VNU Journal of Science: Economics and Business, Vol. 34, No. 2 (2018) 1-16

VNU Journal of Science: Economics and Business

Journal homepage: https://js.vnu.edu.vn/EAB

Exchange Rate Policy and Macroeconomic Stability in Vietnam

Tran Thi Thanh Huyen*

Banking Academy, No. 12, Chua Boc, Dong Da Dist., Hanoi, Vietnam

Received 29 May 2018
Revised 19 June 2018; Accepted 19 June 2018

Abstract: Since Jan 4th 2016, the State Bank of Vietnam (SBV) has applied the central exchange rate regime pegging VND to a basket of 8 currencies, which reflects the adaptation of macro policies in general and exchange rate policy in particular when the integration context has changed. In order to propose suitable solutions to administrate exchange rate policy effectively, this article employs the vector auto regression (VAR) model, in which the relationship between exchange rate and three objectives of exchange rate policy (including prices, output and trade balance) are tested. The data used in this model is quarterly, in the period 2001q1-2017q3. Based on the results of the VAR model, a number of policy implications has been proposed, including: (i) continuing to apply a currency basket pegged exchange rate regime; (ii) instead of choosing to devaluate VND, the SBV should use other exchange rate management tools; (iii) speeding up the development of the derivative exchange rate market is necessary to reduce the level of exchange rate pass-through (ERPT) to the import price index so that helps to control inflation in Vietnam; and (iv) the SBV should prioritize the exchange rate policy administration towards price stability through adopting an inflation-targeting monetary policy.

Keywords: Exchange rate policy, exchange rate, inflation, trade balance, Vietnam.

1. Introduction

Since the "Doi Moi" policy was initialized, the degree of Vietnam's international economic integration has been increasingly promoted. Many bilateral and multilateral free trade agreements have been signed, not to mention ones that are still under negotiation. In the spirit of the trade agreements that Vietnam participates in, liberalization is a mainstream trend, expressed in many areas, including trade, investment and capital movements. To join the common playground, Vietnam should abide by the rules and regulations which are set out. Macroeconomic policies in general and exchange rate policy in particular are forced to change to adapt to new contexts. According to the WTO commitments, in order to be recognized as a market economy in 2018, Vietnam must meet five conditions, including financial market conditions and the stability of the domestic currency. Under TPP's (later CPTPP) agreements, Vietnam is not allowed to devalue its domestic currency, in order to reduce the price of exported goods, which can

* Tel.: 84-983830104.
Email: huyenttt@hvnh.edu.vn

https://doi.org/10.25073/2588-1108/vnueab.4152

help to increase the economy's competitiveness. In Jan 4th 2016, the SBV began to apply a new exchange rate regime which pegged VND to a basket of 8 currencies, replacing the previous USD pegged exchange rate regime.

Exchange rate policy as an indirect tool of monetary policy is directed toward the internal balance and external balance of the economy, including price stability, economic growth and trade balance stabilization. Before having impacts on the internal balance and external balance, the exchange rate policy - a purposeful intervention of the monetary regulator along with supply - demand relationship in the foreign exchange market causes exchange rate fluctuation, which will have certain effects on prices, output and trade balance. Thus, when the exchange rate policy is adjusted, its impact on macroeconomic variables will also change.

In order to propose appropriate implications to manage the exchange rate policy effectively, examining the impact of the exchange rate policy, more specifically, the impact of exchange rate fluctuations to the exchange rate policy's objectives including prices, economic growth and trade balance, is proved to be essential.

So far, there have been many studies investigating the relationship between the above economic variables.

Regarding the relationship between exchange rate fluctuations and prices, previous studies not only investigated the level of exchange rate pass-through to the consumer price index (inflation), but also were concerned about the fluctuation of import prices when the exchange rate changed. Theoretically, the exchange rate can be transmitted to import prices, which puts pressure on domestic production prices, thereby affecting consumer prices. Campa and Goldberg (2005) and Ghosh and Rajan (2009) used ordinary least squares (OLS) to explain the degree of domestic price index fluctuations when the exchange rate changed [1, 2]. However, this single-equation regression model ignored the fact that domestic inflation could affect the exchange rate inversely. To study the interaction between exchange rate and domestic inflation in some industrialized economies, McCarthy (2000) was the first to use a VAR model to investigate the level of transmission of various types of shocks (exchange rate shocks and import price shocks) to domestic inflation [3]. Later, Hahn (2003) also used the VAR model for the Euro area while Ito and Sato (2008) investigated exchange rate pass-through (ERPT) in East Asian countries [4, 5]. In addition to the OLS and VAR methods, the Error Correction Model (ECM) has also been used to investigate the transmission of exchange rate fluctuations. Kim (1998) applied the ECM to study the case of the United States, while Beirne and Bijsterbosch (2009) used it to find out about Central and Eastern Europe [6, 7].

Studies on exchange rate pass-through to Vietnam's prices in recent years have also appeared. This relationship was studied through transmission channels of monetary policy, such as Huong et al. (2014), Vinh (2015), Giang (2017) [8-10]; through impact of foreign exchange reserves on inflation (Trinh, 2015) [11]; direct investigation of ERPT, including Minh (2009), Anh et al. (2010), Anh (2015), Anh (2017) [12-15] or the relationship between inflation and the exchange rate by Minh (2014) [16]. The VAR model is preferred in many studies because of its advantages in investigating the interaction between variables in the model. This is also the model which is used in this article to find out the relationship between exchange rate fluctuations and macroeconomic variables, which consist of the import price index and the consumer price index.

