EXCHANG RATE RISK AND ECONOMIC GROWTH IN VIETNAM

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Abstract

This paper examines the impact of exchange rate risk on economic performances of Vietnam in period 1991-2009 by using Autoregressive Distributed Lag (ARDL) approach. The empirical results show that there is existence of long run relationships between REER volatility and output. Impact of exchange rate risk is statistically significant on economic performances in Vietnam. An increase in exchange rate risk would hurt economic growth. The level relationships also show that growth may be improved when REER depreciates..

Key words: *Exchange rate risk, ARDL approach, Output, Vietnam.*

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1. INTRODUCTION

Understanding the link between exchange rate risk and economic performances such as economic growth, international trade and investment is of particular concern given that more economies, including transition and developing economies, have adopted a more flexible exchange rate arrangement. It is important to understand the implications of such a move for economic activity when the transition to flexible arrangement of exchange rate has been accompanied by increases in the volatility of both nominal and real exchange rate (Caporale and Pittis, 1995; Hasan and Wallace, 1996; Kent and Naja, 1998).

Over 30 years, Vietnam has made a shift from a centrally planned economy to a market economy. This period is known as *Doi Moi* - Renovation. The economic reform has been implemented through a variety of measures aiming to reform economic structure, attract foreign investment, establish gradually a new legal framework directing the economy towards market economy, and to integrate step-by-step into the regional and global economy. From that point of view, Vietnam government has continued to deregulate many sectors, and changed from direct control to indirect control of its economy, including exchange rate system. However, while Vietnam's financial market is still weak, the relaxation on the control of exchange rate could lead to an increase in the exchange rate risk (uncertainty), resulting in the increase in dollarization. The increase in exchange rate volatility could affect negatively the economic performances and brings serious challenges for Vietnam in the period of integrating into world's economy. Therefore, it is worthwhile to investigate the effect of exchange rate risk on growth in Vietnam context. The

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findings may have significant implications for Vietnam to find an exchange rate arrangement that is suitable for its process of accessing into the world economy while ensuring the continuation of rapid economic growth.

There are two apparently opposite views in the literature when dealing with the effects of exchange rate regimes and volatility on economic growth. The first view is called a "*costs of volatility*" argument. Many economists believe that exchange rate uncertainty reduces international trade, discourages investment and compounds the problems people face in insuring their human capital in incomplete asset markets (Obstfeld and Rogoff, 1995). De Grauwe and Schnabl (2004) emphasize that when exchange rate movements are an independent source of volatility and are also driven by speculative dynamics; anticipated entry into monetary unions may help small open economies to avoid negative macroeconomic effects of exchange rate volatility. Schnabl (2008) also finds a positive association between exchange rate stability and growth in 41 mostly small open economies at European Monetary Union. The second view, which is defined as "*advantage of flexibility*" argument, considers that terms of trade shocks are amplified in countries with more rigid exchange rate regimes and that, after controlling for other factors, countries with flexible exchange rate regimes grow faster (Edwards and Yeyati, 2003). The advantage of flexibility effect also seems supported by empirical evidence.

Bagella *et al*. (2006) suppose that these apparently conflicting views can be easily reconciled when exchange rate volatility is properly measured with a multilateral trade weighted exchange rate (real effective exchange rate or REER). Their research finds that the effective exchange rate risk variable performs much better than the bilateral exchange rate volatility with dollars. Therefore, this study investigates the impact of real effective exchange rate risk on growth for Vietnam applying Autoregressive Distributed Lag (ARDL) bounds testing methodology of Pesaran *et al.* (2001) to the analysis of level relationships for models including output, real effective exchange rate volatility, and the real effective exchange rate. The empirical results show that there is existence of long run relationships between REER risk and output. Impact of REER volatility is statistically significant on economic performances in Vietnam. An increase in REER volatility would hurt economic growth. The level relationships also show that growth may be improved when REER depreciates.

