THE MACRO-FACTORS AFFECT SECURITIES MARKET: CASE IN VIETNAM

Nguyen Kim Quoc Trung

nkq.trung@ufm.edu.vn

University of Finance - Marketing

Nguyen Thi Phuong Dung

nguyenthiphuongdung.cs2@ftu.edu.vn

Foreign Trade University, Ho Chi Minh Campus

Abstract

The main objective of this study is to determine the macro-factors affect Vietnam stock market from 2006 to 2017. By using qualitative research methods such as the statistics, description techniques, the study analyzes the volatility of the stock market in Vietnam during that period. At the same time, the method of estimating the long-term relationship between Vietnam stock market and key macro-factors by using an autoregressive distributed lag model. Research results show that the significant variables have influenced on Vietnam stock market are: Consumer price index, Exchange rate and Oil price affect.

Keywords: *stock market, VNINDEX, exchange rate, inflation rate, interest rate, oil price, money supply.*

1. Introduction

International investors and researchers have focused on emerging financial markets in Asia, including Vietnam. The stock market since joining Vietnam has provided attractive investment opportunities for foreign investors. Globalization has led to the economic growth and international financial market integration as well as the participation of foreign investors has made the relationship between the global stock market and macro-factors such as the foreign exchange rate, inflation rate, oil price stronger (Megaravalli và Sampagnaro, 2018).

However, the Vietnamese economy is currently facing many difficulties and challenges with the deficit trade balance, foreign exchange reserves are not strong enough, the usage of foreign direct investment (FDI) capital is still low… So, the concerns of investors about the macro environment for the operation of the stock market are completely baseline and the question is raised whether the fluctuation of the macroeconomy will affect the volatility of the stock market?

There have been many research studies on the influence of macro factors on the stock markets of different countries and vice versa. Specifically, in the Japanese stock market, Hamao (1988) determined that changes in the expected inflation rate, unanticipated changes in risk premia and the term structure of interest rates were statistically significant variables and have affected the Japanese stock returns. Another research study of Megaravalli và

Sampagnaro (2018) has considered the relationship macroeconomic indicators and their impact on stock markets in ASIAN 3 with a pooled mean group approach. While Jareño and Negrut (2016) investigated the impact of the US stock market on macroeconomic factors. As these results, we can see there is a linkage two-way between the stock market and macro-factors. However, in this paper, the author only considers the effect of macro-factors to the stock market. This leads to the main objective of the paper is to answer the question "What are the macro factors affecting the Vietnam stock market?"

2. Literature review and previous research studies

2.1. Literature review

(i) Efficient market hypothesis - EMH:

An effective market is a market in which the prices of securities fully and immediately reflect all available information in the market. The increase or decrease in stock price due to the market's reaction to new information that cannot be predictable. The effective market hypothesis assumes that all investors are equally aware of all the available information. Many methods for analyzing and assessing stocks cause problems in the effectiveness of hypothesis. If one investor seeks an undervalued market opportunity while another assesses the stock on the basis of growth potential, the two investors will have a different assessment of the market value. of the stock. Effective market hypothesis includes weak-form, semi-strong form and strong-form effiency). Accordingly, the weak-form market assumes that the price of securities promptly reflects all information that investors can be obtained from past transaction data: price, trading volume and earnings ratio. Historical price data is publicly available and accessible to investors, as well. Assuming that past data shows future trends, investors will immediately tap and use that information. Secondly, the semi-strong market assumes that all information relating to the company has been publicly disclosed and historical information is reflected in stock prices. Neither fundamental analysis nor technical analysis yielded an extraordinary rate of return to investors. Finally, the strong-form market is strong with all information related to securities, including insider information, is also reflected in stock prices. There is no analysis that could yield a return for investors. Use passive portfolio management strategy.

