchmark interest rate increases, the price of other securities goes down, and vice versa. The impact of interest rates on the stock market provides essential implications for risk management practices, the pricing of financial securities, and government policies toward financial markets. Empirical studies on the efficient market hypothesis 'Random Walk' with stock prices have been mixed. Fama's (1965) and Working's (1960) studies did not contradict the 'Random Walk' theory. Shiller (1989) points out why stock market stochastic behavior should hold, and ample evidence proves that the stock market follows a random trend.

According to Wahyudi et al. (2017)' results, the interest rate harms the stock index. Mukherjee and Naka (1995), Hsing (2013), Paul and Mallik (2014), and Umer (2016) give evidence to support the relationship.

This paper measures the interest rate by Vietnamese government bond yields (%). It is taken from the world government bonds website.

From the above discussions, the author proposes **hypothesis 3** as follows: interest rate

has negatively affected the Vietnamese stock market.

Oil Price

Ray (2012); Rafailidis and Katrakilidis (2014) have shown that oil prices and stock markets are negatively correlated. The changes in crude oil prices significantly affect energy and, ultimately, the cost of production. The high oil prices also reduced economic activity due to the increased cost of production and reduced profit margins. Consequently, this phenomenon affects future cash flows and causes heavy fluctuations in the share prices of manufacturing industries (Kumar, 2014). However, in the long term, Umer (2016) found a positive relationship between the stock index and oil prices.

In this paper, the oil price is measured by Gasoline Prices in Vietnam which is taken from the trading economics website.

The next hypothesis (**hypothesis 4**) is proposed based on the above explanation: Oil price has affected the Vietnamese stock market.

Economic Growth

Economic growth is the central issue of macroeconomics because it is a prerequisite for economic development. According to Paul and Mallik (2014), 'Economic growth is the expansion of a country's gross domestic product (GDP) or potential output'. In particular, the stock market essentially contributes to mobilizing savings for investment, thereby affecting economic growth. Therefore, the stock market can be considered a factor in economic growth (Pearce & Roley, 1985). Furthermore, because of the stock market's liquidity, individual and institutional investors can easily diversify their portfolios, have many trading options, and effectively filter information to reduce risk and increase profits. Hence, it will lead to an increase in the GDP of the national economy and create favorable conditions for savings and investment, promoting the stock market's development. Thus, when an economy has good capital absorption capacity and effective capital usage through the stock market, so it will positively affect economic growth.

Paul and Mallik (2014) investigate the relationship between macroeconomic factors and stock market in banking and finance sector. They demonstrated that GDP growth has a positive impact on the stock market. Hsing (2011), Hsing (2013), Paul and Mallik (2014) and Boonyanam (2014) support the above relationship. In contrast, Wahyudi et al. (2017) results show that GDP has a negative effect on the stock index.

In this paper, economic growth is measured as the annual percent growth of the gross domestic product, taken from the World Bank website.

Hypothesis 5 is proposed as follows: GDP affects the Vietnamese stock market.

Money Supply

According to Mukherjee and Naka (1995), the influence of money supply on the stock market is an empirical question because their relationship could be positive, negative, or even no binding relationship between the stock market and money supply.

Fama (1981), Onneetse et al. (2014), and Bala and Hassan (2018) also confirm the negative relationship between stock prices and money supply. Naik (2013) confirmed the positive relationship between the money supply and the stock market. On the other hand, Umer (2016) showed a positive long-run relationship between the Stock Index and the money supply. In Vietnam, Nguyen and Nguyen (2013) concluded that VNINDEX has a long-term positive relationship with the money supply.

In this paper, the money supply is measured by the logarithms of M2, which is taken from the trading economics website.

Hypothesis 6: Money supply affects the Vietnamese stock market.

Industrial Production Index

Tainer (1993) explored that the industrial production index always follows the economic cycle. That is, it increases during periods of recovery and economic booms and decreases during recessions. It is often used as a measure of the level of economic activity: an increase in industrial output signals economic development. Fama (1981) and Fama (1990) have shown a positive relationship between industrial production and the stock market. The findings of Chen et al. (1986) 's study confirm the positive relationship between the stock market and industrial output growth.

