The Role of Gold Prices and Interest Rate in Stock Index: Insights from Vietnam by Using the Autoregressive Distributed Lag Approach

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Abstract

This study aimed to determine the impact of domestic gold prices, interest rates in the stock market index (VNI) in Vietnam for the period of January 2009 to December 2018. This study employed the Autoregressive Distributed Lag (ARDL) to check the association of Independent variable gold prices and the interest rate on the dependent variable stock market index. The results show a close correlation together in the long-run. The Vietnam stock index is adversely affected by fluctuations in the credit market in the short-run. We observed that domestic gold prices and interest rates have one-way causal relations to the stock price index. Similarly, interest rates were causal for gold prices and still not yet had any particular direction. The adjustment in the short-run moves the long-run equilibrium, although the change is quite slow.

Keywords: Autoregressive Distributed Lag, domestic gold price, interest rate, VNI stock index

1. Introduction

The capital flow in the financial market will shift from a place with a high percentage of return to an area with a lower return rate according to the general principle such as currency, gold, or securities. The efficient market hypothesis proposes that not one person can get the better of the Stock Market. It means that investors capture all new information through the market (Fama, 1970).

We consider the efficient-market hypothesis when it is simultaneously effective in all three aspects, including distribution, operations, and information. Vietnam's economy is now considered an emerging economy due to the characteristics of the socialist-oriented market economy. After 20 years of service in Vietnam, the scale of the stock market has increased in volume, but the range is still quite small. The price fluctuation of the different investment channels has an evident influence. This impact comes from many factors of including the most recent critical factors such as interest rate and price fluctuations. The interest rate has a significant role in the control of the monetary market. It can affect the whole economy, especially the operation of commercial banks and the decision of investors on the stock market.

Since ancient times, people considered gold with investment role and risk prevention. Recently in Asia, Vietnam has the highest period of inflation. Therefore, Vietnamese people like to buy gold for hoarding as an anti-inflation tool because the domestic currency has depreciated a lot, and gold is the safest haven. To manage the local gold market, Saigon Jewelry Company Limited (SJC) gold brand became an only gold brand and under the management of the state. The impact on the domestic gold activities and psychology of investors in the SJC gold market also significantly affected the stock market.

So far, many empirical researchers have examined the connection between financial components and the stock index. In particular, factors include consumption price index, money supply M2, economic growth rate, etc. (Mukherjee & Naka, 1995); (Cong, Wei, Jiao, & Fan, 2008); (Chang & Su, 2010); (Yang, Kim, Kim, & Ryu, 2018); (Wei, Qin, Li, Zhu, & Wei, 2019); (Kaur & Singh, 2019). However, the study only focuses on the gold prices at the domestic level and interest rate on the stock market, i.e. (Chang & Su, 2010); (Kumar & Narayan, 2010); (Trung & Vinh, 2011); (Vinh, 2014); (Luu, Pham, & Pham, 2016). Therefore, due to its important role in exploring the plan about the interaction of the interest rate, gold price, and VN index in the emerging economy of Vietnam.

The objective of this study is to determine the role of domestic gold prices, interest rates in the stock market index (VNI) in Vietnam. We limit the scope from January 2009 to December 2018 (after the global economic crisis) by using the Autoregressive Distributed Lag (ARDL) approach as used in recent studies (Chittedi, 2012); (Gokmenoglu, 2015); (Arfaoui, 2016); (Khai, Sang, Thi, & Nguyet, 2017); (Tursoy & Faisal, 2017); (Le, 2018). This approach of ARDL is significant because recent studies prove that it is quite a suitable model for analyzing the relationship between economic factors.

The further study consists of a short review of the literature and the relationship of variables on a theoretical basis. The following section includes sample data and estimation; the

methodology discusses implemented methods along with a demonstration of experimental results from the model. In the final one, we conclude this study with significant policy implications.

