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The Impact of Financial Integration on Monetary Policy Independence: The Case of Vietnam

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Abstract

Along with the trend of financial globalization, Vietnam has undergone a process of increasing financial integration. The great capital inflow poses a problem for the monetary policy's ability to follow a planned target during the changes in the global financial markets. This paper aims to examine the impact of financial integration on monetary policy independence in Vietnam and investigate the role of foreign exchange reserves on this relationship. The research borrows from Mundell-Fleming's Trilemma theory. The results show that increasing financial integration reduces the independence of monetary policy in the short term, and foreign exchange reserves have not shown an apparent role in Vietnam. In addition, increasing exchange rate stability has a negative impact on the independence of monetary policy, but it has an impact on growing market confidence and partly supporting the management process of monetary policy in the short term. Therefore, in the long run, Vietnam needs to allow exchange rate flexibility more, but there should not be sudden changes; the size of foreign exchange reserves should be strengthened to facilitate the implementation of an independent monetary policy with an obvious impact in the context of an increasing scale of international capital flows in the future.

Keywords: Monetary Policy, Financial Integration, Foreign Exchange Reserves, ARDL Model

JEL Classification Code: C12, C13, E44, F15

1. Introduction

The primary objective of monetary policy is to stabilize the value of the currency to promote economic growth and create jobs. However, in the context of increasing financial

integration, monetary policy has added a role in ensuring the stability of the country's financial system. In terms of policy and academic research, monetary policy independence is one of the most fundamental problems of an open economy (Taguchi, Nataraj, & Sahoo, 2011). The well-known Trilemma theory in international macroeconomics reveals that a country can only follow two of the three options: a fixed exchange rate, an independent monetary policy, and free capital mobility. Therefore, if there is no limit on international capital flows and the exchange rate remains fixed, it will prevent the ability to implement the independent monetary policy. In addition, Calvo and Reinhart (2002) also pointed out that a country's currency without having credibility will prevent it from pursuing an independent monetary policy regardless of applying any exchange rate mechanism.

The impact of financial integration on the independence of monetary policy has been mentioned in much research. In general, this is often studied concerning the determinants of Trilemma or the relationship between Trilemma and the foreign exchange reserves and their effect on the volatility of

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production and domestic inflation. This research perspective has not shown the direct impact of monetary independence as well as the role of foreign exchange reserves on monetary independence with specific levels and trends. Various studies have attempted to measure this effect. Typically, Taguchi et al. (2011) examine the relationship between monetary independence and the financial integration, exchange rate mechanism, and foreign exchange reserves in two decades in five Asian countries, including Thailand, Korea, Indonesia, the Philippines, and India. As a result, Thailand, South Korea, and Indonesia are aiming for a floating exchange rate mechanism with greater monetary independence while India's independent monetary policy continues to decline when applying the fixed exchange rate mechanism along with an increase in monetary independence. In addition, accumulating foreign reserves has a supporting role to a certain extent in maintaining monetary independence.

Similarly, Klein and Shambaugh (2013) use the estimated coefficient of domestic short-term interest rates and foreign interest rates as a method to measure monetary independence, but the stability of the exchange rate is assessed through the exchange rate mechanism that applies in each country and the method of measuring the financial integration based on legal regulations. The results find that when capital controls are absent, the sensitivity level of interest rates in countries applying the fixed exchange rate mechanism is greater than that of the floating exchange rate. However, countries can achieve an average level of monetary independence with soft anchoring mechanisms. The study also notes that when controlling capital, but not closely, it will not help increase monetary independence. Law, Tee, and Ooi (2019) study the impact of financial integration as a threshold variable on monetary independence with foreign exchange reserves, exchange rate stability, and inflation. The results show that if the financial integration is over 13.64% of GDP, the financial integration will impact negatively on monetary independence. Foreign exchange reserves play a role in increasing monetary independence at the above level of financial integration. There is no study on direct impact measurement has been found in Vietnam, and mainly this relationship is considered through trade-offs between the variables in the policy trilogy by quantitative models or describing statistics trends combining with domestic policy (Dinh, 2012; Le, 2010; Pham, 2010).

