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The impact of foreign exchange rate on a balance of payments: Issues from Vietnam

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ABSTRACT

The foreign exchange rate always changes and impacts many economic issues. One of these issues is the impact of the foreign exchange rate on the balance of payments. Our research focuses on the impact of the exchange rate on Vietnam's balance of payments. All data was collected from the Vietnamese State Bank in the period from 2000 to 2020. We applied the model with the unit root, Auto-Regressive Distributed Lag (ARDL), and Granger Causality Test to evaluate the impact of the foreign exchange rate on the balance of payments. The findings indicated that Vietnam's foreign exchange rate has a significant positive impact on the balance of payment. The result implied that when the foreign exchange rate is stable, it seems to create a developed and effective economic environment. All these contributions are an important base for improving Vietnam's balance of payments as well as Vietnam's economy. By deeply analyzing issues of Vietnam's foreign exchange rate and its effect, we propose some orientations and solutions for Vietnam's government and managers in issuing suitable economic policies in the future.

1. Introduction

Many researchers are interested in the impact of change in the foreign exchange rate on economic issues. One of the problems is the effect of the foreign exchange rate on the balance of payments. Deficits of the balance of payments can cause many serious problems for the economy, especially in emerging countries. Destaings et al. (2013) concluded that deficits in the balance of payments or current account can cause economic crises. And deficits in the balance of payments have a relationship with changes in foreign exchange rate policies as well as foreign exchange rate by itself.

The exchange rate is an important economic unit to evaluate the monetary relationship between a nation and other countries in the world. It is the price of a domestic currency compared with an international currency. In addition, when the foreign exchange rate fluctuates, it causes many effects on economic issues such as inflations, interest rates, unemployment, and monetary supply (Ahmad et al., 2014; Kruskovic and Maricic, 2015; Seraj and Coskuner, 2021). These economic issues indicate the importance of foreign exchange rates for the economic growth of the countries, especially in globalization, all nations open doors for international transactions. The important role of the foreign exchange rate also stems from comparing the price system of two countries when nations participate in international trade. It builds a connection between prices of domestic goods and prices of foreign goods with the same products. As a result, a change in the foreign exchange rate will directly impact the balance of payments of the nation. After that, it causes a change in economic issues as well as macroeconomics goals of all the countries in international transactions. It is the reason why many nations are implementing flexible foreign exchange rate policies, which can reduce the impact of foreign exchange rates on economic issues (Makin, 2005; Oladipupo and Onotaniyohuwo, 2011; Dkhili, 2019).

In parts of the balance of payments, the exchange rate is one of the important factors. Therefore, if the foreign exchange rate changes out of the control of the market and governments, it can cause instability in the current account or balance of payments. Moreover, changes in foreign exchange rates impact directly economic activities such as good supply,

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investment, employment, or income of citizens (Bird, 1984; Knoester and Sinderen, 1985; Nguyen et al., 2021). In the context of an economy with a high inflation rate, Vietnam implemented a policy of raising domestic currency prices to solve inflation. As a result, the exchange rates decreased, hampering export growth, and encouraging imports, causing a deficit in the trade balance.

In addition, signs of economic instability in Vietnam and the impact of the global financial crisis made capital inflows into Vietnam narrow. This pushed the Vietnamese economy into a situation: a shortage of foreign currencies. Besides, the Vietnamese government must face pressure to adjust the official exchange rate because the gap between the foreign exchange rate in the free market is so wide. The economic problems caused by a change in the foreign exchange rate led to the imbalance between the supply and demand of foreign currencies as well as an imbalance between the supply and demand of goods in the market (Moreno-Brid, 2003; Nguyen et al., 2020).

Our study, therefore, aims to identify whether the exchange rate truly affects the balance of payments through evidence from Vietnam's balance of payments. Based on the findings, we could give some recommendations to the exchange rate for improving Vietnam's balance of payments in the future.