About the relationship between exchange rate volatility and economic growth, although the economic theory does not provide a clear relationship between these variables, empirical studies on this issue are quite massive and prove different results. Many studies, including Hausmann et al. (2004), Rodrik (2008) and Gluzmann et al. (2012) are quite consistent in supporting the argument that the domestic currency's devaluation promotes economic growth [17-19]. Meanwhile, other studies have demonstrated the opposite effect of the exchange rate on economic growth, including Kappler et al. (2013), Anh (2015) and Habib et al. (2017) [20, 14, 21]. Anh (2015), who investigated the degree of exchange rate fluctuation on Vietnam's economic growth, proved that exchange rate shock played a very important role in the gross domestic product of Vietnam. The cause of this negative effect, according to the author, might be due to the fact that Vietnam's economy depends mainly on imported raw materials. The devaluation of the domestic currency would increase input costs and reduce output growth [14].

Considering the interaction between the exchange rate and trade balance, empirical studies provided various results, although it is widely acknowledged in theory that when the domestic currency depreciates, exports are encouraged and imports are restricted so that trade balances can be improved. Some studies, including those of Rose (1990), Vural (2016) and Trang (2017) [22-24] did not find a statistically significant impact of the exchange rate on the trade balance. The others with statistically significant results supported the arguments that an exchange rate increase would improve the trade balance as found by Bahmani-Oskooee (1991), Anh (2012) and Arize (2017) [25-27], while others showed the opposite effect, including Wang et al. (2012), Koray and McMillin (1999) [28, 29].

A review of relevant studies suggests that studies about Vietnam primarily focused on examining the degree of exchange rate fluctuations to domestic prices and trade balance, few studies paid attention to the impact of the exchange rate on economic growth. Studies have only analyzed the impact of the exchange rate on one or two of the above three variables. With this approach, the analysis results only reflect a part of the impact of the exchange rate (also the exchange rate policy) on the economy, leading to policy implications that may not be adequate. Overcoming the limitations of previous studies, this article focuses on highlighting the impact of the exchange rate on all three macroeconomic objectives of the exchange rate policy: prices, economic growth, and trade balance. For the transmission channel of the exchange rate to prices, the analysis process is divided into two phases: exchange rate fluctuations affect the import price index, then through the production channel transmit to consumer prices and cause inflation. The purpose of this article is to examine whether the combination of all three objectives in relation to the exchange rate in a model brings a different result, compared to previous studies which investigated this relationship separately.

The remainder of this paper focuses on: (i) the methodology and data description; (ii) results on the impact of exchange rate fluctuations to prices (import price index, consumer price index), output, trade balance and discussion of related issues; and (iii) some policy implications for effective exchange rate policy administration.

2. Methodology and data description

2.1. Methodology

Beside prices (import price, consumer price), output, trade balance and exchange rate, other variables including the world oil price, money supply and interest rate are also added to examine the impact of the exchange rate on macroeconomic variables. The exchange rate on the one hand is affected by some macroeconomic variables, on the other hand affect other variables. Among regression models, the VAR model can measure interactions between macro variables over time, which means that each variable will be explained by an equation that includes its lag and the lag of the other variables. Therefore, the VAR model is proved to be appropriate to determine the relationship between the exchange rate and other macro variables. Another strength of the VAR is that it helps to form the impulse response function and variance decomposition. Through the impulse response function, we can measure the response of variables to shocks at a specific time and in the future. Meanwhile, the results of the variance decomposition allows the estimation of the contribution of shocks to the variance of each variable. The VAR model is applied in this research to investigate the impact of exchange rate shocks on domestic prices, trade balance, output growth and possible interactions among these variables. To form structural shocks, this paper uses Cholesky decomposition, in the following order: the world oil price, the output, import price index, consumer price index, money supply, interest rate, trade balance and exchange rate. The order of the above variables in the Cholesky matrix is referenced and inherited from previous studies, including Anh (2010), Anh (2015), Koray and McMillin (1999) and Anh (2017) [13, 14, 29, 15].

Some hypotheses about the relationship between exchange rate fluctuations and macro variables may be given as follows:

H1: The depreciation of the domestic currency is expected to improve the competitiveness of exports, but will also increase the price of imported goods. The overall impact of the exchange rate on the trade balance depends on the share of imports used to produce export goods.

H2: The effect of the domestic currency devaluation on economic growth is expected to depend on the pass-through of exchange rate effects on the trade balance.

H3: As the domestic currency depreciates, import prices and consumer prices are expected to increase.

H4: The level of exchange rate pass-through to the import price index is expected to be higher than to the consumer price index.

2.2. Data description

The data used in the VAR model is taken quarterly in the period 2001q1-2017q3, not monthly as in some previous studies because the data of the import price index is only available yearly or quarterly - the quarterly data can only be found from 2001q1.

All variables (except interest rate and exchange rate) are seasonally adjusted by the Census X-12 method before being logarithmized. The interest rate variable is expressed as a percentage, so is not logarithmic.

The trade balance is not determined in the normal way (the difference between the export value and the import value) but is calculated by taking the ratio between the export value and the import value. This approach, according to Bahmani-Oskooee (1991), is ideal because it helps to limit the difference in estimation results when measuring export and import value in different currencies (USD or local currency). It also makes it easy to change data to a logarithmic form [25]. The exchange rate used in this model is NEER, which is the average exchange rate between VND and the currency of Vietnam's 20 major trading partners. This rate was also used in the researches of Minh (2009) and Anh (2015) [12, 14]. The use of NEER, according to Anh (2015), could better reflect the change in the import price index and then the consumer price index when the exchange rate fluctuates, than using the nominal exchange rate between VND and USD, which was almost always fixed [14].