Along with the trend of financial globalization, Vietnam has experienced rapid financial integration while the exchange rate has been maintained very stable throughout the research period. While Hoang, Nguyen, and Nguyen (2020) show that the capital inflows respond strongly to changes in domestic monetary conditions in Vietnam, Nguyen, Hoang, and Nguyen (2020) indicate that financial integration has a positive and significant effect on the business cycle

synchronization. This paper will focus to clarify whether, with strict exchange rate management, financial integration has been increasing as an inevitable trend that will make it difficult for independent monetary policy management in Vietnam, and foreign exchange reserves have a supportive effect for independent monetary as many studies have shown.

2. Theoretical Background

The theory of the Trilemma or Impossible Trinity is Mundell-Fleming's main contribution in macroeconomics (Aizenman, 2013). This theory states that a country can simultaneously choose any two of the three policy goals, including monetary independence, exchange rate stabilization, and financial integration. The Trilemma theory is shown in Figure 1. Each side of the triangle denotes monetary independence, exchange rate stabilization, and financial integration respectively, indicating the desired policy target, but cannot be achieved simultaneously on all three sides of the triangle. On the top corner, the option of a closed financial market, together with monetary independence and a fixed exchange rate mechanism, is the choice of most developing countries in the second half of the 1980s. On the left corner, an exchange rate mechanism floating with monetary independence and financial integration has been a priority choice of the US for the past three decades. On the right, abandoning monetary independence and exchange rate stability and global financial integration is the choice of countries that use the Euro because of a monetary union, and also Argentina's choice in the 1990s. Policymakers must face trade-offs in which increasing one variable in the trilemma will reduce the weighted average of the other two variables.

The Trilemma Theory is relevant in the situation that the size of foreign exchange reserves is large enough. The important developments that changed the context of the Trilemma theory are that financial globalization took place strongly in most countries of the world in the 1990s–2000 (Aizenman, 2013). At the same time, the gradual economic growth of emerging markets led to structural changes; by 2010, more than half of global GDP was generated by developing and emerging countries. An unforeseen consequence of financial globalization is the financial instability associated with the abrupt halt or evaporation of capital flows and the increasing likelihood of crises in developing countries. The dramatic drop in output and the financial crisis-related social costs added financial stability to three policy goals as framed in the original triangle, changing the Trilemma theory to four impossible policies that can not be achieved simultaneously (Quadrilemma).

Before financial integration, the demand for foreign exchange reserves mainly provided hedging against fluctuations in trade flows. However, the financial

integration of developing countries also adds to the demand, that is necessary to self-secure against the fluctuations of financial flows. According to the nature of the financial markets, the demand for foreign currency increases rapidly due to the financial volatility that surpasses the demand due to fluctuations in trade flows (Aizenman, 2013). The relationship between foreign exchange reserves and financial integration reveals a fourth aspect of the trilemma. In the short term, countries have expected that the accumulation and management of international reserves can increase financial stability and the ability to operate independent macroeconomic policies. This development appears to be critical for emerging markets that are only partially integrated with the global financial system as they often use neutralization measures to control potential inflationary effects from the accumulation of foreign exchange reserves (China and India are typical examples of this trend).

Obstfeld, Shambaugh and Taylor (2005) linked the tendency of reserve accumulation with the three goals of the trio policy. The first reason is the “fear of floating exchange rate” due to the desire to strictly manage exchange rates. Desiring to stabilize the exchange rate to promote trade and minimizing volatile shocks while dollarizing debts set a nominal anchor to stabilize inflation expectations (Calvo & Reinhart, 2002). The second reason is the application of proactive policies to develop and increase the depth of domestic financial intermediation, through a larger domestic financial and banking system than GDP. The third reason is due to the increase in private equity to deepen domestic financial intermediation in developing countries with world financial markets. These three factors increase the likelihood of an economy experiencing financial storms, which can lead to a financial crisis, as seen in Mexico’s 1994–1995 crisis, 1997–98 Asian financial crisis, and 2001–2002 Argentine financial collapse. Foreign exchange reserves serve as a hedge against sudden capital inflows or due to people’s need to hold foreign assets (Calvo, 2006).