2. Literature review

2.1 Relationship between the gold price and stock index

Stocks and gold are two alternative investment channels, or simultaneously gold and securities, to seek profitable opportunities. In this aspect, when the stock price rises, investors will have many opportunities to profit on the stock market, decreasing investment in gold. However, we should note two things from the above comments. (i) Never securities and gold are entirely substitutes for each other. This implies that even if stock prices are attractive, there are some investors who only often investment in gold; (ii) Like stocks, gold is a vital investment channel in the financial market. The bustle in this investment activity will create excitement for them to invest in other activities.

In Southeast Asia, countries with emerging economies include Vietnam, Thailand, Indonesia, Malaysia, Philippine, and India reported by the (Mishra, Das, and Mishra, 2010) research, which demonstrates that in Vietnamese and Philippine stock markets, gold and securities are interchangeable assets. Meanwhile, it is just an additional investment channel for the stock market of some developing countries, such as Thailand, Malaysia, and Indonesia. The study has investigated the role of gold by using Granger causality from January 1991 to December 2009. India's gold and securities prices had correlated positively and had short-run relationships along with a coherent long-run co-correlation.

In contrast to the above study, in the US stock market, between 1991 and 2001, with four gold price indexes and six stock indexes, (Smith, 2001) presented the small and negative correlation in the short-run. Between variables in the long-run, there is no cointegration, along with the Granger causality test illustrates that gold prices and stock indexes have no direct relationship. When studying at the Vietnam stock market, (Vinh, 2014) evaluated US stock index S & P 500, domestic gold price, exchange rate, and the crude oil price from the global financial crisis. Research has shown that gold prices are Co-integration in long-run relationships only after the crisis period.

(Nguyen, Bhatti, Komorníková, and Komorník, 2016) reported on the role of risk prevention on the stock market and stated that people often use gold as a top priority asset after studying for 12 years from 1999 to 2010. They confirm that gold is a safe storage asset for stock markets in Singapore, Thailand, England, and the US, except for Japan, Indonesia, and the Philippines. The authors used a mixed-copulas method to study the role of the gold market, affecting the stock market, thereby assessing the market's risk level. (Hood and Malik, 2013) used the GARCH model from the year of 1995 to the year 2010 on the American stock market and shows that gold is an excellent safety prevention tool and acts as a shelter. In the United States stock exchange that the study considers, the writer stressed that in the period of extremely low or extremely high volatility, the gold price did not fluctuate in the opposite direction to the stock price. Also, with the aim of research on the role of gold in the stock market, analysis by

(Gürgün and Ünalmıs, 2014) investigated the demand for developing and emerging economies. The results presented that gold still has a real meaning in shelter and investment in most countries, even during the world economic crisis period.

2.2 Relationship between the interest rate and stock index

Interest rates often have the opposite effect with some economic factors, especially on stock indexes. For example, a rise in interest rates will attract a flow of money into the banking system or invest in government bonds because of increasing profitability, making cash flow into the stock market low, and vice versa. Besides, when the lending rate increases, it will limit the cash flow into the stock market because the investment cost will increase, and the expected profit will increase. Another possibility is the rising interest rates might also affect the cost of the capital used by businesses, reducing the predicted cash flow in the future of companies, which will affect the price of securities. A study (Mukherjee and Naka, 1995) showed that government bond rates affected the nominal risk-free rate. Then, it also affects the discount rate and the stock market. Another study has shown that when interest rates rise or fall in a particular direction, cash flow into the stock market will increase or decrease (Brown K. & C., 2000). Cointegration testing using the ARDL model and VECM technique is by (Akbar, Rauf, and Chaudhry, 2019) to study the Pakistan stock market from 1992 to 2012. The model consists of 7 independent variables: Tax, inflation, money supply, exchange rate, total domestic savings, the gross domestic product, and nominal interest rates. Specifically, interest rates have positive effects in the current month but have adverse effects on the next month in Pakistan's stock market. With Panel Data, the research described the long-run negative impact of interest rates on stock markets in 7 selected countries in Africa Sarahan from 1990 to 2003 (Balogun, Dahalan, & Hassan, 2016). The long-run relationship studied in Turkey from 1998 to 2012 by the Johansen cointegration test (Toraman, 2014).