This paper is organized as follow. Section 2 provides a brief of the theoretical literature which outlines the reasoning behind why increased exchange rate risk might hurt or help the economic growth. This section also covers the empirical literature review. Next, Section 3 shows an appropriate measure of exchange rate risk for Vietnam. In Section 4, an empirical study is conducted using a approach introduced by Pesaran *et al*. (2001) to analyse level relationships. Concluding remarks are outlined in Section 5.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Theoretical evidence concerning the impact of exchange rate stability on growth is mixed. The theoretical arguments in favor of flexible exchange rates are mainly of macroeconomic nature, as flexible exchange rates allow for an easier adjustment in response to asymmetric country specific real shocks. In contrast, there are also macroeconomic benefits of fixed exchange rates as they contribute to macroeconomic stability and help to avoid "beggar-thy-neighbour" depreciations in highly integrated economic regions. Furthermore, it is argued that for small open countries in the economic catch-up process fixed exchange rates provide a more stable environment for the adjustment of asset and labor markets (McKinnon, 1963). Small open economies with flexible exchange rate regimes are argued to have higher risk premiums on interest rates as uncertainty in asset markets is increasing (Schnabl, 2008). From a microeconomic perspective, low exchange rate volatility can be associated with lower transaction costs for international trade and capital flows thereby contributing to higher growth.

The empirical literature tends to find weak evidence in favor of a negative impact of exchange rate volatility on growth. The panel estimations for 183 countries by Edwards and Levy-Yeyati (2005) over the period 1974 - 2000 find evidence that countries with more flexible exchange rates grow faster than countries with fixed exchange rate. Eichengreen and Leblang (2003) reveal a strong negative relationship between exchange rate stability and growth for 21 countries over a period of 120 years. They find that less flexible exchange rate regimes are associated with slower growth and suggest that a more flexible exchange rate is especially beneficial for low-income countries. They conclude that the results of such estimations strongly depend on the time period and the sample. For large country samples such as by Ghosh *et al*. (2003) there is weak evidence that exchange rate stability affects growth in a positive or negative way. However, Schnabl (2008) investigates the impact of exchange rate stability on growth for a sample of 41 mostly small open economies at the EMU periphery and reveals a robust negative relationship between exchange rate volatility and growth for countries in the economic catch-up process with open capital accounts.

The previous work investigating effect of exchange rate uncertainty over time on growth within a single country is very few. Amuedo-Dorantes and Pozo (2001a) cannot discern any significant impact of real exchange rate uncertainty on the production indexes of four countries: Korea, Singapore, Chile and Mexico. Azid *et al.* (2005) investigate impact of exchange rate volatility on growth in Pakistan and find that this relationship is positive but insignificant.

3. EXCHANGE RATE RISK MEASUREMENT

In the literature, we saw that most papers measuring exchange rate risk used the volatility of bilateral exchange rate. We argue that this is not the most accurate measure of a country's exchange risk for the case of using aggregate data. Bagella *et al*. (2006) show advantages of real effective exchange rate (REER) volatility comparing with bilateral exchange rate volatility and find that this variable performs much better than the bilateral exchange rate volatility. First, it includes trade partners' externalities in the evaluation of the effects of exchange rate volatility on economic performances. This inclusion is fundamental because a country might have low bilateral exchange rate volatility with a leading currency (for example, the US dollar for case of Vietnam) but import instability via variability of governance and economic policies of its trade partners. Individual country stability is therefore insufficient if it is not framed into regional stability and this is why the REER volatility variable is more likely to measure the costs of missing regional integration. A second important advantage of this measure is that favorable and unfavorable exchange rate movements with different partners may compensate each other, thereby dampening the negative effects of individual bilateral exchange rate volatility on economic performances (Qian and Varangis, 1994). This effect is incorporated into REER volatility measure, which conveniently takes into account the potential impact of diversification of trade and investment.