For indirect-impact approach, a typical study of the Trilemma is Aizenman, Chinn, and Ito (2008). The study explores the linkage between monetary independence and financial integration, along with the exchange rate mechanism and the size of foreign exchange reserves of more than 100 countries in the period 1970–2006. Aizenman et al. (2008) developed a set of data to measure the factors of the trilemma, including exchange rate stability, monetary independence, capital account openness, and determination of linear relationships between indices. This equals the three-variable total density method by a constant. Performing an OLS regression analysis is to examine whether the three policy goals have a linear relationship. The results of the study found that the total of these three variables equals one constant. In industrial countries, after giving up exchange rate stability

in the 1980s, the level of exchange rate stability increased in the period 1991–2006 together with increasing financial integration, the exchange rate declined, and foreign exchange reserves decreased. In contrast, developing countries move towards greater exchange rate flexibility and deeper financial integration with higher monetary independence from the early 1970s to the 1990s, and from there, the three policy variables tend to the middle period, which is a combination of a managed floating rate backed by substantial foreign exchange reserves, thus maintaining a certain degree of monetary independence. With emerging Asian economies from the 1990s to the 2000s, monetary independence decreases, financial integration decreases slightly, the exchange rate stabilizes, and the foreign exchange reserve as a cumulative GDP is high. Similar to Aizenman et al. (2008), many studies also apply the Trilemma theory in measuring for different countries, groups of countries (Glick & Hutchison, 2009; Hutchison, Sengupta & Singh, 2012; Cortuk & Singh, 2011; Hsing, 2012; Aizenman, Chinn, & Ito, 2016).

However, these studies use different indexes to measure the Trilemma. Hutchison et al. (2010) and Cortuk and Singh (2011) measure the level of financial integration by calculating the total capital inflow or outflow in India and Turkey. In addition, Aizenman et al. (2016) consider the level of monetary independence to interest rate and exchange rate instruments, not only interest rates like Aizenman et al. (2008).

Although using the various measurement methods to calculate variables of the trilemma, most studies approach these perspectives to find that the sum of the three indices of the Trilemma equals a constant, or in other words, there is an interchange between the three policy variables. When financial integration increases with the exchange rate being stable, monetary independence decreases. When the combination of financial integration increases, and greater monetary independence requires the exchange rate to be more flexible. In the case of stabilizing the exchange rate and remaining monetary independence, the capital flow must strictly control. The research method used is mainly the ordinary least squares method (OLS) or the adjustments based on OLS such as Two-Stage Least Squares (TSLS), the Generalized Method of Moments (GMM), or SUR estimation.

For direct-impact approach, studies of the indirect approach have not shown the apparent impact of financial integration on monetary independence as well as assess the supporting role of foreign exchange reserves on this relationship. A few studies have attempted to measure the impact of financial integration on monetary independence. Besides, they also considered the impact of exchange rate stability and foreign exchange reserves on monetary independence. A typical approach in the direction is Taguchi et al. (2011). The study uses the variables representing the trilemma macroeconomic policies combined with foreign

exchange reserves, like Aizenman et al. (2008), but using different indexes. This study also applied the index of the sensitivity of the domestic interest rate to the changes of interest rate in a central country (US) to evaluate the monetary independence for the Asian countries. Using the GMM method to investigate the impact of financial integration, exchange rate mechanism, and foreign exchange reserves on monetary independence of countries in the period 1976Q1-2009Q4. As a result, Thailand, South Korea, and Indonesia are aiming for a floating exchange rate mechanism that has higher monetary independence, while India has monetary independence decline along with the exchange rate pegging mechanism and the increase in financial integration. Similarly, Klein and Shambaugh (2013) used the coefficients to estimate domestic short-term interest rates based on foreign interest rates as a way to measure monetary independence, but the stability of the exchange rate is assessed through the exchange rate mechanism that applies in each country and measures financial integration based on legal regulations.