2. Literature review

2.1. Exchange rate and balance of payments

Sodestine (1998) indicated that the exchange rate is the price of one currency compared with the price of another currency. Or the exchange rate is the amount of foreign currency that can be used to transfer one unit of the domestic currency. In many cases, it can be understood that the exchange rate is the cost of a domestic currency used to purchase one unit of foreign currency (Rogoff, 1999). The international monetary system divides exchange rate regimes into three kinds such as floating exchange rate, flexible exchange rate, and fixed exchange rate.

The floating exchange rate regime began to exist in 1973 which reflects changes in exchange rate depending absolutely on the supply and demand of foreign currencies, as well as a balance of payments. While flexible exchange rate system is one of the representative instruments to adjust the exchange rate of both the government and the market (Aizenman and Glick, 2009; Onyinye, 2012). With a flexible exchange rate regime, the government will adjust the exchange rate to gain economic goals, however, their policies do not affect so much on the market. But in some cases, it will cause disequilibrium in the balance of payments. Besides, the fixed exchange rate regime is different. Anyanwu (1993) claimed that a fixed exchange rate regime is not essentially self-equilibrating, it can cause payment deficits at existing exchange rates. Or the impact of fixed exchange rates can distort the economic structure (Bahmani-Oskooee, 1985; Aizenman and Lee, 2008; Moore and Glean, 2016).

The balance of payments is a total summary representing all economic transactions, visible and invisible in a period between one country and all other countries in the world (Onyinye, 2012). It reflects the international relationship between a nation and the rest of the nations in the world. Therefore, the balance of payments is a description of expenses in global transactions of one country with other countries in total.

With this definition, the rate of international transactions of nations will be through the stability of monetary expenses as well as currency trading of those countries with the rest of the world. As a result, the countries' international transactions are considered with the stability of the money market or foreign exchange rate. And if a country reduces its' foreign exchange rate, it will increase the balance of payments (Nie, 2017). Or other meanings, a lack of stability of international transactions results in a reduction in the external worth of the nation's international exchange, and excess stability of transactions results in a rise in the external worth of the nation's international transactions (Wasli and AlSaggaf, 2019).

2.2. Impact of foreign exchange rate on the balance of payments

Many researchers found the impact of exchange rates on the balance of payments. Bebek and Li (2021) also applied ARDL in analyzing the impact of reserve currency and balance of payments in the United Kingdom. They found that there is a difference in the balance of payments positions among periods and affected by reserve currency as well as the foreign exchange issue. The study of Ahmad et al. (2014) indicated that the foreign exchange rate impacts Pakistan's balance of payment. He applied the model with the unit root, Auto-Regressive Distributed Lag, and Granger causality test to analyze that impact. The study found there is a significant and positive impact of the foreign exchange rate on the balance of payments. As a result, the stability of the exchange rate creates a developed economic environment by encouraging investment and that can improve the balance of payments. Lotfalipour and Bazargan (2014) also investigated this impact on Iran's trade balances. They employed the GARCH approach and the Panel data model for the period from 1993 to 2011. The findings of this research indicated that the foreign exchange rate seems not to influence the balance of payments. These findings are the same as the results of Steiner (2010) and Usman and Waheed (2010). While the research of Iyoboyi and Muftau (2014) with data in Nigeria, showed that when the foreign exchange rate depreciates, the balance of payments will change. And the results reflect this issue in Nigeria in the period from 1961 to 2021. The findings showed that the foreign exchange rate impacts the balance of payments in long term. The

researchers implied that the government needs to adjust policies to ensure that changes in the foreign exchange rate will not affect so much the balance of payments, especially since they are negative impacts.