However, in some other studies, there is no mutual relationship of interest rate with the stock market, or not statistically significant when conducting regression model analysis. The author analyzed the association of eight macroeconomic factors with the Islam stocks in Pakistan (Hanif & Bhatti, 2019). Industrial production and the stock market have a positive correlation. The result is similar to the money supply factor. At the same time, the gold price also has a negligible effect on the domestic stock index during the research period from July 2011 to October 2016. Another study also concluded the same results (Cooper & Lee Chuin Howe MaysamiHamzah, 2004) In the Arab market, it is generally not by a normal distribution, so the ARDL model research method is implemented at Jordanian by (Mohamed & Ahmed, 2014). In this model, the authors used annual data of 218 companies from 1976 to 2016, using six essential macroeconomic factors. The result of this study showed that the market is statistically insignificant when considering the short-run and long-run relationship with the stock index. Vietnam as an emerging economy, one of the studies developed by (Hussainey and Khanh Ngoc, 2009), provided evidence of factors such as domestic manufacturing, money market, and Stock index have a close relationship. In particular, the author stressed the foundation of US economic components that significantly impacted the Vietnam stock index. However, from 2001 to 2008, between interest rates and the stock market, the author didn't find short-run and long-run relationships. With current studies, we still do not have a clear answer about interest

rates versus the stock index. Acquiring past results and continuing to apply to the Vietnam stock market by finding the gap left by previous studies, this study is an effort to overcome.

3. Data and methodology

3.1 Data

Before conducting the analysis, we determined some descriptions of the variables of the gold price, interest rate, and stock index. Study in Vietnam for ten years with monthly data of time series 120 observations from January 2009 to December 2018.

Table 1. Explain the variables used in the ARDL model

Variables	Unit	Symbol	Concept
Domestic gold price	Million VND / tael	SJC	SJC is a national gold brand at Vietnam, data collected is the close price on the last trading day every month at the SJC Jewelry Company
Stock price index	Point	VNI	VNI is the most popular index in Vietnam; data collected is the close price on the last trading day every month at Vietnam stock market
Interest rate	%	IR	IR is the refinancing rate; data collected the central bank in Vietnam.

Monthly data was used because of the high consistency between the number of variables when applying the analytical model and further to make sure the update and timeliness of time series data. The daily data of variables do not have a uniform number of trading days in a year, nor does it coincide with the trading day of the SJC Jewelry Company, the central bank, and the Vietnam stock market.

Variables changed in natural logarithms before being used to make the data smoother, decrease the high dispersion, or having some variable with extraordinary observations. This study used logarithmic data from the SJC gold price, VNI stock index, and interest rate helps facilitate the identification and analysis of data.

3.2 Research methodology

The study uses a quantitative method with a model approach to the ARDL model with the monthly time series. The research order is done in turn as follows:

First, ADF and PP test methods define the stationary of the time series. Tests include constants that do not tend at I (0) and I (1) of variables. To determine the stationary level of variables, ensure that there are no stationary variables at the second difference when applying the ARDL regression model.

Step two, we will define the ARDL model with the suggestion by (Pesaran & Shinb, 1996). According to (Pesaran, 1997). ARDL model has many advantages compared to other cointegration methods for many reasons. When the number of observations is small, the ARDL

model is a significant approach to verify cointegration. Meanwhile, Johansen's co-bonding technique requires a large number of samples to achieve reliability. The ARDL method does not estimate the system of equations when looking for long-run relationships; in this case, it only gives a single comparison. Besides, regression variables can tolerate different optimization lag, as well as when the data does not guarantee the properties of the stationary, with time-series I(1) or I(0), the application of ARDL is most suitable for empirical research. Through AIC, SC, HQIC test standards, we will find the optimal ARDL model. ARDL model (p0, p1, p2) has the form;

$$LVNI_t = \alpha + \sum_{i=1}^{p_0} \alpha_{i0} LVNI_{t-i} + \sum_{j=0}^{p_1} \alpha_{j1} LSJC_{t-j} + \sum_{k=1}^{p_2} \alpha_{k2} LIR_{t-k} + \varepsilon_{1t} \qquad (1)$$