Hosseini et al. (2011) examine the effect of

macroeconomic variables on the stock market indexes in China and India. In the long term, an increase in industrial production negatively affects the stock index in the Chinese stock market. While in the Indian stock market, industrial production and inflation have a long-term negative impact on the stock market.

In this paper, the Index of Industrial Production is an indicator that evaluates the growth rate of industrial production every quarter.

Hypothesis 7: Industrial production index has positively affected the Vietnamese stock market.

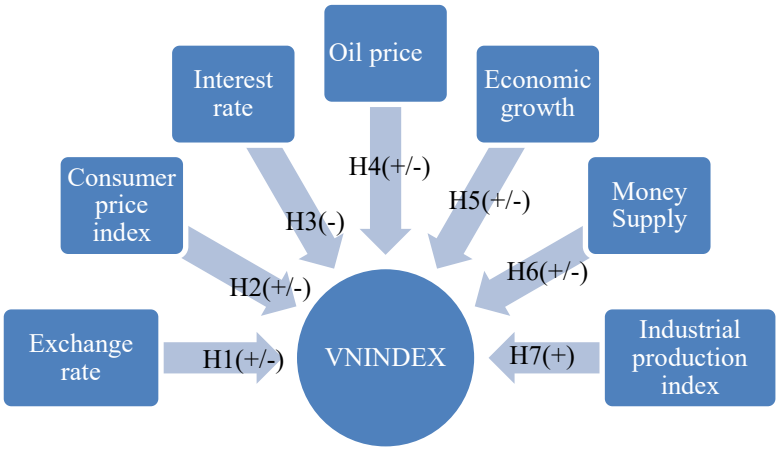

Figure 1. Proposed model

RESEARCH METHOD AND PROPOSED MODEL

Research Method

The study uses Eviews 12 software to estimate the macro-economic factors affecting the Vietnamese stock market with an Autoregressive Distributed Lag Model (ARDL)-Bound Test according to Pesaran and Shin (1999), and Pesaran et al. (2001). The ARDL model assists us in controlling endogenous phenomena by simultaneously analyzing short- and long-term relationships among time-series data (Banjeree et al., 1993). Moreover, it is suitable for short-time data series (Pesaran & Shin, 1999). Besides, autocorrelation, unit-root, and bound tests are used to ensure reliable and unbiased findings.

Choosing the latency of the ARDL model, estimating the long-term coefficients of the ARDL model, and testing the model's wrong shape through Ramsey's RESET test are performed to clarify the impact of macroeconomic factors on stock prices in Vietnam. In a developing country like Vietnam, the information is not transparent and fully disclosed, so the historical data is taken from the 1st quarter of 2009 to the 4th quarter of 2019 at the quarter level. The reason for choosing this period, Vietnam's economy recovered in 2009 after the global financial crisis. The Covid-19 pandemic appeared at the end of 2019, creating a deep recession in the global economy from 2020 to the present, including Vietnam. So, to ensure consistent economic conditions, the author chooses the research time from the 1st quarter of 2009 to the 4th quarter of 2019.

Proposed Model

$$VNINDEX_t = \beta_0 + \sum_{i=1}^{n} \beta_i \, MACRO\_VARIABLES + \varepsilon \quad (1)$$

$$VNINDEX_t = \beta_0 + \beta_1 NER_t + \beta_2 CPI_t + \beta_3 IR_t + \beta_4 OIL\_PR_t + \beta_5 GDP_t + \beta_6 M2_t + \beta_7 IPI_t + \varepsilon \quad (2)$$

Where:

$VNINDEX$: stock price; NER: Exchange rate; CPI: Consumer price index; I.R.: Interest rate; OIL_PR: Oil prices; GDP: Growth of gross domestic product; M2: Money supply; IPI: Industrial production index.

RESEARCH RESULTS

Table 1 presents the descriptive statistics for all macroeconomic factors in model 2, including the mean, minimum, and maximum values with a sample of 44 observations.