The impact of the foreign exchange rate was investigated by Odili (2014) with the results from Nigeria's data in the period from 1971 to 2012. The authors also used Auto-Regressive Distributed Lag and co-integrating with the estimation technique to analyze the impact. The findings showed that the foreign exchange rate affects positively and statically significant the balance of payments in the long term while the result was statically insignificant in short term. Besides, the results also revealed that when domestic currency value increases, the balance of payments of that country has a trend to decrease. This finding is right with Marshall-Lerner's condition in the case of Nigeria. Oladipupo and Onotaniyohuwo (2011) and Alencar and Strachman (2014) applied the OLS method to analyze this issue in Nigeria in the period from 1970 to 2008. Their study indicated that the depreciation of domestic currency can improve a nation's balance of payment status. Besides, they also implied that there is a relationship between foreign exchange policies or currency control policies and the balance of payment issues. In other words, an improper allocation and misuse of domestic currency, as well as the unsuitable foreign exchange policies can lead to a persistent balance of payments deficits in Nigeria.

Narayan and Smyth (2006), Felipe et al. (2010) and Kayamo (2021) found a relationship between the exchange rate on the foreign reserves of the nation as a part of the balance of payments, they found that the exchange rate has a statistically significant positive effect on foreign exchange reserves in long run. They tested variables using Augmented Dickey-Fuller (ADF) to ensure unit root for exchange rate and foreign reserves variables with data from China and USA. Their findings supported the view that in long term, the exchange rate has a relationship with foreign exchange reserves which, if included, would lead to cooperation between China and the USA in the future. Or, when there is a specific change in the exchange rate can lead to an increase or decrease in the tradable goods price relative to the non-tradeable goods price, causing an expansion or decrease in exporting values, which will be reflected in an increase or reduction in the balance of payments of two countries (McCombie, 1993; 1997; Araujo and Lima, 2007; Riache et al., 2020). The effectiveness of exchange rate policies was examined by Alawattage (2009) and Thahara et al. (2021). Their study indicated that exchange rate policies have a large impact on achievements that Sri Lanka gained since the economy liberalized in 1977. The test results showed that there is a relationship between foreign exchange rate and balance of payments in long term. The impact is positive and significant. However, the result is different in short term, the exchange rate seems not to impact the balance of trade as a part of the balance of payments.

From 1990, the studies of Rose (1990) and Papadopoulos (1993) proved that monetary and exchange rate policies impact the balance of payments in the open economy of Greece, especially in the period from 1955 to 1990. The findings implied that when the home currency of Greece depreciates annually by 25%, it will cause declining GNP growth and effect directly on the balance of payments. As a result, the government of Greece had to adjust monetary and foreign exchange rate policies to suit the reality of the balance payments. According to Anyanwu (1993) and Taylor (1986), the model of balance of payments can be affected by fixed exchange rates in the United Kingdom and West Germany with quarterly data, in which the government fixed foreign exchange rates in a period. As a result, it made changes in the balance of payments of selected countries. In the UK, the findings showed that the deficit of the balance of payment is the result of monetary policies from authorities, while data from West Germany also interpreted the evidence of change in foreign exchange policies on the balance of payments

Although, some studies are implemented about the impact of foreign exchange rate on macroeconomics variables in Vietnam such as GDP, International Direct Investment (FDI)... there haven't been still studies about the impact of foreign exchange rates on the balance of payments. As a result, our study aims to find out the impact of this issue on the balance of payments, a case from Vietnam.

3. Data and model

3.1. Data and variables

Our study aims to analyze the impact of the foreign exchange rate on the balance of payments, evidence from Vietnam in the period from 2000 to 2020. We collected data from the Vietnamese State Bank and used EViews 9 software to implement the research. We used two variables to be the foreign exchange rate or the exchange rate (EXR) and the balance of payments (BOP) to implement our research.

3.2. Model and hypothesis

ARDL (AutoRegressive Distributed Lag) is a combination of the VAR (vector autoregression) model and the least-squares regression (OLS) model (Shrestha and Bhatta, 2018). ARDL is considered a successful, flexible, and easy-to-use model for the analysis of multivariate time series. The ARDL model allows determining the impact of established variables on the dependent variable (Sahoo and Das, 2012). Moreover, using the ARDL model, the time series variables are stationary, the delay is optimal, the model is not redundant, there is no autocorrelation, no variable variance, and suitable functional form (Shrestha and Bhatta, 2018).