(ii) Capital asset pricing model - CAPM

The model describes the relationship between risk and expected return. In this model, the expected return of a security is equal to the risk-free return plus a risk premium based on the system-wide risk 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. The CAPM model has been developed by William Sharpe since the 1960s and has had many applications ever since. Although there are a number of other models that attempt to explain market dynamics, the CAPM is a conceptually simple and practical application. Like any other model, this model is only a simplification of reality by necessary assumptions, but it still allows us to draw useful applications. The widely used CAPM model was discussed as profitability can be predicted from other financial factors. This has led to the development

and testing of alternative asset pricing regulations, such as the Differential Valuation Theory (APT) and the Present Value Model (PVM). Various evidence of links on the effects of stock returns and macro variables was found in the literature using other asset pricing rules instead. In the context of volatile macroeconomic markets of stock returns, APT assumes that profits are generated by a number of macroeconomic factors. This 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. In an empirical investigation, they found that the yield spreads between long-term and short-term government bonds, expected inflation, unexpected inflation, nominal industrial production growth and the spread. The interest rate between high and low bonds of the company significantly explains the profits of the stock market.

2.2. Previous research studies

Domestic and foreign studies have done and tested on macro factors affecting the price of securities. Overseas, in particular, Fama & Schwert (1977), Nelson (1977) and Jaffe & Mandelker (1976), all claim that macroeconomic variables clearly affect income and stock prices promissory note.

Hosseini et al. (2011) market research in China and India came to the conclusion that in the short term, the Chinese stock price index is positively but insignificantly correlated with the M2 expansion of money with the size of 0.701. In the long run, this positive correlation is due to the influx of public funds into the market leading to an increase in the company's earnings, in addition to its cyclical monetary policy. In India, the stock price index is negatively correlated with the M2 expansion of money with a magnitude of (-22.53) due to a counter-cyclical monetary policy. This negative effect is in line with the expectation that when the money supply increases, inflation will increase and profit will increase lower.

Mukherjee and Naka (1995) show that the industrial production index is positively correlated with the expansion of the money supply growth, the increase in the expansion of the money supply can lead to an increase in the discount interest rate leading to There is a negative effect on stock prices in the valuation model, but economic stimulus packages are likely to generate more income for companies that increase cash flow and thereby increase stock prices. Chen, et al. (1986) in the US also concluded that real economic activity correlates positively with stock prices. Fama (1990) researched in the US also found that real economic activity correlated positively with stock prices, similar to the post-war period in the US that also showed positive correlations.

Fama (1990) research in the US showed that measuring the variance of returns of the stock price index before cash flow shocks would require a lot of time data and the shocks impact on expected returns are One way to assess the fairness in stock prices. The variables representing historical data of expected returns and shocks in expected returns account for 30% of the annual share of profit variance in the NYSE market while the product growth rate (manufacturing index industry) represents the expected cash flow, explaining 43% of the profit variance. Combining the capacity of the research variables to account for 58% of the annual variance of stock returns is useful information proving the effectiveness of the market.

In Vietnam, studies of Nguyen Minh Kieu, Nguyen Van Diep and Le Nguyen Hoang Tam (2013) on "Macroeconomic factors and volatility of Vietnam's stock market" using qualitative methods without Perform quantitative research to examine the correlation in the relationship between macro variables with stock prices. In addition, according to research by Than Thi Thu Thuy and Vo Thi Thuy Duong (2015), "The impact of macroeconomic factors on stock price indexes on HOSE", the authors use Regression model using eviews software to check the relationship and co-link between macro variables to VNINDEX, VN30, VN100.

3. Methods

3.1. Research methods

The study used descriptive statistical method, self-correlation test to analyze the initial data series, stop test, optimal latency test, Bound test (bounds test). The relationship between VNINDEX and macro variables will be estimated and verified through ARDL (Auto Regression Distributed Lag) model - Bound Test according to Pesaran and Pesaran (1997), Pesaran and Shin (1999), Pesaran and et al (2001). The ARDL model helps us to control endogenous phenomena (Laurenceson and Chai, 2003), simultaneously analyzing the short-term and long-term relationships for different tuple data series (Banjeree et al., 1993). , and are suitable for short-duration data series (Pesaran and Shin, 1999).