Table 1. Descriptive statistics

	VNINDEX	NER	CPI	IR	OIL_PR	GDP	M2	IPI
Mean	5.7975	9.9495	5.3744	6.6250	4.4621	15.2955	14.9781	4.7134
Median	6.1985	9.9440	5.5049	6.0000	4.5356	14.3718	14.9363	4.6985
Maximum	7.0656	11.2122	5.7435	13.0000	5.4806	21.2133	16.4145	5.3145
Minimum	1.0000	9.6840	4.5951	4.5000	3.6378	12.6479	13.7633	4.2097
Std. Dev.	1.5608	0.3021	0.3413	2.8867	0.4603	2.61033	0.6911	0.2644
Observations	44	44	44	44	44	44	44	44

In the next section, we consider whether the variables are stationary. Augmented Dickey-Fuller (ADF) Unit root tests and Phillips-Perron are used to check the stationarity in the time series of variables (Table 2).

Table 2. Unit Root Test

Variables	ADF		Phillips-Perron	
	Level	1st difference	Level	1st difference
VNINDEX	-1.0946 (0.9180)	-5.1117 (0.0008)***	-0.4695 (0.9813)	-5.0575 (0.0000)***
CPI	-0.7249 (0.9646)	-6.7717 (0.0000)***	-0.6442 (0.9709)	-6.9487 (0.0000)***
GDP	-1.8507 (0.6623)	-7.6923 (0.0000)***	-1.7794 (0.6973)	-9.2324 (0.0000)***
IPI	-2.6608 (0.2575)	-0.2975 (0.0461)**	-3.1256 (0.1135)	-15.1870 (0.0000)***
M2	-1.1802 (0.9020)	-6.2729 (0.0000)***	-1.1802 (0.9020)	-6.2846 (0.0000)***
NER	-1.3646 (0.8572)	-4.7665 (0.0021)***	-1.6086 (0.7731)	-4.7219 (0.0024)***
OIL_PR	-2.0867 (0.5383)	-5.8499 (0.0001)***	-2.2999 (0.4250)	-5.8256 (0.0001)***
IR	-3.0746 (0.1255)	-5.0914 (0.0009)***	-2.3842 (0.3822)	-4.2929 (0.0077)***

Note: Values in parentheses ( ) are p-values.

(*), (**), (***): statistically significant at 10%, 5%, 1%

Source: Results from Eviews

When examining the characteristics of time series data using the ADF and Phillips-Perron unit addiction tests (1988). The tests illustrate that all the nonstationarity data series are performed at the 1%, 5%, or 10% significance levels. Based on Table 1, all p-values are less than 1%, so all variables have no unit root. That means we conclude the series is stationary. Besides, the dependent variable is stationary, and the independent variables are a mix of stationary and non-stationary (integrated at order 1) variables.

In the next section, the author examines the defective phenomenon in the model. According to Montgomery et al. (2001), multicollinearity occurs when the VIF value exceeds 10. In this paper, VIF is less than 10.0 with the elimination of the Industrial production index variable. Hence, in the model, the estimates of regression coefficients are reliable and stable. That means no multicollinearity problem exists in the model (Table 3).

Table 3. Variance Inflation Factor

Variable	Coefficient variance	Uncentered VIF	Centered VIF
CPI	0.0590	984.6153	3.8673
GDP	0.0008	116.7522	3.2311
IR	0.0003	11.6290	1.8200
M2	0.0199	2583.1130	5.3641
NER	0.1055	6009.3120	5.4094
OIL_PR	0.0188	217.7359	2.2415
C	5.6625	3254.8300	NA

Source: Results from Eviews

The ARDL model provides a valuable means to test the presence of long-term relationships between economic time series. Akaike's Information Criterion (AIC) is used to select the lag structure in the ARDL model. Next, the study uses RESIDUAL DIAGNOSTICS tests (including variance change and autocorrelation) and CORRELOGRAMQ-STATISTICS (standard remainder distribution). The results are shown as follows.