Therefore, we employed the econometric model of the ARDL or Auto-Regressive Distributed Lag model to find out the impact of the exchange rate on the balance of payments in Vietnam as follows:

$$BOPt = \alpha_0 + \sum_{i=0}^{t} \beta_i * EXR_{t-i} + \sum_{j=1}^{t} \alpha_j * BOP_{t-j} + u_t \quad (1)$$

We considered that there are two hypotheses for this model:

1) The exchange rate lags have an impact on the balance of payments.
2) The balance of payments lags has an impact on the balance of payments.

Besides we used variables and expected signs in Table 1 for studying the impact of foreign exchange rates on Vietnam's balance of payments.

Table 1: Variables and expected sign (VSB, 2021)

Variable	Description	Unit	Expected Sign
BOP	Balance of Payments	Billions of US$	
EXR	Foreign Exchange Rate	US$/VND	+

4. Results and discussions

In the first step, we draw two figures of exchange rate and balance of payments. In Fig. 1, the exchange rate tends to increase through the research period. Therefore, the EXR variable has a unit root, which means that it is non-stationary. Besides in Fig. 2, with the BOP figure, BOP has an unstable direction. We can also conclude that the BOP variable has no unit root, and it is stationary.

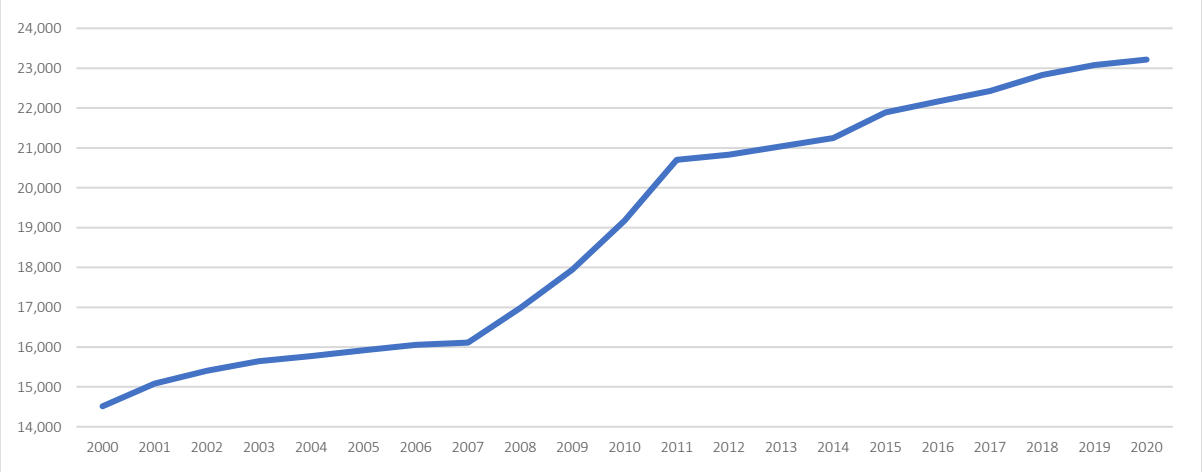

Fig. 1: Exchange rates of Vietnam, 2000 – 2020 (US$/VND); Source: Annual report of Vietnam State Bank (SBV, 2021)