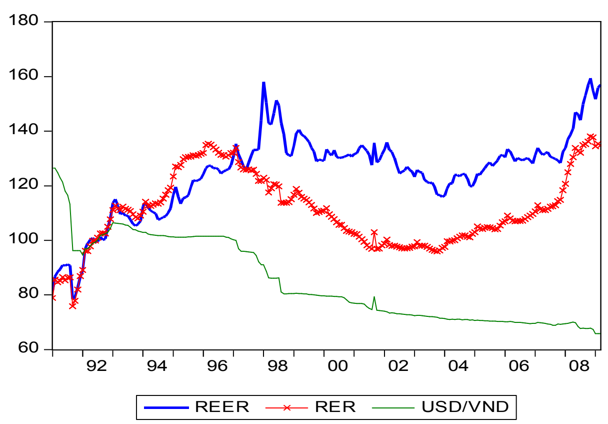
Then, we use a measure of real exchange rate volatility where bilateral exchange rates are weighed for their relative trade share. The real effective exchange rate index is defined in foreign currency terms (an increase in its value indicates an appreciation of Vietnamese currency) and is estimated by the geometric mean method as the following formula:

$$REER_t = \prod_{j=1}^{n} (e_{j} \frac{P_t}{P_{j}})^{w_{jt}} \qquad (1)$$

where $REER_t$ is the real effective exchange rate of Vietnam at time *t*; *n* is the number of trading-partner currencies in the trade basket. The currency basket includes twenty of Vietnam's largest trading partners during the last 20 years (Japan, Singapore, China, United Sates, South Korea, Australia, Thailand, Germany, Hong Kong, Malaysia, France, Indonesia, United Kingdom, Netherlands, Philippines, Italy, Switzerland, India, Spain, and Canada). Each selected trading partner accounted for at least 0.5 percent of Vietnam's total foreign trade during the last ten years. The basket covered about 80 percent of total trade in every year since 1998. The trade weights are re-calculated annually; e_{jt} is the nominal bilateral exchange rate relative to currency *j*, measured as the number of units of currency *j* per unit of the domestic currency and expressed as an index; w_{jt} is the weight assigned to currency *j* at time *t*, reflecting the contribution of the country of currency *j* to the Vietnam's foreign trade; P_t is the domestic price index at time *t* and P_{jt} is the price index of foreign country *j* at time *t*.

Figure 1 describes the movement of REER and bilateral rate of Vietnam Dong against US Dollar in both real and nominal term for period January 1990 - March 2009. From Figure 1, it can be seen clearly that Vietnamese authorities were inclined to maintain a stable nominal USD/VND exchange rate, with strong depreciation in 1990-1991 because of applying a floating exchange rate system and in 1997-1998 due to the Asian financial crisis. Nominal exchange rate also slightly depreciated in period 1999-2003 after the government introduced a new principle for setting the exchange rate. REER and RER tend to appreciate during 1991-1996 as the inflation differential became unfavorable to Vietnam. When the Asian financial crisis broke out in 1997, REER of Vietnam continued to appreciate sharply because of the precipitous falls in the values of a number of Asian trading partner's currencies. After such large changes, the REER may have attracted greater attention than before. The USD/VND rate underwent several large-scale devaluations in 1998, sufficient to bring about a considerable depreciation in REER and RER, especially when Asian currencies began to stabilize against the USD with domestic inflation being kept not too far out of line with trading partners. By 2003, the REER had fallen back to a level last prevailing before the Asian financial crisis. From 2004, the VND was holding relatively steady against the USD, and the USD itself was weakening against many other currencies, then VND depreciated slightly in nominal terms. However, its high inflation rate was much more than offset this nominal depreciation tendency, so that the VND tended to appreciate in real terms. REER at the end of 2008 was about 30 per cent higher than at the beginning of 2004.