Where: LVNI, LSJC, and LIR are by natural logarithms of VNI, SJC, and IR, p0, p1, p2 are the optimal lag selected, α: is the constant of the model. αi0, αj1, αk2, are coefficients with a defined time lag. ε1t is a free error of the equation (1).

Step three, bound tests is determined based on F-statistics coefficients to detect the cointegration of variables, that also means that, consider the long-run relationship of research variables.

$$\Delta LVNI_t = \beta + \sum_{i=1}^{p_0} \beta_{i0} \Delta LVNI_{t-i} + \sum_{j=0}^{p_1} \beta_{j1} \Delta LSJC_{t-j} + \sum_{k=1}^{p_2} \beta_{k2} \Delta LIR_{t-k} + \gamma_1 LVNI_{t-1} + \gamma_2 LSJC_{t-1} +$$

$$\gamma_3 LIR_{t-1} + \varepsilon_{2t} \qquad (2)$$

Where:

Δ: this is the first difference between the variables. β is the constant of the model. Bi0, βj1, βk2, are coefficients with defined time lags. ε2 is a free error of the equation (2). The model has no co-integration if; $\gamma\_1 = \gamma\_2 = \gamma\_3 = 0$

ARDL model is essential for the development of the Vector Autoregressive model (VAR) and the least-squares regression model (OLS). Therefore, after determining the cointegration of variables, the study will conduct regression to determine the long-run relationship in the original data with the selected dependent variable.

Step four; via Granger causality, we conduct to check the Short-run relationship. Besides, the speed of the adjustments will measure by the error correction model. This will explain short-run shock will affect long-run values.

$$\Delta LVNI_t = \mu + \sum_{i=1}^{p1} \mu_{i0} \Delta LVNI_{t-i} + \sum_{j=0}^{p2} \mu_{j1} \Delta LSJC_{t-j} + \sum_{k=1}^{p1} \mu_{k2} \Delta LIR_{t-k} + \delta ECM_{t-1} + \varepsilon_{3t}$$

$$(3)$$

Where:

μ: is the constant of the model. μi0, μj1, μk2, are coefficients with defined time lags. ε3t is a free error of the equation (3). The ECM error correction part is the residual of the model long-run regression results of ARDL that has done it before. δ is the coefficient of ECM.

Finally, we apply Breusch - Godfery Langrage Multiplier (LM) test and White's test to investigate the certainty of ARDL, the model, undergoes diagnostic tests, including serial correlation and the Heteroscedasticity of the residual model. The Graphs with CUSUM and CUSUMSQ simulate the stability of the ARDL estimation model.

4. Results

4.1 Verify the stationary

The requirement when analyzing time series is that the strings must be stationary. The test of stationary by the unit test from 2 different methods, but all showed quite similar results.

Table 2. Verify the stationary by unit root test

Variable	Standard: ADF		Standard: PP		Conclusion
	I(0)	I(1)	I(0)	I(1)	
LVNI	-1.570009	-10.00975***	-1.663736	-10.07165***	I(1)
LSJC	-3.318524**	-3.066182**	-3.764007***	-9.883701***	I(0)
LIR	-2.421778	-5.746777***	-1.532341	-9.839243***	I(1)

Note: ***, ** symbol * corresponds to 1%, 5%, 10% meaning

Table 2 indicates the stationary of time series data by the unit root test approach; at there, LVNI and LIR are stationary at the first difference, and LSJC alone is stationary at level 0. According to (Pesaran & Shinb, 1996), (Mehrara & Musai, 2011), the variables are not the same as the level I(1) or I(0), then the ARDL procedure is most suitable for empirical research.