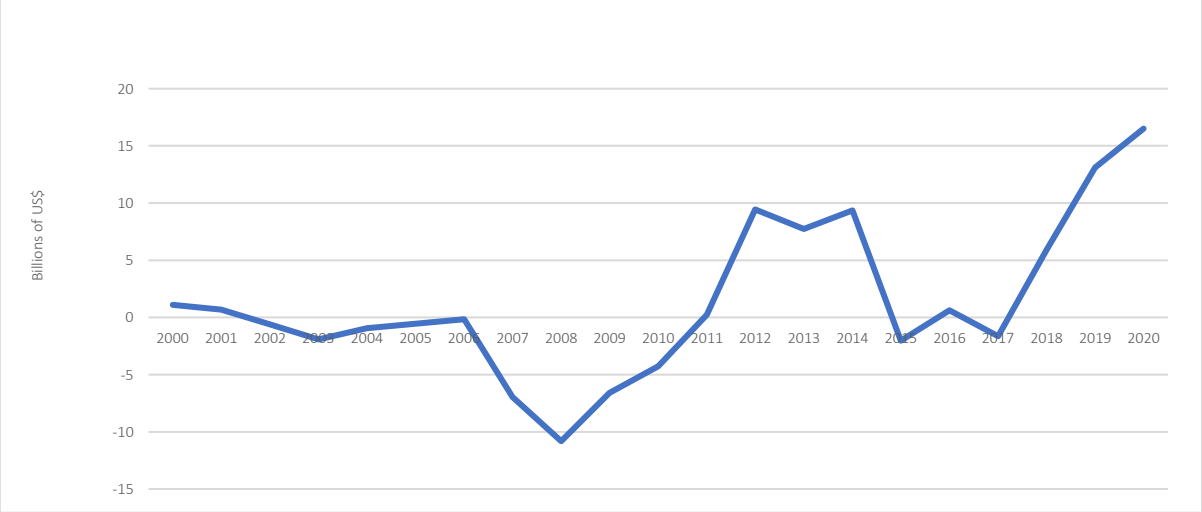

Fig. 2: Balance of payments of Vietnam, 2000–2020 (billions of US$); Source: Annual report of Vietnam State Bank (SBV, 2021)

On that basis, we continue implementing ADF Test for BOP and EXR. Table 2 shows that variable BOP 1st difference has the absolute values of t-Statistic at three levels 1%, 5%, and 10% are respectively |-3.886751|, |-3.052169|, and |-2.666593|. Those figures are smaller than the ADF statistic which is |-6.946762|. Thus, variable BOP is stationary.

We can see in Table 3 the variable EXR has the value of t-Statistic at three levels 1%, 5% and 10% are |-3.857386|, |-3.040391|, and |-2.660551|. These three figures are greater than the ADF statistic which is only |-0.049062|. Therefore, variable EXR is non-stationary. In summary, the results of Tables 2 and 3 show that BOP is a stationary variable and EXR is a non-stationary variable.

Table 2: Unit root test (ADF Test) of variable BOP

Null Hypothesis: BOP has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, max lag: 3)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.946762	0.0000
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

Note: *MacKinnon (1996) one-sided p-values

Table 3: Unit root test (ADF Test) of variable EXR

Null Hypothesis: EXR has a unit root Exogenous: Constant Lag Length: 0 (Automatic-based on AIC, max lag: 3)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.049062	0.0415
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

Note: *MacKinnon (1996) one-sided p-values

According to the ADF test results, BOP and EXR with lag at 1st have unit root at meaning 1% level. As a result, we changed the model with independent and dependent variables with EXR (-1) and BOP (-1) to ensure the accuracy of the research model. The research model of our study can be written as follows:

$$\Delta BOPt = \alpha_0 + \sum_{i=0}^{t} \beta_i * \Delta EXR_{t-i} + \sum_{j=1}^{t} \alpha_j * \Delta BOP_{t-j} + u_t \quad (2)$$

In time series, the lag of variables plays an important role to explain the impact of variables and stationary. Therefore, before conducting the ARDL model in determining the relevant order of lag, we continue using VAR (vector autoregression model) and the AIC (Akaike information criterion) as the primary standard for our research.

Table 4 suggests 3rd lag. This means that the maximum delay of the model is 3. The test methods were carried out then to eliminate the mismatch latency and provide optimal latency. As a result, the endogenous variables or independent variables are BOP and EXR with lag at 1st-2nd-3rd-4th, and others are the exogenous variables. All results from LRTS (Sequential modified LR test statistic), AIC (Akaike information criterion), SCIC (Schwarz information criterion), and HQIC (Hannan-Quinn information criterion) still suggest the 3rd lag (significant at 5% level). This means that the maximum delay of the model is 3. The test methods were carried out to eliminate the mismatch latency and provide optimal latency. After indicating the suitable lag length through VAR, we applied the ARDL model.