2.3. Analytical process

- Step 1: Checking stationarity of the data series by the Augmented Dickey - Fuller (ADF) Test.
- Step 2: Selecting the optimal lag for the model through the LR, FPE, AIC, SC, HQ criteria and Wald Test.
- Step 3: Evaluating the model by: (i) checking the stability of the system; (ii) Granger causality test to determine the fit of the variables in the model; (iii) White noise detection: self-correlation and variance of variation.
- Step 4: Building impulse response function (IRF).
- Step 5: Making variance decomposition (VDF).

Table 1. Variables used in VAR model

No.	Variable	Symbol	Measurement	Data source	Time
1	The world oil price	POIL	Brent Crude oil price - Europe (2001Q1 = 100)	FRED[1]	2001q1-2017q3
2	Output	GDP	Gross domestic product (comparative price 2010 - Bil dong)	GSO[2]	2001q1-2017q3
3	Import price	IMP	Import price index (2009 = 100)	GSO	2001q1-2017q3
4	Consumer price	CPI	Consumer price index (2010 = 100)	IFS[3]	2001q1-2017q3
5	Money supply	MS	Ratio of broad money supply (M2) to nominal GDP	IFS, GSO	2001q1-2017q3
6	Interest rate	IR	Deposit interest rate at commercial banks (%/year)	IFS	2001q1-2017q3
7	Trade balance	TB	Ratio of nominal export value to nominal import value (applying the method of Bahmani-Oskooee (1991)) [25]	IFS	2001q1-2017q3
8	Exchange rate	NEER	Nominal effective exchange rate (2001q1 = 100), calculated by method of Hang et al (2010) [30]	IFS, DOTS[4]	2001q1-2017q3

Source: Author's synthesis.

3. Research results and discussion

3.1. Checking stationarity of the data series

Stationarity is one of important conditions to consider when analyzing time series data. If the time series are not stationary, fake regression will be generated, which makes model results biased. An ADF test is used to determine the stationarity of the data series with AIC (Akaike Info Criterion). The results of the test (see Table 2) reveal that all variables are not stationary at level but stationary at the 1% level of significance when taking the first difference. Thus, the VAR model is estimated with data series in the form of the first-order difference.

3.2. Lag

Lag in the VAR model is of very important significance. Table 3 shows the criteria to determine lag for VAR analysis.

Based on the above criteria, the lag of the VAR model can be either 0, 3, 4 or 6. Meanwhile, the results of the Wald Test (see Appendix 1) supports that the lag of the equation should be 3. Therefore, the article uses a VAR model with a lag of 3.

3.3. Evaluating the model

The Granger causality test (see Appendix 2) for all variables (except for the world oil price) shows that all variables are endogenous. In addition, the stability condition test result (see Appendix 3) reveals that the AR roots are within the unit circle, indicating that the time series is stable enough for analysis and forecasting. The results of a residual serial correlation test (see Appendix 4) and a variance of variation test (see Appendix 5) also satisfy the condition for using the VAR model.

[1] Federal Reserve Bank of St. Louis https://fred.stlouisfed.org
[2] General Statisitcs Office of Vietnam.
[3] International Financial Statistics, IMF.
[4] Direction of Trade Statistics, IMF.

Table 2. Results of ADF test

	Lag based on AIC	**t-Statistic**		**Lag based on AIC**	**t-Statistic**
LNPOIL	0	-2.07	D(LNPOIL)	1	-6.58***
	3	-2.06	D(LNGDP)	2	-14.63***
LNIMP	1	-1.61	D(LNIMP)	0	-6.33***
LNGDP	5	-2.32	D(LNCPI)	9	-4.6***
LNMS	0	-2.25	D(LNMS)	0	-10.26***
IR	2	-1.68	D(IR)	1	-7.51***
LNTB	8	-0.67	D(LNTB)	7	-4.26***
LNNEER	1	-1.34	D(LNNEER)	0	-5.65***

Notes: *** denotes for 1% statistical significance.
Source: Estimation from the model.

Table 3. Lag for the VAR model

Lag	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	NA	2.01e-19	-23.18395	**-22.69097***	-22.99151
1	144.7247	5.97e-20	-24.41742	-22.19904	-23.55145
2	94.10060	3.82e-20	-24.94479	-21.00099	-23.40529
3	**101.7317***	1.46e-20	-26.10965	-20.44044	-23.89662
4	60.81162	**1.45e-20***	-26.54559	-19.15096	-23.65903
5	47.18971	1.99e-20	-27.02956	-17.90952	-23.46947
6	44.49731	2.45e-20	**-28.33503***	-17.48958	**-24.10141***

Source: Estimation from the model.

To investigate the interactions of variables in the model, it is necessary to consider the impulse response function (IRF) and the variance decomposition.

3.4. Results of impulse response function to exchange rate shock

Figure 1 shows the fluctuation of trade balance, output growth, the import price index and the consumer price index when exchange rate shock appears.

The results of the impulse response function show that the impact of exchange rate fluctuations on the trade balance follows the J curve - that is, after VND devalues by 1%, the trade balance decreases continuously from the 2nd quarter to the 5th quarter (with the strongest decrease of 0.011%) then improves, but not significantly (with the highest increase of 0.003% after 7 quarters). Overall, VND devaluation does not help to improve significantly the trade balance of Vietnam. This limited impact of the exchange rate may be explained by the fact that almost every imported commodity (70-80%) is used for export production so that VND devaluation although it helps to improve exports, but it cannot offset the increase of imported good value.