4.2 The optimal lag of the ARDL model

The model selection comes from optimal lag applying by the ARDL model. In that case, the model selects itself according to standards of AIC, SC, and Hannan-Quinn information (HQ). The results are consistent with the most standards determined the optimal lag. The chosen optimal model is the ARDL (1, 0, 2) model. This result shows that the VNI index will fluctuate its price from the previous month. Besides, it will be influenced by the current gold price variable and the interest rate variable in the last two months.
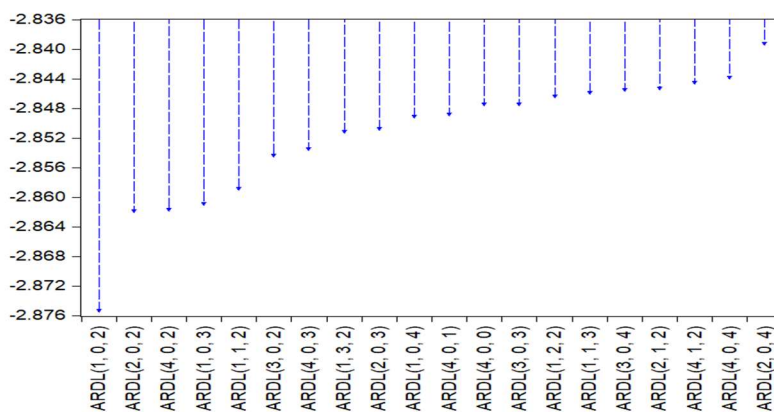
Figure 1. Chart of ARDL model selection

The ARDL model represented as follows:

Table 3. ARDL model (1, 0, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LVNI(-1)	0.933047	0.026647	35.01527	0.0000***
LSJC	-0.023876	0.040501	-0.589528	0.5567
LIR	-0.180622	0.084209	-2.144924	0.0341**
LIR(-1)	-0.112404	0.124996	-0.899258	0.3704
LIR(-2)	0.229113	0.087781	2.610053	0.0103**
C	0.813177	0.322225	2.523628	0.0130**

Note: ***, ** symbol * corresponds to 1%, 5%, 10% meaning

4.3 Verification of cointegration with Bound test

Test the Bound of the ARDL method with results as follows:

Table 4. Verification of cointegration with Bound analysis

F-Bounds Test		Null Hypothesis: No levels relationship			Results	CUSUM test
F-statistic	Value	Significant	I(0)	I(1)		
Dependent variable			Asymptotic: n=1000			
LVNI	5.329543	10%	3.17	4.14	Cointegration	Stable
LSJC	7.775785	5%	3.79	4.85	Co-integration	Not Stable
LIR	2.907628	2.5%	4.41	5.52	No co-integration	Not Stable
		1%	5.15	6.36		

Table 5. ARDL model (1, 0, 2) when considering co-integration relationships

Dependent Variable: D(LVNI)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LVNI(-1))	0.082720	0.093967	0.880312	0.3806
D(LSJC)	0.088235	0.175457	0.502886	0.6161
D(LIR)	-0.205555	0.091000	-2.258837	0.0259**
D(LIR(-1))	-0.225874	0.092788	-2.434287	0.0166**
D(LIR(-2))	0.089727	0.099259	0.903974	0.3680
LVNI(-1)	-0.067289	0.028072	-2.397001	0.0182**
LSJC(-1)	0.002833	0.044742	0.063309	0.9496
LIR(-1)	-0.073825	0.035526	-2.078082	0.0401**
C	0.554003	0.366969	1.509674	0.1340

Note: ***, ** symbol * corresponds to 1%, 5%, 10% meaning

Test hypotheses:

• Hypothesis H0: $\gamma\_1 = \gamma\_2 = \gamma\_3 = 0$: no co-integration relationship exists between variables;

• Hypothesis H1: $\gamma\_1 \neq 0, \gamma\_2 \neq 0, \gamma\_3 \neq 0$: exists the co-integration relationship between the variables.