Choosing the latency of the ARDL model, Estimating the long-term coefficients of the ARDL model and diagnosing the test: testing the model's wrong shape through Ramsey's RESET test to consider the extent and direction of impact of the ARDL model Macro factors such as inflation, expansion of money supply, exchange rate, interbank interest rates and industrial production index to stock price index at Ho Chi Minh Stock Exchange (HOSE)). This is also an inheritance from studies abroad and a new point when applying the ARDL model with the delay of independent variables to consider the impact of macro variables on Vietnam's stock market, capital comes after compared to other markets like the US. ARDL is considered a successful, flexible and easy-to-use model for analyzing multivariate time series (Aydin, 2000). The ARDL model allows us to determine the impact of the independent variables on the dependent variable by selecting the appropriate latency to give the most reasonable results.

Table 1. Variables in proposed model

Number	Variables	Author(s)
1	Exchange rate	Suriani et al., 2015; Mishra (2004)
2	Inflation	Gallagher and Taylor (2002a, b) Rapach (2002); Spyrou (2004)
3	Interest rate	Fama (1965); Samuelson (1965); Shiller (1989)
4	Oil price	Jones and Kaul (1996)
5	Gross Domestic Product	Paul (2012)
6	Money supply	Mjkherjee and Naka (1995); Fama (1981)
7	Industrial production index	Fama (1990)l Geske & Roll (1983); Chen, Roll and Ross (1986); Tainer (1993)

Source: Author's collection

3.2. Research data

Based on the theoretical framework and empirical studies, the authors propose the following research model:

$VNINDEX_t = f(CPI, GDP, IPI, M2, NER, OIL\_PRICES, POLICY\_RATE)$

where:

• IPI: industrial production index (taken from the General Statistics Office)

• CPI: consumer price index (representing inflation rate) (taken from the General Statistics Office)

• OIL_PRICES: oil prices

• POLICY_RATE: is the interest rate difference

• NER: exchange rate (taken from Worldbank)

• M2: money supply (taken from Worldbank)

• GDP: growth of gross domestic product (taken from Worldbank)

The relationship between VNINDEX and the macro variables in the model will be estimated and tested using the ARDL - Bound Test method. The procedure for performing ARDL Bounds - Test consists of the following steps:

- Step 1: Testing Unit Root Test by methods such as ADF, PP (Phillips-Perron) to ensure the conditions for applying the ARDL - Bound Test method (no stopping variables at level 2).

- Step 2: Establish ARDL model.

- Step 3: Determine the hysteresis structure for the model in step 2. To determine the hysteresis structure, we can use indicators such as AIC, SIC (more suitable in the case of small sample sizes)

- Step 4: Verify the autocorrelation phenomenon in the residual

- Step 5: Test the stability of the model by CUSUM and CUSUMSQ test proposed by Brown et al. (1975).

- Step 6: Perform Bounds Test to verify the existence of long-term relationship between variables.

- Step 7: If the result in Step 6 is to have long-term relationship, we will regress the cointegration equation and limit error correction equation - Unrestricted Error Correction Model to consider the relationship equilibrium in the long run and short-term effects between variables.

4. Results

In Vietnam, the collection of macro data is quite difficult, the use of annual data is inappropriate because Vietnam stock market is an emerging market with a history of only about 10 years. In this study, the data used here is quarterly data, from Q1 2008 to Q4 2016. First we consider whether the variables described above are stationary or not.