The results show that in the absence of capital controls, the sensitivity level of interest rates in countries, which apply fixed exchange rate mechanism is greater than that of floating mechanism, while with soft anchoring mechanism management (within a broader range of pegging mechanism) achieves an average degree of monetary independence. The study also implies that applying loose capital controls will not help increase the country's monetary independence. Law et al. (2019) study the impact of financial integration as a threshold variable on monetary independence concerning foreign exchange reserves, exchange rate stability, and inflation. Financial integration in the study is measured on a real scale, but calculated on the size of capital flow, not the cumulative value. The results show that when the financial integration is over 13.64% of GDP, the impact of financial integration on monetary independence is significant and negative. Foreign exchange reserves play a role in increasing the monetary independence at this level of financial integration. The study uses the OLS and threshold regression, but does not consider the stationary of time data series.

Measuring the impact of financial integration on the monetary independence in Vietnam is primarily an indirect approach through considering that the total of three policy variables reaches a constant. Thereby the results show that the trade-off of one variable means the total decrease of the remaining two variables.

Dinh (2012) uses statistical methods to describe variables of the Trilemma with a sample of Asian countries in the period 1995–2010, it was found that the Vietnam economic data index reached the highest level of 0.77 in 1999 and the lowest of 0.26 in 2002 before returning to the average level of about 0.45. Compared to the region, Vietnam's monetary independence is often higher than the regional average and this gap seems to always be maintained. The average degree of independence of Asian countries – 11 ranges from 0.4 to 0.5.

Thus, by observing the trend of the trilemma of eleven Asian countries (including Vietnam) over the past decade, we can see the current and upcoming policy trends of this country is the increase in the private sector, the exchange rate is more flexible and the monetary independence is average. Some studies only assess Vietnam's three policy objectives by descriptive statistical method (Le, 2010) or only measure Vietnam's monetary policy independence and consider the evolution of the other two goals without measuring this relationship (Pham, 2010). These studies generally found that the situation of Vietnam in the direction of increasing financial integration, meanwhile, the exchange rate is kept relatively stable and monetary policy independent is affected.

In general, previous research often approached indirectly through testing the existence of the Trilemma. There are few studies that find out the direct impact of financial integration on monetary independence or study deeper the level and direction of impact as well as assessing the role of foreign exchange reserves on monetary independence of the country. The various variables used in the model, and the method of calculating variables similar to Aizenman et al. (2008). The most commonly used estimation method is OLS regression in indirect approach studies. However, when measuring direct impact, the studies use a more diverse methodology and focus on the constraints of time series data. The results generally find that financial integration has a negative impact on monetary independence, especially the more pronounced impact in countries with high exchange rate stability. In Vietnam, there is a lack of study measuring the direct impact of financial integration on monetary independence for the Vietnamese economy. This relationship is considered through trade-offs between trilemma variables. Financial integration is mainly measured by the KAOPEN index, which is a regulatory-based method, so it does not explain the real integration of the financial system, and studies have not considered the role of foreign exchange reserves. Our studies will contribute to empirical research by measuring the direct impact of financial integration on monetary independence through the ARDL. We also analyze the role of foreign exchange reserves to monetary independence in Vietnam.

3. Methodology

Aizenman et al. (2008) has used indicators to measure the achievement of three macroeconomic policy goals (including exchange rate stability, monetary independence, and capital market openness) in which, exchange rate stability and monetary independence are measured based on the actual exchange rate in the markets and correlation of interest rates between two countries. However, the capital market openness is measured following legal regulations; hence, it does not reflect the real level of financial integration

in a country. At the same time, the approach of Aizenman et al. (2008) does not assess the direct impact of financial integration on the exchange rate nor the role of foreign exchange reserves. Following the research of Aizenman et al. (2008), Taguchi et al. (2011), and Law et al. (2019) we transform the equation to be able to evaluate the level and direction of the impacts of the variables on monetary independence in a more detailed way. Following the approach of Taguchi et al. (2011), and Law et al. (2019), the proposed estimation equation is as follows:

$$IFI = \beta_1 * IFI + \beta_2 * ES + \beta_3 * RES \quad (1)$$

In Eq. (1), MI denotes monetary independence index, IFI is financial integration ratio, ES is exchange rate stability index and RES is foreign exchange reserves.