Table 4: Lag length selection

Lag	LogL	LRTS	AIC	SCIC	HQIC
0	-331.1300	NA	48.01858	48.24681	47.99745
1	-324.9928	7.013960	47.28469	47.55857	47.25934
2	-323.3492	1.643647	47.19274	47.51227	47.16316
3	-317.6342	4.898531*	46.51918*	46.88435*	46.48537*
4	-317.3450	0.206570	46.62072	47.03154	46.58269

Note: * indicates lag order selected by the criterion

We can see in Table 5 with the results from the ARDL model, the impact of the foreign exchange rate and the balance of payments in previous years even also impact Vietnam's balance of payments in the following years, because P-values are less than 0.05. Or the change of BOP_{t-1}, BOP_{t-2}, and BOP_{t-3} have negative impacts on BOP in the future. And the change of EXR_{t-1}, EXR_{t-2}, and EXR_{t-3} have a positive impact on BOP in the future. This is supported by the economic theories indicating that not only the foreign exchange rate but also the balance of payments in the past will affect the current balance of payments and the balance of payments in the future. The findings are also supported by the results of Knoester and Sinderen (1985), Narayan and Smyth (2006), and Bebek and Li (2021). It means that when the exchange rate increases, Vietnam's balance of payment has a trend increase, and when the BOP of previous years increases, Vietnam's balance of payment still decreases.

In addition, results in Table 5 also suggest that lagged EXR and lagged BOP can be regarded as a predictor in analyzing the change of the balance of payments in following periods, consistent with the arguments of Aizenman and Lee (2008), Ahmad et al. (2014), and Lotfalipour and Bazargan (2014) with R-squared=0.4612, the ARDL model explains 46.12% of the change in the variable BOP based on the change of BOP_{t-1}, BOP_{t-2}, BOP_{t-3}, EXR_{t-1}, EXR_{t-2}, and EXR_{t-3}. While the 53.88% remaining is affected by other factors that have not been shown in the model. The study only focuses on explaining the significance of the estimated coefficient of the variables related to exchange rates (EXR) and balance of payments (BOP) in the model.

To test the accuracy of the results, we conducted a Granger Causality test to consider the relationship

between EXR and BOP of Vietnam from 2010 to 2020.

Table 5: Autoregressive distributed lag model (ARDL)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6050.000	1360.000	-4.454407	0.0021
BOP (-1)	-1.026912***	0.180281	-5.696184	0.0005
BOP (-2)	-0.610861**	0.213073	-2.866908	0.0209
BOP (-3)	-0.673665***	0.187957	-3.584136	0.0071
EXR (-1)	657131.7**	1714929.	0.383183	0.0116
EXR (-2)	4730276**	1703516.	2.776772	0.0240
EXR (-3)	8943440***	2117821.	4.222945	0.0029
R-squared	0.461201	Mean dependent var		5.22008
Adjusted R-squared	0.419601	S.D. dependent var		6.08009
F-statistic	10.92164	Durbin-Watson stat		2.471108
Prob(F-statistic)	0.001753			

Note: *** and ** denote significance at the 1% and 5% levels, respectively

In Table 6 the P-value of the Null hypothesis "EXR does not Granger Cause BOP" is less than 0.05. Therefore, we reject Null. As a result, it shows that EXR impacts BOP. However, BOP does not influence EXR because its P-value is greater than 0.05. In summary, we see that the foreign exchange rate, as well as foreign exchange rate policies, truly have an impact on Vietnam's balance of payments, but there is not enough evidence to prove the balance of payments impacts the foreign exchange rate.

Table 6: Granger causality test

Null Hypothesis	F-Statistic	Prob.
EXR does not Granger Cause BOP	11.1122	0.0032
BOP does not Granger Cause EXR	1.5852	0.2674

In Table 7, Chi-squared is 2.993671 and P-value is greater than 0.05, we can conclude that the data has no serial correlation. And this result guarantees the accuracy of the chosen model and is suitable for our study.