Augmented Dickey-Fuller (ADF) Unit root tests and Phillips-Perron are used to check the stationarity of variables:

Table 2: Unit Root Test

| Variables	ADF		Phillips-Perron	
	Level	1st difference	Level	1st difference
VNINDEX	-4.599398	-6.838830	-4.541095	-17.44747
	(0.0041) ***	(0.0000) ***	(0.0048) ***	(0.0000) ***
CPI	-1.360720	-3.784112	-1.110190	-3.659024
	(0.8544)	(0.0303) **	(0.9129)	(0.0394) **
GDP	-0.556375	-1.890869	-11.63129	-14.27394
	(0.9748)	(0.6351)	(0.0000) ***	(0.0000) ***
IPI	-0.215032	-1.497080	-2.828698	-16.33373
	(0.9897)	(0.8089)	(0.1971)	(0.0000) ***
M2	-3.579188	-5.192616	-1.001107	-7.963268
	(0.0468) **	(0.0009) ***	(0.9309)	(0.0000) ***
NER	-1.099360	-4.712295	-0.996261	-4.650856
	(0.9140)	(0.0032) **	(0.9317)	(0.0037)
OIL_PRICES	-1.846223	-5.171268	-1.981389	-5.148107
	(0.6605)	(0.0010) **	(0.5909)	(0.0010)
POLICY_RATE	-3.628850	-5.827050	-2.635958	-5.646613
	(0.0467) **	(0.0002) ***	(0.2678)	(0.0003) ***

Source: Analysis of authors

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

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

On the basis of the hypothesis H0: the research variable series has a unit root (non-stop) and H1: the research variable series has no unit root (stop). p-value $<\alpha$ with significance level $\alpha = 5\%$ or $\alpha = 10\%$ or $\alpha = 1\%$. When examining the characteristics of time series data, using the ADF and Phillips-Perron unit addiction tests (1988), the authors found that the variables have unit root (individual unit root process), but all stop at the 1st difference) (except variables VNINDEX, M2 and POLICY_RATE, has no unit root).

By using the ARDL model to provide a very valuable means to test the presence of long-term relationships between economic time series. This model is "autoregressive", in the sense that yt is "partially explained" by its own delay values. It also has a "delay distribution" component, in the form of consecutive delays of the explanatory variable "x", the present value of xt is excluded from the distributed delay of the structure of the model (David, 2015). Akaike's Information Criterion (AIC) to select the late structure in ARDL model. Next, the study uses RESIDUAL DIAGNOSTICS tests (including variance change and autocorrelation); CORRELOGRAM - Q-STATISTICS (standard distribution of the remainder), the results are presented in the following tables:
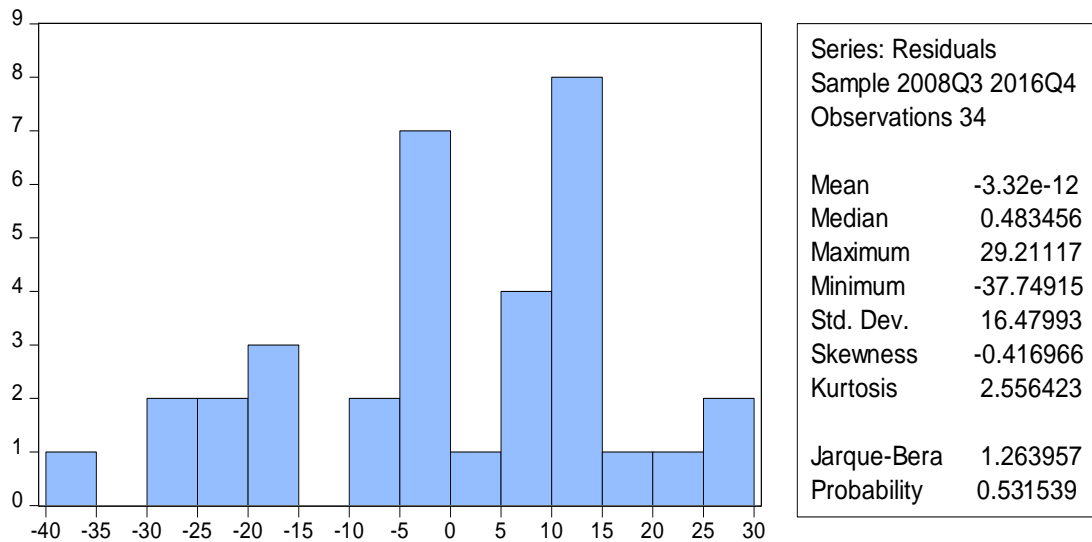
Figure 1: Verifying the normal distribution of residuals