Figure 1: REER, Nominal and Real Exchange Rate (USD/VND)



The methods of measuring volatility have evolved over time to reflect new advances in econometric techniques. Nonetheless, a clearly dominant approximation for uncertainty has not yet emerged (Bahmani-Oskooee and Hegerty, 2007). The most common is some measures of variance, but the exact construction of this measure differs from study to study. Amuedo-Dorantes and Pozo (2001a) argue that the ARCH approach allows us to better capture exchange-rate uncertainty for time series analysis. In another study, Amuedo-Dorantes and Pozo (2001b) investigate the relationship between exchange rate volatility and FDI in the United States and find that ARCH measure is significant. In addition, Seabra (1995) tests several measures of exchange rate uncertainty that are prevalent in the literature in his study of purchasing power parity in 11 Latin American countries. He concludes that ARCH-based methods are most efficient. This measure is also used in most of previous studies. Therefore, to determine the volatility of real exchange rate, we use the conditional variance of the log of real exchange rate.

The conditional variance (h) of the log of real exchange rate is used to measure the risk (uncertainty) associated with the real effective exchange rate or bilateral real exchange rate with US dollar. Volatility variables are derived from a GARCH model with specifying a GARCH (1,1) model because it is the most robust of the family of volatility models (Engle, 2001)

Table 1: ADF Tests for Stationary of REER

Variable	Level		First difference	
	constant	*constant & trend*	*constant*	*constant & trend*
REER	-2.04(2)	-2.04(2)	-11.84(1)	-11.87(1)

Note: At the 5% level of significance, the critical value for each test with *constant* is -2.87 and with *constant & trend* is -3.43. Number of lags is shown in parentheses.

Table 1 shows that REER series have I(1) then the model for the mean of each series is specified with an ARIMA model. Lagrange Multiplier test is used to test for heteroskedasticity in the errors of mean equations and to find the best fitting autoregressive model to measure the forecast of uncertainty. The models for the meaorted in Table 2.

Table 2: Mean and Variance Equations for REER Movements

$$REER_t - REER_{t-1} = 0.0018 + 0.0483\ (REER_{t-1} - REER_{t-2}) + e_t$$

(9.6e-4) (7.9e-2)

$$h_t = 0.00017\ +\ 0.2367e_{t-1}^2\ +\ 0.7466h_{t-1}$$

(4.94e-6) (0.0452) (0.0253)

Q(12) = 6.51 [0.89] *Q(24)* = 22.10 [0.57]

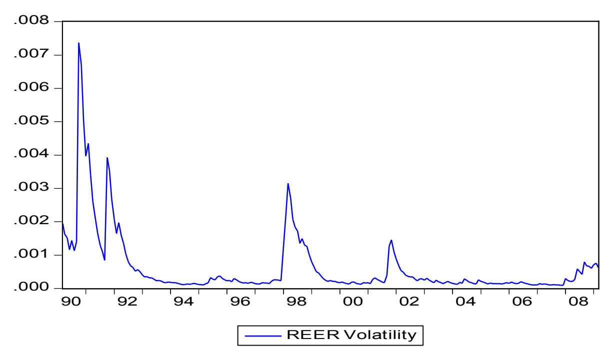
$Q^2(12)$ = 10.29 [0.59] $Q^2(24)$ = 13.02 [0.97] *LM(1)* = 0.10 [0.29]

Estimation Period: 1990M1 – 2009M3

Note: REERrepresents real effective exchange rate. htrepresents the conditional variance, the variance of the error term for the mean equation above it. *Q(12)* and *Q(24)* represent the Ljung–Box statistic for up to twelve and twenty four orders autocorrelation in the residuals, respectively. $Q^2(12)$ and $Q^2(24)$ represent the Ljung–Box statistic for up to twelve and twenty four orders autocorrelation in the squared residuals, respectively.LM(1) represents Engle's statistic for an additional ARCH term in the conditional variance equation.