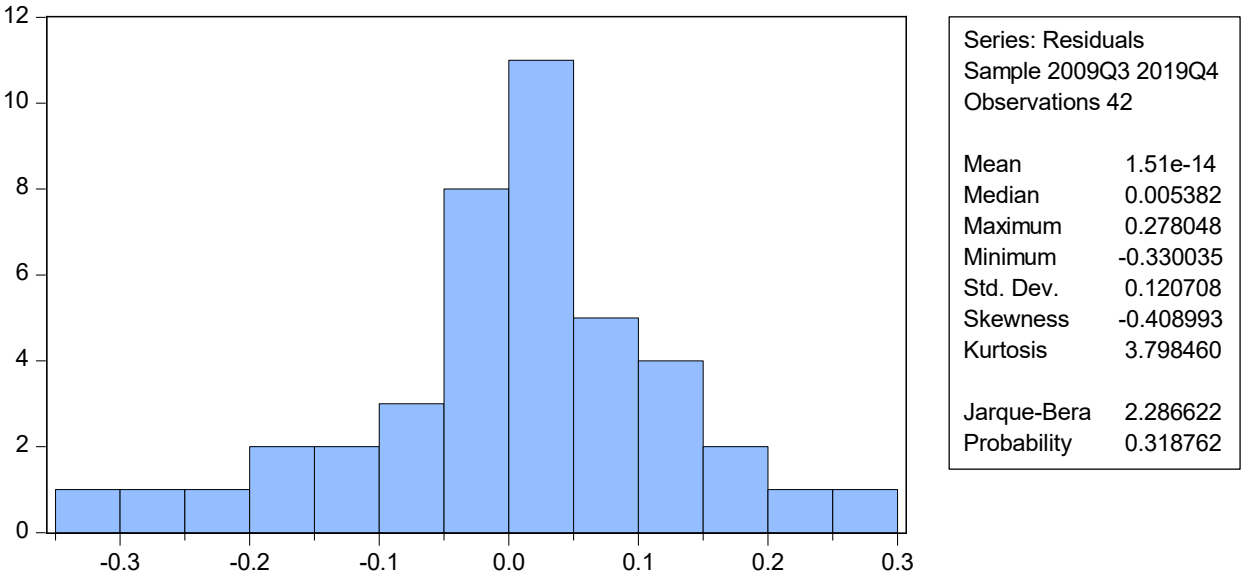

Figure 2. Verifying the normal distribution of residuals

Source: Results from Eviews

Figure 2 shows that the p-value is higher than 5%, indicating no reason to reject H0 (the residual has normal distribution). The Jarque-Bera test reveals the model's residuals have a normal distribution, are free of significant serial correlation, and are free of heteroskedasticity.

The tests for heteroscedasticity and autocorrelation will be used to claim no systematic change in the spread of the residuals over the range of measured values to prove that the residuals are independent of each other (Table 4).

Table 4. Heteroskedasticity and Autocorrelation Test

No.	Test	F-statistic	p-values	H0
1	Heteroskedasticity Test: Breusch-Pagan-Godfrey	1.4850	0.1915	Accept
2	Breusch-Godfrey Serial Correlation LM Test	1.8131	0.0900	Accept

Source: Results from Eview

The tests in Table 4 are used for testing the autocorrelation and heteroscedasticity phenomenon, which aim to claim that the residuals are independent of each other and no systematic change occurred in the spread of the residuals over the range of measured values. The tests are based on the ordinary least squares method (Appendix 1). Because both p-values are larger than 5%, it means the autocorrelation and the heteroskedasticity phenomenon do not exist in the model (Appendix 2).

In the next section, the author performs a Bounds test to clarify the co-integration issue and determine optimal lag selection. Regarding the Bounds Test with a null hypothesis of no co-integration. The test results show that the statistical value F is greater than the upper limit value with a significance of 5%. Thus, we can possibly reject H0 and conclude a long-term relationship between variables in the time series model (Table 5).

Table 5. Bounds Test

F-Bounds Test		Null Hypothesis: No level of relationship		
Test Statistic	Value	Significance	I(0)	I(1)
			Asymptotic: n = 1000	
F-statistic	13.18353	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
Actual Sample Size	42		Finite Sample: n = 45	
		10%	2.188	3.254
		5%	2.591	3.766
		1%	3.54	4.931
			Finite Sample: n = 40	
		10%	2.218	3.314
		5%	2.618	3.863
		1%	3.505	5.121

Source: Results from Eviews

F-statistic is 13.1835, which is significant at 0.01 marginal values with 3.99 as the upper bound value, as shown in Table 5. It indicates that VNINDEX and its determinants have a long-term relationship because the variables are cointegrated, according to Pesaran et al. (2001).