Source: Analysis of authors

According to the result in Figure 4, p-value is greater than 5%, so there is no evidence to reject H0 (the residual has normal distribution). The remainder has a standard distribution through the Jarque-Bera test. The tests for autocorrelation and variance change for residuals as follows:

Table 3: Autocorrelation phenomenon Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.139864	Prob. F(2,16)	0.8705
Obs*R-squared	0.584207	Prob. Chi-Square(2)	0.7467

Source: Analysis of authors

The p-value in Table 3 and Figure 2 (below) is greater than 5%, so there is no evidence to refute H0: There is no autocorrelation. Therefore, the model does not exist the autocorrelation phenomenon.

Sample: 2008Q1 2016Q4
Included observations: 34
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.082	-0.082	0.2473	0.619
		2	0.083	0.076	0.5085	0.776
		3	-0.222	-0.212	2.4522	0.484
		4	-0.258	-0.311	5.1631	0.271
		5	-0.152	-0.203	6.1390	0.293
		6	-0.209	-0.325	8.0491	0.235

*Probabilities may not be valid for this equation specification.

Figure 2: Testing the autocorrelation phenomenon

Source: Analysis of authors

The variance phenomenon is tested in Table 3 as follows:

Table 4: Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.602076	Prob. F(15,18)	0.8372
Obs*R-squared	11.35944	Prob. Chi-Square(15)	0.7267
Scaled explained SS	2.477660	Prob. Chi-Square(15)	0.9999

Source: Analysis of authors

The p-value of variance change test (Breusch-Pagan-Godfrey) has a value greater than 5%, so the hypothesis H0 (residuals with variance unchanged) does not have enough evidence to reject it. Therefore, the model has no variance change phenomenon.

The stability of the model is done through CUSUM Test and RAMSEY RESET Test:
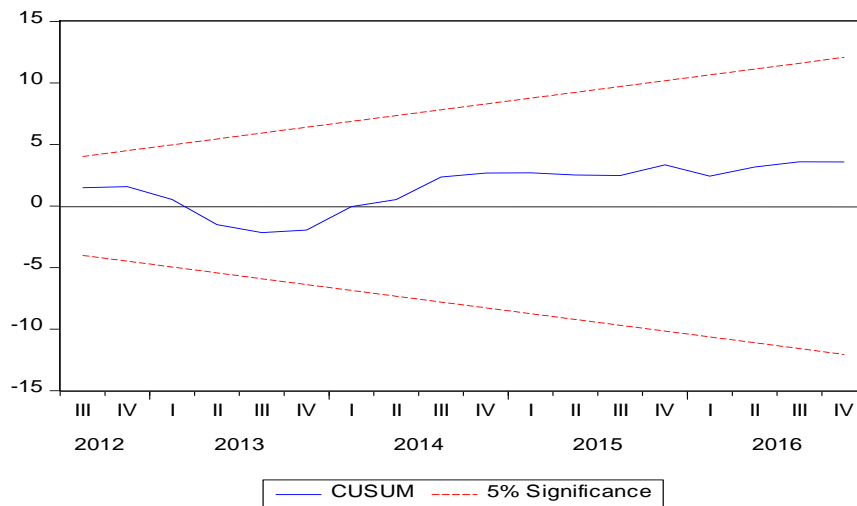
Figure 3: Testing the stability of the model

Source: Analysis of authors

The CUSUM Test shows that the stability of the model is guaranteed within the upper and lower limits with a significance of 5%.