Figure 2 describes the REER volatility in Vietnam for 20 years. Before 1992, the exchange rate volatility is very high as Vietnam adopted a floating exchange rate regime aiming to devalue the Vietnamese currency that was overvalued in previous years because of the existence of the centrally planned economy for a long time. After that, it can be seen that Vietnam has used the USD as a key nominal anchor therefore the volatility of real exchange rate is very small. It only increases if there is an adjustment in nominal exchange rate or trading band. As discussed above, the State Bank of Vietnam (SBV) had to devalue three times the Vietnamese Dong by 16.3 per cent and widen trading band from +/- 1% to +/-10% because of the Asian financial crisis 1997-1998. These actions increased the real effective exchange rate volatility. After introducing a new principle for setting the exchange rate, the volatility was very small exception of the volatility in 2002 when United State implemented a weak dollar policy and trading band of USD/VND exchange rate was widened. It seems that there is little volatility of exchange rate from 2004 to 2007 as the official exchange rate was almost unchanged. In 2008, SBV increased trading band four times (from +/- 0.5% to +/-0.75% in January, +/- 1% in March, +/-2% in June, and to +/-3% in November) that has never happened before. These adjustment increased exchange rate fluctuation.

Figure 2: Volatility of Vietnamese REER (1990 January - 2009 March)



4. EMPIRICAL INVESTIGATIONS

4.1. Econometric Model and Data Descriptions

Empirical studies show that most of the time series are not stationary. Since facing a spurious regression problem among these series which include a unit root, some methods are suggested to solve this problem. One of them is taking the differences of the series and then putting them into regressions. This method leads to the loss of information that is important for the level relationships. As long as the first differences of the variables are used, determining a potential long run relationship between these variables becomes impossible. This is the point of origin of co-integration analysis.

The co-integration approach developed by Engle and Granger (1987) overcame this problem. According to this approach, time series which are not stationary at levels but stationary in the first difference can be modeled with their level states. In this way, loss of information in the long run can be prevented. However, this approach becomes invalid if there are more than one co-integration vectors. Moving from this point, with the help of the approach developed by Johansen (1988), it is possible to test how many co-integration vectors there are among the variables by using the VAR model in which all the variables are accepted as endogenous. Therefore, unlike the Engle Granger method, a more realistic examination is provided without limiting the test in one co-integration vector expectation.

However, in order to perform these tests developed by Engle and Granger (1987), Johansen (1988) and Johansen and Juselius (1990), the condition must be met that all series should not be stationary at the levels and they should become stationary when the same differences are taken. If one or more of the series are stationary at levels, that is to say I(0), the co-integration relationship cannot be examined with these tests. Bounds test approach developed by Pesaran *et al*. (2001) removes this problem. According to their approach, the existence of a co-integration relationship can be examined between the series regardless of whether they are I(0) or I(1) (under the circumstance that dependent variable is I(1) and the independent variables are either I(0) or I(1)). This point is the greatest advantage of the bounds test among all the co-integration tests. Moreover, this approach can distinguish dependent and independent variables and is more suitable than another method for small sample size (Ghorbani and Motallebi, 2009; Bassam, 2010).

Pesaran *et al*. (2001) suggest their method based on Autoregressive Distributed Lag (ARDL) approach. ARDL model is changed to error correction model like below:

$$\Delta y_t = c_0 + c_1 t + \pi_{yy} y_{t-1} + \sum_{i=1}^{k} \pi_{yi} x_{t-}^{i} + \sum_{j=1}^{p-1} \lambda_j \Delta y_{t-j} + \sum_{i=1}^{k} \sum_{j=0}^{p-1} \gamma_{t-j}^{i} \Delta x_{t-j}^{i} + u_t \qquad (2)$$

where k is the number of independent variables, the disturbances u_t are serially uncorrelated.

The ARDL approach uses two steps to estimate the level relationship. First step is to determine whether a level relationship exist between the variables in equations (2). The null hypothesis of no level relationship among variables is tested (i.e. H_0: $\pi_{yy} = 0, \pi_{yi} = 0 \quad i = 1, ..., k.$) by using the F-test for the joint significant of the lagged levels coefficient. Two sets of critical values are generated. One set refers to I(1) series and the other for I(0) series. Here, the critical values for I(1) series are referred to as the upper bound critical values while the critical values for I(0) series are referred to as the lower bound critical values. If the estimated F-statistics is greater than the upper bound critical values, we conclude that the variables in question are cointegrated. Also, if the estimated F-statistics falls between the lower and the upper bound critical values, the decision about cointegration among the variables involved is inconclusive. And if the estimated F-statistics is less than the lower critical values, the null hypothesis of no cointegration cannot be rejected. Second step is to estimate the long-run and the short-run coefficients by using the ARDL approach if the long-run relationship is established between the variables. The lag orders of the variables are chosen using statistic criteria, e.g. Akaike Information Criteria (AIC), Schwarz Information Criteria (SIC).