The results of the Bound test with the statistical value- F is higher than the upper bound limit value (I (1)) corresponding to the 1%, 2.5%, 5%, 10% significance level. That means, the coefficients are all different from 0. So we can reject the null hypothesis, or accept hypothesis H_1. Then there exists a cointegration relationship between the variables. In this case, we can say that a long-run relationship between variables in the model. The result of table 4 in the cointegration test illustrates that when we chose the VNI stock price index or the SJC Gold price index as the dependent variables. At that time, models have cointegration, meaning that a long-run relationship between VNI and SJC with the other two variables existed. However, when using the CUSUM test to check the stability of the model, the study showed that selecting VNI as the dependent variable is more optimal. Also, results with the gold price make the dependent variable insignificant. This confirms that the choice of the model with the VNI stock index variable as a dependent variable is perfectly reasonable to carry out further tests.

4.4 The long-run relationship between variables

The results from Table 6 tell us the dependence of stock index on the SJC gold price and interest rate. Specifically, when we see other factors unchanged, if the price of gold rose 1%, the VNI stock price will increase by 0.82%. We can explain easily on the market in Vietnam; investors still consider gold as a reserve, a type of asset people use in many commercial transactions and real estate investment. Therefore, when the economic growth rate increases, the stock market is active, people have the psychology of storing gold. Then, the demand of people for gold to rise, the SJC price will fluctuate in the same way with the VNI index. The interest rate has

a negative impact and statistically significant. This indicates when other factors remain unchanged, VNI will decrease by 0.88% if the interest rate increases by 1%.

Table 6. Long-run relationship between variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LSJC	0.827755	0.107554	7.696141	0.0000
LIR	-0.886040	0.078865	-11.23493	0.0000
C	-0.536467	1.053714	-0.509120	0.6116

Note: ***, ** symbol * corresponds to 1%, 5%, 10% meaning

4.5 Short-run relationship and error correction model

After defining the long-run relationship of SJC gold price, interest rate, and the VNI stock index (this is a temporary relationship at the time of the study), we continue to consider the short-run relationship of ARDL model. The VNI and the fluctuation of interest rates in the previous period of 1 month affected itself instability, not by the SJC gold price. Because of cointegration, the ARDL model is used to determine, considering the residual correction when t-1 lags into the model. The residual variable is defined based on the regression model of a long-run variable

Table 7. Error correction model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.813177	0.199117	4.083908	0.0001
D(LIR)	-0.180622	0.082507	-2.189181	0.0307
D(LIR(-1))	-0.229113	0.084211	-2.720722	0.0076
ECM(-1)*	-0.066953	0.016597	-4.034122	0.0001

Note: ***, ** symbol * corresponds to 1%, 5%, 10% meaning

The results from Table 7 show in the short-run the relationship of the factors affecting the stock index as follows: ECM (-1) = -0.066953 indicates that the price fluctuation of the VNI stock index is about 0.066953. This is the difference in the short-run and long-run. The sign of the ECM coefficient is negative and statistically significant at 1%. The above result implies a cointegration relationship between variables, as observed earlier, according to previous studies (Engle & Granger, 1987). This proves that shocks, or short-run fluctuations, will affect stock prices and take about 15 months for short-run corrections to achieve long-run equilibrium, a slow correction.

4.6 Granger causality relationship between variables

Once again, we test the interplay of variables in the short-run model.