Table 5: Ramsey Reset Test (Stability)

Ramsey RESET Test

Equation: UNTITLED

Specification: VNINDEX VNINDEX(-1) CPI CPI(-1) CPI(-2)
    GDP IPI M2 M2(-1) M2(-2) NER OIL_PRICES OIL_PRICES(-1) POLICY_RATE C

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.364259	17	0.1903
F-statistic	1.861203	(1, 17)	0.1903

Source: Analysis of authors

With the Ramsey RESET Test p-value is greater than 5%, so the hypothesis H0: the estimated model is not biased and compatible with no evidence to reject it, so the model has an unbiased and compatible estimate. At the end of the article, we perform bounds test: the procedure of testing the contour of ARDL method for the study is as follows:

Hypothesis H0: there is no co-association between the variables. The test results show that the statistical value F is greater than the upper limit value with a significance of 5%. Thus it is possible to reject the hypothesis H0, and conclude that there exists a long-term relationship between variables in the time series model.

Estimating the long-term coefficients of the ARDL model: shows the results of estimating the short-term coefficients of the ARDL model (1, 2, 1, 0, 0, 2, 0, 1, 0). And estimate the long-term coefficients of the ARDL model with the chosen lags. Thus, the research results show that the Consumer Price Index (representing inflation), M2 money supply, exchange rates and oil prices have an impact on the stock market. In particular, M2 money supply and oil price have the same effect; Consumer price index and exchange rate have opposite effects. This research result is consistent with the research of Le and Dang (2015) and some previous researchers.

5. Discussion and Conclusion

The article has analyzed the macro factors affecting Vietnam's stock market, through the representative of VNINDEX. Thus, according to the research results, in the long term, the Consumer Price Index (representing inflation), the exchange rate and the price of oil affect the stock market. All variables Exchange rate, Consumer price index and Oil price have a positive impact on the stock price index with 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 more than 17 years of establishment and development of the stock market, but the results show that the one-way relationship from the stock market to economic growth shows that the stock market is still quite young, but consistent with the level of development of a stock market. The economy is developing and still at an early stage compared to the necessary development trend of an economy.

6. References

1. Aydin, H. 2000. Interest Rate Pass-Through in Turkey. *Research and Monetary Policy Department*, 1-38.

2. Chen, N. F., Roll, R., and Ross, S. A. 1986. Economic forces and the stock market. *Journal of business*, 383-403.

3. Fama, E. 1990. Stock Returns, Expected Returns, and Real Activity. *Journal of Finance*, 1089-1108.

4. Fama, E. F, & Schwert, G. W. 1977. Asset returns and inflation. *Journal of Financial Economics, 5*, 115-146.

5. Fama, E. F. 1981. Stock returns, real activity, Inflation and Money. *American Economic Review, 71*, 545-564.

6. Gallagher, L. and Taylor, M. P. 2002a. The stock return inflation puzzle revisited. *Economics Letters*, 147-156.

7. Gallagher, L. and Taylor, M. P. 2002b. Permanent and temporary components of stock prices: evidence from assessing macroeconomic shocks. *Southern Economic Journal*, 345-362.

8. Geske, R. and Roll, R. 1983. The Fiscal and Moneytary linkage between Stock Returns and Inflation. *The Journal of Finance, 38*(1), 1-33.

9. Hosseini, S. M; Ahmad, Z. and Lai, Y. W. 2011. The Role of Macroeconomic Variables on Stock Market Index in China and India . *International Journal of Economics and Finance*, 233-243.

10. Jones, C. M and Kaul, G. 1996. Oil and the Stock Markets. *Journal of Finance, 1996*, 463-91.

11. Mukherjee, T. K. and Naka, A. 1995. Dynamic Relations between Macroeconomic Variables and the Japanese Stock Market: An Application of a Vector Error Correction Model. *Journal of Financial Research*, 233-37.

12. Rapach, D. E. 2002. The long-run relationship between inflation and real stock prices. *Journal of Macroeconomics*, 331-51.

13. Shiller, R. J. 1989. *Market Volatility.* Cambridge, Mass: MIT Press.

14. Spyrou, S. I. 2004. Are stocks a good hedge against inflation? Evidence from emerging markets. *Applied Economics*, 4167-769.

15. Suriani, S.; Kumar, M. D.; Jamil, F. and Muneer, S. 2015. Impact of Exchange Rate on Stock Market. *International Journal of Economics and Financial Issues*, 385-388.