In this study, we investigate the impact of exchange rate volatility on growth, export, and FDI performances using bounds test approach developed by Pesaran *et al*. (2001). Since we are most interested in the impact of the shocks to the real exchange rate and to real exchange rate volatility on output of Vietnam then we estimate a ARDL model with three variables which is applied by Amuedo-Dorantes and Pozo (2001a) for single country (Chile, Korea, Mexico, Singapore). In addition, we include a dummy variable D_S to account for the effect of the change in exchange rate system on economic performance. Then the equations for estimating are follow.

$$\Delta IO_t = a_0 + a_1 t + a_2 IO_{t-1} + a_3 REER_{t-1} + a_4 VOL\_R_{t-1} + \sum_{j=1}^{l-1} a_5^j \Delta IO_{t-j} + \sum_{j=0}^{l-1} a_6^j \Delta REER_{t-j} + \sum_{j=0}^{l-1} a_7^j \Delta VOL\_R_{t-j} + a_8 D_S + u_t \quad (3)$$

where *IO* is real industrial output, *REER* is real effective exchange rate, *VOL_R* is real effective exchange rate volatility. The dummy variable is defined by $D_S = 1$, over the period March 1999 - December 2003, 0 elsewhere[1].

Data of *IO* is collected from General Statistics Office of Vietnam (GSO). The others are calculated from data of IMF (IFS and DOT). Because data of real industrial output is available from January 1991 then the output equation is estimated using monthly data from January 1991 to March 2009.

All data are seasonally adjusted. Prior to estimation, all the variables are transformed into natural logarithms.

4.2. Results and Discussions

Unit root test

Before constructing our models, we examine the series in order to determine whether they are stationary or not. Augmented Dickey–Fuller (ADF) unit-root tests are conducted including a drift term and both with and without a trend. Table 3 contains the results from the unit-root tests.

Table 3. ADF Tests for Unit Root

Variable	Level		First difference	
	constant	*constant & trend*	*constant*	*constant & trend*
VOL_R	-6.05(12)	-5.56(12)	-4.40(12)	-4.64(12)
IO	-0.22(12)	-1.08(12)	-5.89(12)	-5.87(12)

Note: At the 5% level of significance, the critical value for each test with *constant* is -2.87 and with *constant & trend* is -3.43. Number of lags is shown in parentheses.

The results indicate that, with the exception of REER volatility, all the series are non-stationary and the ADF test results are invariant as to whether the unit-root tests are conducted with or without a linear trend. The null hypotheses of difference-stationary processes for each of the nonstationary series are accepted. Unit root tests show that dependent variables are I(1) and independent variables are mixture of I(0) and I(1). Then, ARDL approach is more suitable than other approaches for investigating relationships in level of variables.

Bounds Testing for Level Relationships

It is important that the lag order of the underlying VAR is selected appropriately. There is a delicate balance between choosing lag order sufficiently large to mitigate the residual serial correlation problem and, at

[1] Before February 1999, SBV set the official exchange rate. After that, the government introduced a new principle for setting the exchange rate.An average inter-bank rate of exchange between VND against USD would be official exchange rate in the following day. This new arrangement has been viewed as a turning point in the exchange rate policy in Vietnam, aiming at gradually moving toward greater exchange rate flexibility and giving more weight to market forces in exchange rate determination. However, from 2004, the governor of the SBV was quoted as publicly stating that the VNDwould not be allowed to depreciate by more than1 percent per annum. As it turned out, the official USD/VND ratewas again almost unchanged from January 2004 toDecember 2007.

the same time, sufficiently small so that the conditional ECMs are not unduly over-parameterized. Particularly in view of the limited time series data which are available a decision must be made concerning the time trend in each equation and whether its coefficient should be restricted.