Analysis of the output impulse response to exchange rate shock exposes that domestic devaluation has no clear impact on the output growth.

Thus, VND devaluation does not help improve significantly the trade balance and has no clear impact on the output growth but makes the import price index increase and contributes to inflation in Vietnam. This can be clearly seen through analyzing the impulse response of the import price index and the consumer price index to the exchange rate shock.

When there is an exchange rate shock, the import price index and the consumer price index all increase, however the reaction level of the import price index is higher than that of the consumer price index. This is suitable with the ERPT theory because exchange rate fluctuations affect the import price index at first then through the production channel have impact on the consumer price index.

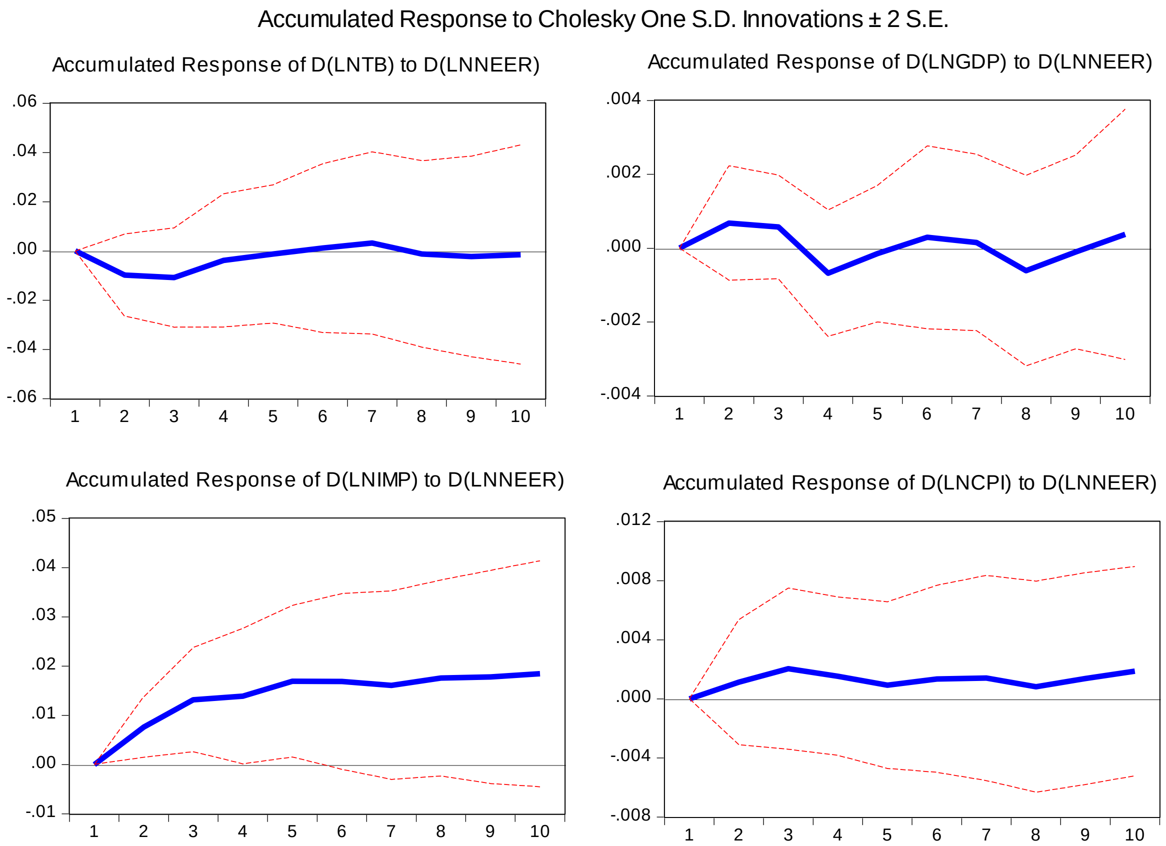

Figure 1. Impulse response to exchange rate shock.
Source: Estimation from the model.

Applying the formula of Leigh and Rossi (2002), the article continues to measure the cumulative exchange rate pass-through coefficient to the import price, in time t and t + k (denoted as PTt, t + k):

PTt, t + k = Pt, t + k / Et, t + k

Where: Pt, t + k is the cumulative change in the import price and Et, t + k is the cumulative exchange rate change to the exchange rate shock in the period of t and t + k.

The exchange rate pass-through coefficient of the import price index in each period is determined by taking the difference between the cumulative exchange rate pass-through to the import price index of two consecutive periods.

Table 4. The exchange rate pass-through coefficient to the import price index

Period	**Cumulative ERPT coefficient**	**ERPT coefficient in each period**
1	0	0
2	0.99059	0.99059
3	1.439686	0.449096
4	1.970279	0.530593
5	2.037308	0.067029
6	1.879602	-0.15771
7	1.753204	-0.1264
8	1.751619	-0.00159

Source: Estimation from the model.

Table 4 reveals that the degree of exchange rate pass-through to the import price index is nearly complete at the 2nd quarter after exchange rate shock happens. Six (6) months after the shock, the average ERPT coefficient is 0.495, which means that a 1% change of the exchange rate causes a 0.495% change of the import price index. The average ERPT coefficient to the import price index after 1 year and 2 year is 0.49 and 0.22, respectively.