Table 7: Correlation test

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.332455	Prob. F (6,8)	0.9016
Observation R-squared	2.993671	Prob. Chi-Square (6)	0.8096
Scaled explained SS	0.706941	Prob. Chi-Square (6)	0.9943

The study results show that the ARDL model is suitable and reliable to evaluate the influence of the foreign exchange rate on Vietnam's international balance of payments. The results also examine the reliability and relevance of the research model in the case of the impact of exchange rates on the balance of payments. The study also indicates that the independent variable exchange rates truly influence the balance of payments.

5. Recommendations and conclusions

5.1. Recommendations

After analyzing the impact of the foreign exchange rate on Vietnam's balance of payments using the data from 2010 to 2020, we propose the following recommendations.

Firstly, the Vietnamese government should issue some appropriate policies that stabilize the economy, because one of the necessary conditions to attract sources from foreign investors is a stable and effective economy. If Vietnam's economy is not stable, investors might hesitate to invest their capital. Thus, it is essential to build a stable and sustainable economy in which the government issues appropriate international economic policies as well as foreign exchange rate policies.

Secondly, the State Bank of Vietnam should study to build a controlled devaluation policy, but it ensures not affect integrative policies among Vietnam and other countries. In recent years, Vietnam's balance of payments is unbalanced because the import value is still greater than the export value, causing foreign currency reserves to decrease. To solve this problem, the government could implement a devaluation policy to stimulate exports and restrict imports. Thereby, the foreign currency reserve would increase, and the balance of payments might be improved. However, the Vietnamese government needs to control issues such as inflation, monetary supply, and implementation of international commits as well as select targeted exchange rate policies.

Finally, the State Bank of Vietnam should consider selecting a suitable target for the exchange rate policies of each period, because the change in the exchange rate does not impact the same on the balance of payments in every period. For example, an increase in the exchange rate can improve the trade balance and contribute to stabilizing the capital balance but it can cause a debt burden. Therefore, the exchange rate management needs to weigh benefits and incurred costs. To ensure the best balance of payments as well as the highest benefits for the economy, the State Bank of Vietnam needs to consider carefully when issuing the exchange rate policies.

5.2. Conclusion

In conclusion, our study proved that the foreign exchange rate plays an important role in determining a change in Vietnam's balance of payments. In our study, we applied Auto Regression Distribution Lags Model to analyze the impact between these two variables–the foreign exchange rate and the balance of payments. All results proved that when the foreign exchange rate increases,

Vietnam's balance of payments also has a trend to increase, too. Besides, not only does the foreign exchange rate affects the balance of payments, but also the balance of payments of previous years impacts the current balance of payments. Moreover, the findings expressed significant and positive variables. We confirm that the change in the foreign exchange rate, as well as related policies, will cause a change in the balance of payments in the future. And Vietnamese government should consider issuing suitable foreign exchange policies to ensure a positive change in the balance of payment. These findings are the same as the conclusions of Odili (2014) and Oladipupo and Onotaniyohuwo (2011) that confirmed that devaluation of currency value can help improve the balance of payments.

ARDL is an appropriate and reliable research tool, it is shown that other factors should be added and adjusted to expand the research scope so that the model would be easier and clearer to explain. We extended the empirical works of Papadopoulos (1993), Narayan and Smyth (2006), and Lotfalipour and Bazargan (2014) by examining the balance of payments predictability in Vietnam. We use lagged foreign exchange rate and lagged balance of payments to predict the future values of Vietnam's balance of payments.

However, our research only demonstrates the impact of exchange rates on the balance of payments. As a result, the reversed relationship has not been proved in the study. In other words, we have not examined whether there is any impact of balance of payments on exchange rates, or the study has not evaluated whether there exists any influence of the balance of payments on exchange rates or the impact of different factors on Vietnam's BOP. We will continue to study these issues in the future.

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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