Table 6. ARDL Long Run Form

ARDL Long Run Form and Bounds Test				
Dependent Variable: D(VNINDEX)				
Selected Model: ARDL(1, 2, 1, 2, 0, 0, 2)				
Case 2: Restricted Constant and No Trend				
Date: 07/11/21 Time: 00:08				
Sample: 2009Q1 2019Q4				
Included observations: 42				
Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.9096	3.7520	1.3085	0.2017
VNINDEX(-1)*	-0.6391	0.1162	-5.4988	0.0000
CPI(-1)	2.6014	0.4860	5.3527	0.0000
GDP(-1)	0.0829	0.0245	3.3822	0.0022

Table 7. Continued

IR(-1)	-0.0585	0.0127	-4.5885	0.0001
M2**	-1.0995	0.3032	-3.6267	0.0012
NER**	0.1931	0.6019	0.3208	0.7509
OIL_PR(-1)	-0.3532	0.1011	-3.4951	0.0017
D(CPI)	4.5362	0.2717	16.6950	0.0000
D(CPI(-1))	0.4209	0.2538	1.6580	0.1089
D(GDP)	0.0551	0.0182	3.0238	0.0054
D(I.R.)	-0.0411	0.0182	-2.2573	0.0323
D(IR(-1))	0.0377	0.0176	2.1431	0.0413
D(OIL_PR)	-0.0211	0.1380	-0.1532	0.8794
D(OIL_PR(-1))	0.3063	0.1214	2.5235	0.0178
* p-value incompatible with t-Bounds distribution.				
** Variable interpreted as Z = Z(-1) + D(Z).				
Level Equation				
Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
CPI	4.0705	0.5184	7.8527	0.0000
GDP	0.1296	0.0252	5.1415	0.0000
IR	-0.0915	0.0214	-4.2792	0.0002
M2	-1.7205	0.4421	-3.8915	0.0006
NER	0.3021	0.9579	0.3154	0.7549
OIL_PR	-0.5527	0.1485	-3.7213	0.0009
C	7.6823	5.1921	1.4796	0.1506
EC = VNINDEX - (4.0705*CPI + 0.1296*GDP-0.0915*IR-1.7205*M2 +				
0.3021*NER-0.5527*OIL_PR + 7.6823)				

Source: Results from Eviews

Selecting the lags of the ARDL model: on the bases of the AIC and SBC criteria, Table 6 shows that the optimal delay in the ARDL model is (1, 2, 1, 2, 0, 0, 2). Additionally, the long-term coefficients of the ARDL model are estimated with the chosen lags (1, 2, 1, 2, 0, 0, 2).

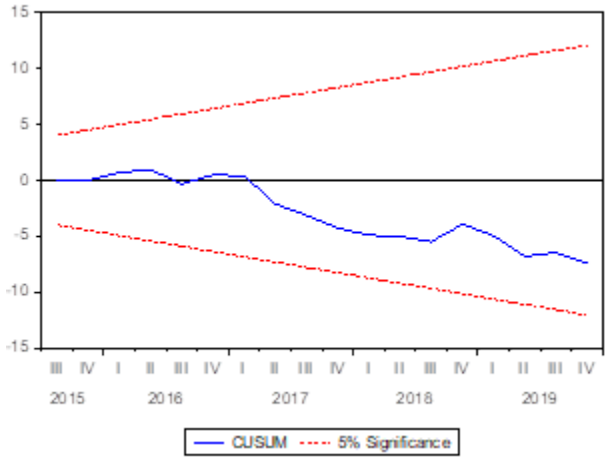

Figure 3. Testing the stability of the model (CUSUM Test)
Source: Results from Eviews