To determine the appropriate lag length *l, m, n* and whether a deterministic linear trend is required in addition to the equation, we estimate the conditional model (3) by least square, with and without a linear time trend. Because coefficients of trend are always significant in the regressions of output then we only consider with case of regressions with deterministic trend. Tables 4 give Akaike's and Schwarz's Information Criteria denoted respectively by AIC and SIC, and Lagrange multiplier (LM) statistics (χ^2_{SC}) for testing the hypothesis of no residual serial correlation against orders 1 and 6 for estimating equations (monthly data).

The lag orders selected by AIC and SIC are 2 and 1, respectively while the χ^2_{SC} statistics suggest using a relatively high lag order: 4 or 5. In view of the importance of assumption of serially uncorrelated errors for the validity of the bounds test, it seems prudent to select lag to be either 4 or 5. However, for completeness, we report test results for l = 2, 3, 4, and 5.

Table 4: Statistics for Selecting the Lag Order

l	AIC	SIC	$\chi^2_{SC}(1)$	$\chi^2_{SC}(6)$
1	-3.13	3.00	23.39[0.00]	29.14[0.00]
2	-3.16	-2.98	0.12[0.72]	11.85[0.07]
3	-3.14	-2.92	3.67[0.06]	9.88[0.13
4	-3.15	-2.88	0.36[0.55]	9.61[0.13
5	-3.13	-2.81	1.02[0.31]	10.4
6	-3.11	-2.75	3.17[0.07]	11.62[0.0

Note: AIC = – $2l/T + 2k/T$ and SIC = – $2l/T + (k\log T)/T$ where l is the maximized log likelihood value, T is the number of observations, and k is number of freely estimated coefficients. P-values are in brackets.

Table 5 gives the values of the F-statistics for test the existence of level relationships under two different scenarios. The critical value bounds of the statistics F_{IV} and F_V are given in Pesaran *et al*. (2001) and depend on the number of independent variables in regressions.

Table 5: *F-statistics* for Testing the Existence of a Levels

l	F_{IV}	F_V	t_V
2	12. ***	17.02***	-6.97***
3	12.38***	16.42***	-6.80***
4	14.07***	18.65***	-7.27***
5	11.15***	14.73***	-6.31***

Note: F_{IV} is the F-statistic for testing $a_1 = a_2 = a_3 = 0$ in (3). F_V is the F-statistic for testingin $a_2 = a_3 = a_4 = 0$ (3). t_V is the t-statistic for testing $a_2 = 0$ in (3). The 1% critical value bounds are (4.99, 5.85) and (6.34, 7.52) for F_{IV} and F_V, respectively. The 1% critical value for t_V is (-3.96, -4.53). *** is significant of 1%.

The result of F-statistics indicates that at 0.05 significance level, null hypothesis of no level relationship is rejected for all cases of selected lag orders (the results from the application of the bound t-test support the results of F-tests). In other words, results of bounds tests support the existence of level relationships in the estimating equations.

Level Relationships

First, the orders of ARDL models were selected by searching across the $6^3 = 216$ ARDL models. The estimate results in the choice of ARDL (2, 0, 1) for the estimating equation. By normalizing on output, from the selected ARDL models, the empirical results of the relationships in level are presented in equation (4).

$$IO_t = -20.5309\ VOL\_R_t - 0.3629\ REER_t + 5.0472 + \hat{\varepsilon}_t \quad (4)$$

(9.8849) (0.0682) (0.3194)

where $\hat{\varepsilon}_t$ is the equilibrium correction term and the standard errors are in parenthesis.