Thus, the impact degree of exchange rate fluctuations on the import price index is quite high, although reduces significantly when transferring to the consumer price index but still has a certain impact on the domestic inflation. Thus, if the level of ERPT to the import price index is limited, the impact of exchange rate fluctuations on the consumer price index will certainly reduce, contributing to control the inflation - one of important internal balance goals of the economy.

3.5. Variance decomposition

The impulse response function, although it provides information about the degree of ERPT to macro variables, it cannot show how much the exchange rate shock contributes to explain the fluctuation of these variables. Therefore, in order to evaluate the importance of exchange rate shocks, it is necessary to decompose variance for the variables.

Table 5. Results of variance decomposition

Variance Decomposition of D(LNGDP):

Period	D(LNGDP)	D(LNIMP)	D(LNCPI)	D(LNM2)	D(IR)	D(LNNEER)	D(LNTB)
1	100.0000	0.000000	0.000000	0.000000	0.000000	**0.000000**	0.000000
2	83.72711	2.161897	9.728304	0.504215	2.185665	**0.999122**	0.693686
3	63.94375	5.950505	21.02487	2.105225	1.615676	**0.750108**	4.609864
4	52.18364	8.579380	21.95283	3.475176	2.047762	**2.469631**	9.291583
5	55.38007	7.960179	21.23224	3.102891	1.808973	**2.438080**	8.077558
6	57.40427	6.924665	21.51686	2.823231	1.812082	**2.287868**	7.231030
7	53.86340	7.686855	23.94534	2.817438	1.633553	**2.004320**	8.049091
8	53.65166	7.810498	23.38878	2.667795	1.545524	**2.264723**	8.671011
9	56.04086	7.305449	21.82674	2.522068	1.441292	**2.285963**	8.577630
10	58.00950	6.819767	20.91079	2.351038	1.343333	**2.274081**	8.291489

Variance Decomposition of D(LNIMP):

Period	D(LNGDP)	D(LNIMP)	D(LNCPI)	D(LNM2)	D(IR)	D(LNNEER)	D(LNTB)
1	2.588390	97.41161	0.000000	0.000000	0.000000	**0.000000**	0.000000
2	2.136981	73.21030	10.62582	3.541645	0.004071	**8.370369**	2.110811
3	1.971904	61.80610	10.06696	5.586117	4.251111	**10.63942**	5.678383
4	2.733438	59.69238	9.404552	7.628519	4.561894	**9.652974**	6.326247
5	2.686886	56.79450	10.73453	7.378741	5.339724	**9.077611**	7.988008
6	3.139571	56.38515	11.16207	7.275368	5.319684	**8.891553**	7.826601
7	3.336487	55.51885	11.77065	7.355439	5.300377	**8.767493**	7.950708
8	3.297305	55.49739	12.01065	7.228812	5.279206	**8.805940**	7.880702
9	3.428953	54.89631	12.48633	7.331055	5.341955	**8.713834**	7.801565
10	3.583470	54.69793	12.55883	7.349069	5.322612	**8.714555**	7.773533

Variance Decomposition of D(LNCPI):

Period	D(LNGDP)	D(LNIMP)	D(LNCPI)	D(LNM2)	D(IR)	D(LNNEER)	D(LNTB)
1	13.75600	0.020347	86.22366	0.000000	0.000000	**0.000000**	0.000000
2	10.51642	2.427142	76.06515	3.714857	0.289982	**2.532381**	4.454075
3	11.16506	3.646252	69.51603	7.711245	0.284664	**3.768485**	3.908268
4	12.67287	9.326337	58.12417	7.558273	0.257204	**7.775284**	4.285868
5	12.23296	9.009763	56.94433	7.455218	0.670749	**7.861222**	5.825762
6	14.33955	9.663060	54.08611	7.116792	1.050920	**7.875952**	5.867613
7	14.27096	9.783290	53.83102	7.100809	1.151446	**7.872085**	5.990381
8	16.42488	9.553859	51.61875	7.318908	1.119421	**7.937808**	6.026369
9	16.43143	9.533518	51.48819	7.304328	1.159232	**8.023491**	6.059810
10	19.19870	9.262685	48.99593	7.037469	1.196401	**8.047983**	6.260838

Variance Decomposition of D(LNTB):

Period	D(LNGDP)	D(LNIMP)	D(LNCPI)	D(LNM2)	D(IR)	D(LNNEER)	D(LNTB)
1	0.210199	2.726578	0.021462	13.09539	2.816412	**0.000000**	81.12996
2	4.780944	3.836892	9.680076	9.790883	3.666472	**1.771880**	66.47285
3	4.797403	4.126647	9.164628	9.111511	9.026808	**1.616078**	62.15693
4	8.041065	4.048117	8.889849	8.156892	9.222167	**2.159625**	59.48229
5	8.121783	4.428550	8.613070	9.254477	10.60423	**2.114787**	56.86310
6	7.626729	5.424324	9.628977	8.758712	10.36151	**2.035191**	56.16456
7	8.038919	5.613116	9.391189	8.950944	11.30422	**2.025468**	54.67615
8	7.941234	6.288357	9.839676	8.727944	12.03175	**2.200883**	52.97016
9	7.884218	6.272615	10.98096	8.536578	11.76485	**2.158724**	52.40205
10	7.799732	6.528883	10.99285	8.485141	12.23745	**2.141032**	51.81492

Cholesky Ordering:
D(LNGDP) D(LNIMP) D(LNCPI) D(LNM2) D(IR) D(LNTB) D(LNNEER)

Source: Estimation from the model.