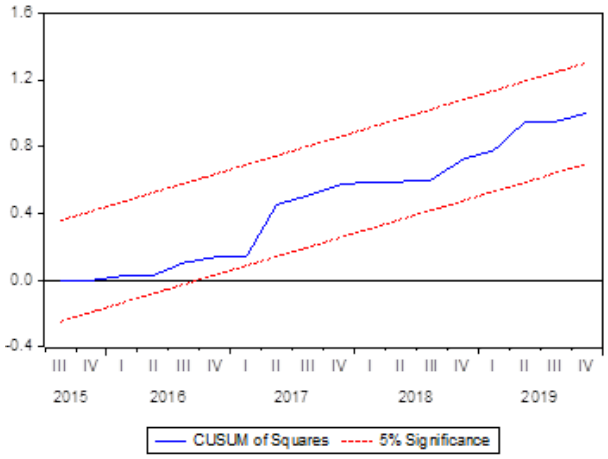

Figure 4. Testing the stability of the model (CUSUM of Squares Test)

Thus, the research results show that the consumer price index, gross domestic product, interest rate, money supply and oil price are statistically significant variables affecting the stock market. In particular, the consumer price index and GDP directly relate to the stock market. Whereas interest rate, money supply, and oil price have opposite effects.

The following section implements diagnostic tests to ensure reliable and unbiased results. First, the author presents the results of the CUSUM Test and the CUSUM of Squares Test to verify the stability of the model

With a significance of 5%, the CUSUM Test and CUSUM of Squares Test show that the model's stability is guaranteed within the upper and lower limits (Figures 3 and 4). Given that the curved line representing the residuals did not fall outside the two extreme lines representing the critical regions, the residuals would have been stable.

Besides, to confirm the model specification, Ramsey Reset Test is applied. The test is used to examine whether the linear specification is rejected (Table 7).

Table 8. Ramsey Reset Test (Stability)

Ramsey RESET Test			
Equation: UNTITLED			
Specification: VNINDEX VNINDEX(-1) CPI CPI(-1) GDP IR IR(-1) IR(-2) NER OIL_PR OIL_PR(-1) OIL_PR(-2) C			
Omitted Variables: Squares of fitted values			
	Value	df	Probability
t-statistic	0.061931	29	0.9510
F-statistic	0.003835	(1, 29)	0.9510

Source: Results from Eviews

With a p-value greater than 5%, no evidence supports H0: 'the estimated model is not biased and compatible', implying an unbiased and well-specified model.

DISCUSSIONS

Testing the series' behavior is important when dealing with time series data to determine the stationary levels. From the unit root test, we found that the variables were integrated of the same order, I(1). Moreover, ARDL can be applied in modeling the series' relations, regardless of the order of integrations. We, therefore, move ahead to conduct the ARDL bounds test for co-integration. The test results confirmed evidence of long-term relationships because the F-Statistics value is greater than the lower and upper critical bounds for all the significant levels. At the 5% level, the paper's findings determine five statistically significant variables affecting the Vietnamese stock market: consumer price index, gross domestic product, interest rate, money supply, and oil price.

First, the consumer price index has positively affected the Vietnamese stock market because the coefficient is higher than zero (4.0705). The findings are in line with the studies by Hosseini et al. (2011), Hosseini et al. (2011), Ouma and Muriu (2014), Umer (2016), and Alam (2017). The findings show a long-term positive relationship between the stock market and the consumer price index in Vietnam. In some previous studies, inflation hurts the stock market, but this finding proves the positive correlation in the Vietnamese context. Investors' behaviors are sensitive in countries where the financial market has a high level of asymmetric information, such as Vietnam. An increase in inflation implies that the economy is unstable. In response to the rise in inflation, investors will take action to hedge against inflation by requiring the nominal stock market return to be high to compensate for an increase in inflation. Thus, the inflation-stock price relationship is demonstrated to be positive. The explanation is supported by Irving Fisher's (1930) argument, known as the Fisher Effect, which clarifies the long-term relationship between inflation and stock price based on investors' expectations of the nominal stock market return. Therefore, higher inflation will increase the nominal stock market return; investors are fully compensated (Ouma & Muriu, 2014; Alam, 2017).