The level estimate is highly significant and has the expected sign. The result shows that exchange rate volatility affects significantly negative on Vietnam economic performance. A rise in exchange rate volatility decrease output. Vietnam is small open economy, the international price level is given and traded goods make up a high share of the domestically consumed goods, exchange rate stability ensures domestic price stability. The welfare effect of stable exchange rates originates in macroeconomic stability which provides a favorable environment for investment and consumption. In addition, financial market in Vietnam is underdeveloped then exchange rate volatility is associated with higher transaction cost because uncertainty and hedging exchange rate risk is costly. From a short-term perspective, stabilization in exchange rate can foster economic growth by a more efficient international allocation of capital when transaction costs for capital flows are removed (McKinnon, 1973). Moreover, Vietnam is a dollarized economy, for the preiod of 1991-2009, the degree of dollarization in Vietnam is always above 20 per cent in comparison with 7-10 per cent in other countries in Southeast Asia such as Thailand, Malaysia and Indonesia due to massive flow of remittance and foreign investment and increased export earnings over the past years (Son, 2009). Then fluctuations in exchange rate level constitute a risk for growth as they affect the balance sheets of banks and enterprises where foreign debt tends to be denominated in foreign currency (Eichengreen and Hausmann, 1999). The level relationship also indicates that an appreciation will decrease economic growth.

Table 6 provides the result of the error correction representation of estimated ARDL model. The result indicates that the error correction term, EC_IO(-1), have the right sign (negative) and is statistically significant. This is evidence of cointegration relationships among variables in the model. The estimate value of error correction terms imply that the speed of adjustment to the long run equilibrium in response to the disequilibrium caused by short run shocks of the previous period is 55.91 per cent. This numbers implies that the adjustment of the output to changes in the independent variables is moderate and may take about more than 5 months.

Table 6: The ECM for the Selected ARDL Model

Regressor	ARLD (2, 0, 1)
ΔLIO(-1)	- 0.2094 (0.0647)***
ΔVOL_R	- 2.2291 (11.188)
ΔREER	- 0.6094 (0.1715)***
c	0.0006 (0.0080)
trend	0.0065 (0.0009)***
D_S	- 0.0526 (0.0104)***
EC_IO(-1)	- 0.5591 (0.0792)***
Adj. R-squared	0.4111
Serial Correlation	F(6,204) = 1.36[0.23]

EC_ IO = IO+20.5309VOL_R+0.3629REER - 5.0472

Note: *, **, and *** are respectively significant of 10%, 5%, and 1%. The numbers in parentheses are standard errors. The number in bracket is p-value.

5. CONCLUSION

This study investigates the impact of exchange rate volatility on economic growth in Vietnam for period January 1991 - March 2009. We use a multilateral real exchange rate and the GARCH (1, 1) model to measure exchange rate volatility. This measurement is supposed as the best volatility proxy to reconcile conflicting views of costs and advantages of flexible exchange rate system. This study also applies a approach called ARDL to the problem of testing the existence of a level relationship between a dependent variable and a set of regressors when regressors are a mixture of I(1) and I(0) because measure of exchange rate volatility is stationary while other variables in models are non stationary.

The empirical result shows that there exits of level relationship in output model which accounts for impact of real exchange rate and real exchange rate volatility. Economic performances will be injured by exchange rate volatility. An increase in exchange rate volatility will reduce significantly economic growth. Therefore, a stable of exchange rate system with main trading partners is needed to enhance economic growth.

From the beginning of 2016 the SBV announces a central exchange rate every day for the VND/USD, which would be used by financial institutions authorized to trade in foreign currencies. The rate is calculated based on the three benchmarks: demand and supply of the Vietnam dong, the exchange rates for a basket of eight strong foreign currencies, and for any change to balance macro-economic needs. Besides announcing the central rate daily, each week the SBV will calculate the cross exchange rate between the VND and the eight other currencies including the USD, the Euro, the Yuan, the Japanese Yen, the Singapore Dollar, the South Korean Won, the Thai Baht, and the Taiwan Dollar. This change is the right direction to enhance economic growth. The new regime will facilitate stronger performance in the foreign currency derivatives market, meeting the requirements for risk prevention in exchange rates and increase liquidity in the market.❑

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