It can be clearly seen in Table 5 that the exchange rate contribution in explaining fluctuations in trade balance and output is rather moderate (about 2-2.5% at one year after the shock and that level continues for the following years). This is also consistent with the above impulse response function.

Among the factors affecting prices, the exchange rate shock plays a relatively important role in explaining changes in the import price index and the consumer price index. Specifically, the exchange rate shock contributes approximately 8.4% to the fluctuation of the import price index after 2 quarters. This contribution level peaks to the highest point at 10.6% after 3 quarters and fluctuates between 8.7-9.7% in the following quarters. Meanwhile, about 2.5% of the consumer price index volatility after 2 quarters is explained by the exchange rate shock. The exchange rate shock contribution increases gradually then keeps stable at above 7.7% during the 3rd quarter to the 10th quarter. It is notable that, the contribution of the exchange rate shock to the fluctuation of the consumer price index from the 3rd quarter is higher than the contribution of the money supply shock, which proves that ERPT to the import price index has a certain impact on the consumer price index. Meanwhile, the contribution of the import price shock to the consumer price index volatility is also quite high, above 9%, from the 4th quarter.

4. Conclusions and some policy implications

By using up-to-date data, the VAR model reveals the following key points: (i) devaluation of VND not only does not help to improve significantly the trade balance and has no clear impact on the economic growth but leads to an increase in the import price index, which contributes to inflation in Vietnam; (ii) the level of ERPT to the import price index is relatively high, although decreases dramatically when passed through to the consumer price index, which reveals that the impact of exchange rate fluctuation to inflation can be reduced if ERPT to the import price index is limited and, (iii) this paper along with previous studies confirms the important role of exchange rate policy to stabilize prices in Vietnam.

Based on the results drawn, the following policy implications may be given:

Firstly, the currency basket pegged exchange rate regime choice of the SBV from Jan 4th, 2016 is in the right direction because it is in line with the integration requirements. The exchange rate fluctuates in both trend (up and down) and the degree of oscillation is also smaller (suitable with the demand for currency stability).

Secondly, among the tools that the SBV can use to manage the exchange rate, VND devaluation is proved to be not a correct choice. Instead of this, the SBV should apply suitable exchange rate fluctuation tools or enhance using indirect intervention measures.

The results of the VAR model shows that VND devaluation is not an optimal solution to enhance the competitiveness of export goods, thus improving the trade balance. It is due to the fact that Vietnam is heavily dependent on import goods while the degree of ERPT to the import price index is relatively high so that VND devaluation will have negative impact on imports, make production costs increase, narrow the domestic production in general and the export production in particular. As a consequence the trade balance is affected. VND devaluation also has a negative impact on inflation control and even increases the external debt. In conclusion, the devaluation of the domestic currency can have negative consequences, not only does it not help to improve, but also might reduce the competitiveness of the economy. The SBV should consider using other exchange rate management tools such as exchange rate fluctuation tools and other indirect intervention measures (such as interest rate).

Thirdly, the State Bank of Vietnam should pay much attention to find out solutions to reduce risks caused by exchange rate fluctuations because if the degree of ERPT to the import price index decreases, the effect of the exchange rate fluctuations on inflation will also go down. According to the study by Nhung and Huyen (2017), speeding up the development of the derivative exchange rate market is necessary to hedge exchange rate risks for export-import enterprises so as to reduce the level of ERPT to the import price index [31].

Fourthly, the SBV should prioritize the exchange rate policy administration towards price stability through adopting an inflation-targeting monetary policy. In order to maintain the current currency basket pegged exchange rate regime, towards the floating exchange rate regime in the future, the exchange rate policy should not continue to be used as a means of monetary policy to solve urgent situations. This is due to the fact that the exchange rate does not help to increase the volume of money but only contributes to change the structure of currencies. In order to achieve the above goal, multi-targeting monetary policy, which is favored over quantity control, should be replaced by inflation-targeting monetary policy. Inflation-targeting monetary policy will be a long-term solution to limit the embarrassment and passivity of the SBV in administrating exchange rate policy, thus the exchange rate policy will not have to be sacrificed for the inflation target.

References

[1] Campa, J. M. and Goldberg, L. S., "Exchange rate pass-through into import prices", *The Review of Economics and Statistics,* 87 (2005) 4, 679-690.

[2] Ghosh, A. and Rajan, R. S., "Exchange rate pass-through in Korea and Thailand: Trends and determinants", *Japan and the World Economy*, 21 (2009), 55-70.

[3] McCarthy, J., "Pass-Through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies", *Eastern Economic Journal*, 33 (2000) 4, 511-537.

[4] Hahn, E., *Pass-Through of External Shocks to Euro Area Inflation*, European Central Bank, Working Paper No. 243, 2003.

[5] Ito, T. and Sato, K., "Exchange rate changes and inflation in post-crisis Asian economies: VAR analysis of the exchange rate pass-through", *Journal of Money, Credit and Banking*, 40 (2008), 1407-1438.

[6] Kim, K. H., "US Inflation and the Dollar Exchange Rate: A Vector Error Correction Model", *Applied Economics*, 30 (1998) 5, 613-619.

[7] Beirne, J. and Bijsterbosch, M., *Exchange rate pass-through in central and eastern European member states,* European Central Bank, Working Paper Series, No. 1120, 2009.

[8] Huong, T.T.X., V.X.Vinh and N.P. Canh, "Transmission of monetary policy: A number of appropriate regression models", *Journal of Development and Integration,* 16 (2014) 26, 41-46.