Table 8. Granger causality test

Ho:	F-Statistic	Prob.	Conclusion	Obs
LSJC does not Granger Cause LVNI	2.47535	0.0887*	Reject Ho	
LVNI does not Granger Cause LSJC	0.44565	0.6415	Accept Ho	
LIR does not Granger Cause LVNI	10.4626	7.E-05***	Reject Ho	
LVNI does not Granger Cause LIR	1.16173	0.3167	Accept Ho	
LIR does not Granger Cause LSJC	5.55787	0.0050***	Reject Ho	
LSJC does not Granger Cause LIR	1.17313	0.3131	Accept Ho	118

Note: ***, ** symbol * corresponds to 1%, 5%, 10% meaning

Table 8 shows the causal relationship of the variables, the SJC gold price the VNI stock index has a positive causal effect. However, the impact is quite weak, with a 10% significance level. In particular, the inspection reveals that the strong impact of the interest rate on VNI with the meaning 1% level. The SJC gold price is affected by interest rate at the 1% level.

4.7 Diagnostic test

Carrying out diagnostics for ECM is to simulate the stability of the model and to approve the effectiveness of using the ARDL approach. The results from Figure 2 and Figure 3 illustrate that the selected model has quite good stability.
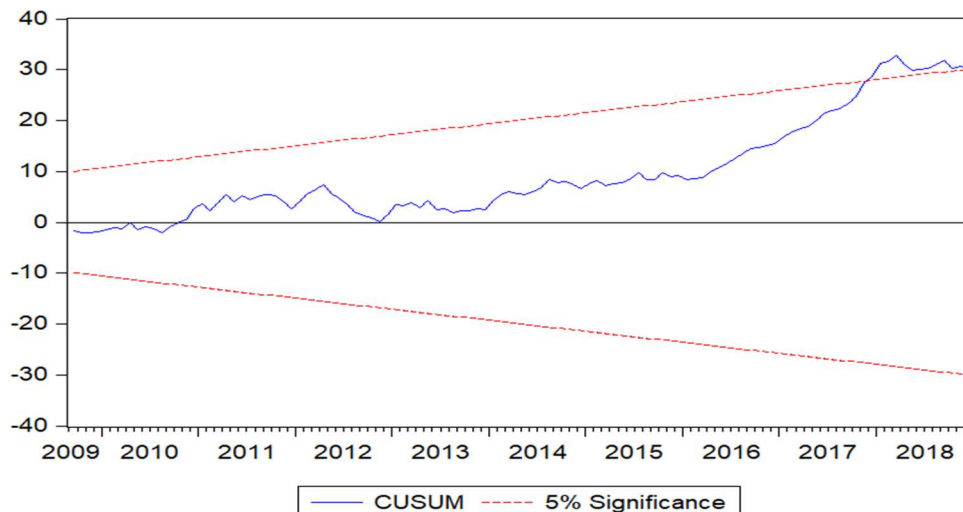

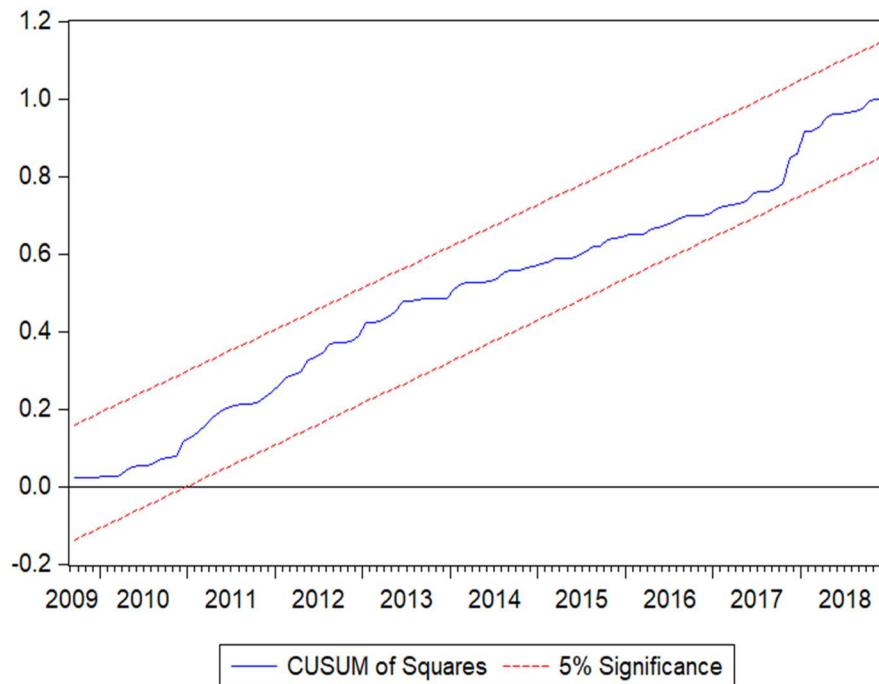Figure 2. Diagnostic test for the stability of the model