Second, GDP is a statistically significant variable that influences the stock market in

Vietnam. Given the positive coefficient, their relationship is directly demonstrated (0.1296). The findings of the paper are in line with those of Paul and Mallik (2014), Hsing (2011), Hsing (2013), and Boonyanam (2014). GDP is one of the macroeconomic indicators that measures the direction of economic development. Vietnam's aggregate stock price indexes will be created as the GDP rises.

Third, since the stock price and interest rate are negatively correlated, the interest rate will hurt Vietnam's aggregate stock price index. If the interest rate rises one point and all other things are unchanged, the VNINDEX will lose 0.0915 points. Hsing (2013), Umer (2016), and Wahyudi et al. (2017) all support the findings of this paper.

Fourth, the money supply is explored to have a negative and statistically significant impact on the price of Vietnamese stocks. During the study period, a one-point increase in the money supply will result in a 1.7204 decrease in stock market growth. That result is consistent with the studies by Onneetse et al. (2014) and Bala and Hassan (2018). The findings support the theory that an increase in the amount of money in circulation can increase the price of goods and services in the economy. They claim that money supply and stock returns are mutually exclusive because money supply causes inflation, which raises the discount rate. The stock value is lower due to the higher discount rate and vice versa.

Finally, oil price is a factor that has a negative and significant impact on the Vietnamese stock market. The findings of Ray (2012), Kumar (2014), Rafailidis and Katrakilidis (2014) and Wahyudi et al. (2017) support the paper's conclusion. A rise in oil prices will cause a drop in stock prices.

CONCLUSIONS AND LIMITATIONS

The article estimates the macroeconomic factors affecting the Vietnamese stock market, measured by VNINDEX. The research results show that in the long term, the consumer price index, gross domestic product, interest rate, money supply and oil price affect the stock market, which are statistically significant variables at 95% confidence intervals. This result is consistent with the theoretical basis and the analytical framework above and is consistent with Vietnamese practices and previous studies. Vietnam has over 20 years of establishment and development of the stock market. However, the results reflecting the one-way relationship between the stock market and economic growth show that the stock market is still relatively young and inconsistent with development of the stock market. Vietnam's economy is developing and remains at an early stage than the development trend of the economy in the world.

Aside from some impressive results, certain flaws need to be addressed. First, only macroeconomic variables, such as the consumer price index, gross domestic product, interest rate, money supply, oil price, exchange rate, and industrial production index, are used in this study to estimate their impact on the Vietnamese stock market. Therefore, besides these factors, other factors such as gold price, wages, imports, and exports should be considered in future studies. Second, the data is collected quarterly from 2009 to 2019, so the number of observations is small. Finally, instead of the ARDL model, the results could be obtained using a vector error correction model.

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APPENDIX 1: OLS REGRESSION

Dependent Variable: VNINDEX
Method: Least Squares
Date: 11/22/22 Time: 11:53
Sample: 2009Q1 2019Q4
Included observations: 44

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	3.5555	0.2641	13.4619	0.0000
GDP	0.1156	0.0279	4.1399	0.0002
IPI	1.6054	0.7126	2.2528	0.0305
IR	-0.0726	0.0195	-3.7212	0.0007
M2	-2.2218	0.2636	-8.4290	0.0000
NER	-0.3622	0.3270	-1.1076	0.2754
OIL_PR	-0.1121	0.1551	-0.7230	0.4744
C	15.2167	2.7357	5.5623	0.0000

R-squared	0.9763	Mean dependent var	5.7976
Adjusted R-squared	0.9717	S.D. dependent var	1.5608
S.E. of regression	0.2626	Akaike info criterion	0.3265
Sum squared resid	2.4824	Schwarz criterion	0.6509
Log likelihood	0.8164	Hannan-Quinn criter.	0.4468
F-statistic	211.8806	Durbin-Watson stat	1.2153
Prob(F-statistic)	0.0000		

APPENDIX 2: HETEROSKEDASTICITY AND AUTOCORRELATION TEST

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.4851	Prob. F(11,30)	0.1888
Obs*R-squared	14.8071	Prob. Chi-Square(11)	0.1915
Scaled explained SS	12.5058	Prob. Chi-Square(11)	0.3268

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.8132	Prob. F(2,28)	0.1818
Obs*R-squared	4.8158	Prob. Chi-Square(2)	0.0900

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