[9] Vinh, N.T.T, "The role of different channels on transmitting monetary policy into output and price in Vietnam", *Journal of Economics and Development,* 214 (2015), 20-30.

[10] Giang, L.T., *Applied structural vector autoregression model to analyze monetary transmission mechanism in Vietnam,* Doctoral Thesis, National Economics University, 2017.

[11] Trinh, P.T.T., "Impact of foreign exchange reserves to inflation: Approaching by VAR model", *Economic Development Review,* 26 (2015), 46-68.

[12] Minh, V.V., *Exchange rate pass-through and its implications for inflation in Vietnam,* Vietnam development forum, Working paper 0902, 2009.

[13] Anh, N.D.M, T.M. Anh and V.T. Thanh, "Exchange rate pass-through into inflation in Vietnam: An assessment using Vector Autogression approach", *Vietnam Economic Management Review,* 2010.

[14] Anh, P.T., "Applying SVAR model to analyzing exchange rate pass-through effects (ERPT) in Vietnam", *Journal of Economics and Development,* 220 (2015), 48-58.

[15] Anh, P.V., *Choosing the exchange rate regime in order to implement the inflation targeting policy in Vietnam,* Doctoral Thesis, Foreign Trade University, 2017.

[16] Minh, H.D., *The relationship between inflation and exchange rate in Vietnamese economy,* Doctoral Thesis, Hanoi University of Science and Technology, 2014.

[17] Hausmann, R., Pritchett, L. and Rodrik, D., *Growth accelerations,* NBER Working paper series 10566, 2004.

[18] Rodrik D., "The Real Exchange Rate and Economic Growth", *Brookings Papers on Economic Activity,* Vol. 2008, 365-412.

[19] Gluzmann, P. A., Levy - Yeyati, E. and Sturzenegger, F., "Exchange rate undervaluation and economic growth: Díaz Alejandro (1965) revisited", *Economics Letters,* 117 (2012), 666-672.

[20] Kappler, M., Reisen, H., Schularick, M. and Turkisch, E., "The Macroeconomic Effects of Large Exchange Rate Appreciations", *Open Econ Rev,* 24 (2012), 471-494.

[21] Habib, M. M, Mileva, E. and Stracca, L., "The real exchange rate and economic growth: Revisiting the case using external instruments", *Journal of International Money and Finance,* Accepted Manuscript, 2017.

[22] Rose, A. K., "Exchange rates and the trade balance: Some evidence from developing countries", *Economics Letters,* 34 (1990), 271-275.

[23] Vural, B. M. T., "Effect of Real Exchange Rate on Trade Balance: Commodity Level Evidence from Turkish Bilateral Trade Data", *Procedia Economics and Finance,* 38 (2016), 499-507.

[24] Trang, L. M, *Exchange rate policy to promote export of Vietnam,* Doctoral Thesis, Thuong mai University, 2017.

[25] Bahmani - Oskooee, M., "Is there a long-run relation between the trade balance and the real effective exchange rate of LDCs?", *Economics Letters,* 36 (1991), 403-407.

[26] Anh, D. T. H., Impact of the real exchange rate on trade balance in the context of international economic integration, Doctoral Thesis, Banking Academy, 2012.

[27] Arize, A. C., Malindretos, J. and Igwe, E. U., "A Convenient Method for the Estimation of ARDL Parameters and Test statistics: U.S.A Trade Balance and Real Effective Exchange Rate Relation", International Review of Economics and Finance, 2017, http://dx.doi.org/10.1016/j.iref.2017.03.024.

[28] Wang, C. H., Lin, C. H. and Yang. C. H. et al., "Short-run and long-run effects of exchange rate change on trade balance: Evidence from China and its trading partners", Japan and the World Economy, 24 (2012), 266-273.

[29] Koray, F. and McMillin, W. D., "Monetary shocks, the exchange rate, and the trade balance", Journal of International Money and Finance, 18 (1999), 925-940

[30] Hang, N. T. T., D. T. Minh, T. T. Thanh, L. H. Giang and P. V. Ha, Exchange rate policy choice in the context of economic recovery, VEPR, Working Paper No. 2010.

[31] Nhung, N.C. and T.T.T. Huyen, "Exchange rate pass-through into Vietnamese import prices by industries and by countries", International Business Management, 11 (2017) 11, 1834-1843.

Appendix 1. The result of Wald Test

VAR Lag Exclusion Wald Tests

Date: 01/18/18 Time: 15:01

Sample: 2001Q1 2017Q3

Included observations: 62

Chi-squared test statistics for lag exclusion:
Numbers in [ ] are p-values

	D(LNGDP)	D(LNIMP)	D(LNCPI)	D(LNM2)	D(IR)	D(LNNEER)	D(LNTB)	Joint
	130.1439	19.56893	17.16310	27.86992	33.26795	26.07035	14.90440	317.7768
Lag 1	[0.000000]	[0.006580]	[0.016374]	[0.000232]	[2.36e-05]	[0.000489]	[0.037245]	[0.000000]
	98.50932	9.601056	15.59528	16.64677	24.18130	21.63054	8.267791	255.4028
Lag 2	[0.000000]	[0.212331]	[0.029082]	[0.019822]	[0.001059]	[0.002941]	[0.309574]	[0.000000]
	86.24633	10.04336	5.286244	17.04301	9.348264	21.87198	7.414894	183.2793
Lag 3	[7.77e-16]	[0.186130]	[0.625076]	[0.017121]	[0.228610]	[0.002673]	[0.386995]	[0.000000]
df	7	7	7	7	7	7	7	49

Source: Estimation from the model.