Figure 3: Diagnostic test for the stability of the model after adjustment

Table 9. Diagnostic tests from model

Breusch-Godfrey Serial Correlation LM Test:				Result	Conclusion
F-statistic	1.407241	Prob. F(2,110)	0.2492	Accept Ho	No serial correlation
Obs*R-squared	2.943851	Prob. Chi-Square(2)	0.2295		
H_0: that there is no serial correlation					
H_1: there is a serial correlation					
Heteroscedasticity Test: White					
F-statistic	1.418738	Prob. F(20,97)	0.1322	Accept Ho	No Heteroscedasticity
Obs*R-squared	26.70571	Prob. Chi-Square(20)	0.1437		
Scaled explained SS	20.34172	Prob. Chi-Square(20)	0.4367		
H_0: there is no heteroscedasticity (constant variance)					
H_1: there is Heteroscedasticity					

Although in 2017, 2018, lines fluctuate from the 5% significance level, but not much. After using the adjustment model in squared form, the oscillation line has shown quite well. Table 9 means that the correlation test of the serial and the Heteroscedasticity also satisfy the requirements. The appropriateness of the model is 5% significant.

5. Conclusion

The study has shown that the data series is stationary at the level I (0) or the first difference I (1), which means no time series of data is stationary at the second difference. This is perfectly suitable for conducting the ARDL model in the analysis. The bound test has shown the long-run relationship between variables. The SJC gold price has the same direction in the long-run and has no short-run impact on the VNI stock index. The results are contrary to some previous studies (Do, Mcaleer, and Sriboonchitta, 2009). In real life, the gold market in Vietnam still looses, not strictly managed. Vietnam chose the SJC gold as the national gold brand since 2012, as well as no gold trading floor, and the SJC gold price is strongly affected by the crude gold price in the world.

The interest rate variable has a negative impact both in the short and long-run on the VNI stock index. The variability of the stock price index has an inverse correlation with the variation of interest rates in the previous month. This result is also exact while testing by short-run causality Granger. This is consistent with past research results (Balogun et al., 2016) in Sahara African countries. The error correction model has obtained results consistent with the theoretical basis in the adjustment of equilibrium. Specifically, the results also indicate that the expected adjustment rate of the VNI stock price index converges to long-run equilibrium is very slow, about one year (i.e., adjust 6.6953%/month to reach the balanced state in the long-run).

Some of the study's findings have also filled a gap of previous studies considering the selection of data series of 10 years after the global economic crisis up to now, supplementing the research in the Vietnam stock market with the data series before 2009 (Hussainey & Khanh Ngoc, 2009). This study considers the gold price as an independent variable, along with the collection of the SJC domestic gold prices instead of the world gold price according to research by (Vinh, 2014) which is more practical when assessing the Vietnam market. A comprehensive look at the impact aspects of variables to find the right model in the analysis using the ARDL model approach makes research more objective.

To expand for further study on the relationship of gold prices, interest rates, and stock indexes, we need to add some other factors to the model, such as investor psychology, exchange rate, world gold price, economic development speed, etc. Further, the analysis can also use different approaches to enrich the study, such as the VAR model, the GARCH model, and so on.

Acknowledgments

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