Appendix 2. The result of Granger causality Test

VAR Granger Causality/Block Exogeneity Wald Tests

Date: 01/18/18 Time: 15:01

Sample: 2001Q1 2017Q3

Included observations: 62

Dependent variable: D(LNGDP)

Excluded	Chi-sq	Df	Prob.
D(LNIMP)	4.270458	3	0.2337
D(LNCPI)	11.24760	3	0.0105
D(LNM2)	2.254390	3	0.5213
D(IR)	4.272351	3	0.2335
D(LNNEER)	7.188725	3	0.0661
D(LNTB)	13.43937	3	0.0038
All	42.20861	18	0.0010

Dependent variable: D(LNIMP)

Excluded	Chi-sq	Df	Prob.
D(LNGDP)	2.280575	3	0.5163
D(LNCPI)	10.57845	3	0.0142
D(LNM2)	2.036398	3	0.5649
D(IR)	2.388255	3	0.4958
D(LNNEER)	10.73091	3	0.0133
D(LNTB)	2.701458	3	0.4400
All	44.70628	18	0.0005

Dependent variable: D(LNCPI)

Excluded	Chi-sq	df	Prob.
D(LNGDP)	4.018838	3	0.2594
D(LNIMP)	1.116125	3	0.0732
D(LNM2)	3.112014	3	0.0747
D(IR)	1.406603	3	0.7040
D(LNNEER)	0.579286	3	0.0012
D(LNTB)	4.814430	3	0.1859
All	27.30115	18	0.0735

Dependent variable: D(LNM2)

Excluded	Chi-sq	df	Prob.
D(LNGDP)	3.887372	3	0.2739
D(LNIMP)	12.47865	3	0.0059
D(LNCPI)	3.982862	3	0.2633
D(IR)	17.25461	3	0.0006
D(LNNEER)	0.654950	3	0.8837
D(LNTB)	5.251963	3	0.1542

All	37.46921	18	0.0046
Dependent variable: D(IR)			
Excluded	Chi-sq	df	Prob.
D(LNGDP)	2.888487	3	0.4091
D(LNIMP)	0.982556	3	0.8055
D(LNCPI)	6.551119	3	0.0877
D(LNM2)	1.211408	3	0.7503
D(LNNEER)	0.426836	3	0.9346
D(LNTB)	15.97075	3	0.0011
All	42.55745	18	0.0009
Dependent variable: D(LNNEER)			
Excluded	Chi-sq	Df	Prob.
D(LNGDP)	13.41282	3	0.0038
D(LNIMP)	14.09969	3	0.0028
D(LNCPI)	11.11048	3	0.0111
D(LNM2)	3.552607	3	0.3140
D(IR)	8.600559	3	0.0351
D(LNTB)	12.53242	3	0.0058
All	44.28992	18	0.0005
Dependent variable: D(LNTB)			
Excluded	Chi-sq	Df	Prob.
D(LNGDP)	2.890429	3	0.4088
D(LNIMP)	1.816439	3	0.6114
D(LNCPI)	5.678044	3	0.1284
D(LNM2)	5.347809	3	0.1480
D(IR)	7.315635	3	0.0625
D(LNNEER)	2.860004	3	0.0137
All	33.14710	18	0.0160

Source: Estimation from the model.

Appendix 3. The stability condition test result

Roots of Characteristic Polynomial
Endogenous variables: D(LNGDP) D(LNIMP) D(LNCPI) D(LNM2) D(IR) D(LNTB) D(LNNEER)

Exogenous variables: C D(LNPOIL) D(LNPOIL(-1))

Lag specification: 1 3

Date: 01/18/18 Time: 15:02

Root	Modulus
-0.004991 + 0.999836i	0.999848
-0.004991 - 0.999836i	0.999848
-0.868606	0.868606
0.341960 + 0.769341i	0.841916
0.341960 - 0.769341i	0.841916

0.774599	0.774599
-0.212826 - 0.699571i	0.731228
-0.212826 + 0.699571i	0.731228
-0.676613 - 0.229238i	0.714392
-0.676613 + 0.229238i	0.714392
-0.337348 - 0.617069i	0.703262
-0.337348 + 0.617069i	0.703262
0.081004 - 0.694414i	0.699123
0.081004 + 0.694414i	0.699123
0.589535 - 0.353779i	0.687540
0.589535 + 0.353779i	0.687540
-0.562827 + 0.383966i	0.681325
-0.562827 - 0.383966i	0.681325
0.457348 + 0.465684i	0.652709
0.457348 - 0.465684i	0.652709
-0.611565	0.611565

No root lies outside the unit circle.

VAR satisfies the stability condition.

Source: Estimation from the model.

Appendix 4. The result of residual serial correlation test

VAR Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h

Date: 01/18/18 Time: 15:02

Sample: 2001Q1 2017Q3
Included observations: 62

Lags	LM-Stat	Prob
1	55.01253	0.2576
2	33.57703	0.9546
3	38.82026	0.8511
4	46.63386	0.5696
5	45.62039	0.6109
6	47.27564	0.5433
7	31.89744	0.9722
8	72.54269	0.0761
9	62.22293	0.0972
10	56.11902	0.2255

Probs from chi-square with 49 df.

Source: Estimation from the model.

Appendix 5. The variance of variation test result

VAR Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Date: 01/18/18 Time: 15:03

Sample: 2001Q1 2017Q3
Included observations: 62

Joint test:		
Chi-sq	Df	Prob.
1291.027	1288	0.4710

Source: Estimation from the model.