According to the Trilemma Theory, the deeper financial stability and/or the fixed exchange rate will reduce monetary independence, so β_1 and β_2 are expected to be negative. If foreign exchange reserves contribute to financial stability in the context of increased globalization as mentioned by Obstfeld et al. (2005), the accumulation of foreign reserves will maintain an increase in monetary independence, therefore, β_3 is expected to be positive.

Monetary independence index (MI) is measured by the method of Aizenman et al. (2008) by the following formula:

$$MI = 1 - \frac{\text{corr}(I_VN_ON, I_US_ON) - (-1)}{1 - (-1)}$$

where $\text{corr}(I_VN_ON, I_US_ON)$ is the correlation between Vietnam's overnight interbank rates and the US's interest rates. Monetary independence is complete if MI takes the value of 1, on the contrary, the value is 0.

Following Lane and Milesi-Ferretti (2006), international financial integration ratio (IFI) is constructed by:

$$IFI = \frac{FDIA + FPIA + OTHA + FDIL + FPIL + OTHL}{GDP}$$

where, FDIA, FPIA, OTHA, FDIL, FPIL, OTHL are the accumulated value of assets and liabilities of direct investment, portfolio, and other investment, respectively.

Exchange rate stability index (ES) is measured by using the quarterly standard error of the exchange rate (EX) of the domestic currency with the US as follows:

$$ES = \frac{0.01}{0.01 + \text{stdev}(\Delta \log(EX))}$$

The greater value of this index indicates a more stable movement of the two currencies.

Foreign exchange reserves ratio: the size of foreign reserves (excluding gold) is defined as a percentage of GDP by the accrual method (Aizenman, Chinn & Ito, 2013).

In this study, we use Auto Regressive Distributed Lag (ARDL) for assessing the impact of financial integration on monetary independence in Vietnam. The ARDL model was initially developed by Pesaran and Shin (1997) and then by Pesaran, Shin, and Smith (2001). Models have been used for decades to measure short- and long-run relationships between economic variables. The ARDL cointegration technique has many advantages compared to other cointegration methods. First, unlike other cointegration techniques that require variables to have the same order, the ARDL technique can be applied even when the variables are cointegrated at different levels. Second, while other cointegration techniques are sensitive to sample size, the ARDL technique is suitable even when the sample size is small. Third, the ARDL technique provides results that are not biased even when the variables are endogenous (Odhiambo, 2009).

Table 1: Summary of Variables and Data Sources

Variable name	Notation	Descriptions	Source
Monetary independence index	MI	the correlation between Vietnam's overnight interbank rates and the US's interest rates	DataStream, national data
Financial integration ratio	IFI	accumulated method (Total asset + liabilities of FDI, FPI, OTH)/GDP	Lane and Milesi-Ferretti (2017); IMF, Balance of Payments; WB, Global Economic Monitor and authors' calculation
Exchange rate stability index	ES	The quarterly standard error of the exchange rate (EX) of the domestic currency with the US	Datastream, national data
Foreign exchange reserves ratio	RES	foreign reserves (excluding gold)/GDP	IMF, International Financial Statistics

3.1. Estimate a Long-Term Relationship

ARDL model (p, q, r, s) with the lagged of four variables MI, IFI, ES, RES is rewritten respectively as follows:

$$\begin{aligned} \Delta MI_t = & \alpha_0 + \sum_{i=0}^p \beta_{1i} \Delta MI_{t-1} + \sum_{i=1}^q \beta_{2i} \Delta IFI_{t-1} \\ & + \sum_{i=1}^r \beta_{3i} \Delta ES_{t-1} + \sum_{i=1}^s \beta_{4i} \Delta RES_{t-1} \\ & + \beta_5 MI_{t-1} + \beta_6 IFI_{t-1} + \beta_7 ES_{t-1} \\ & + \beta_8 RES_{t-1} + \varepsilon_t \end{aligned} \quad (2)$$

where, Δ is the symbol of the first difference, ε_t is the error of the equation.

We estimate the above equation to test the existence of long-term relationships between variables by using F -tests on the significance of the variables' lagged coefficients.

Hypothesis H_0 : $\beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$, and

Hypothesis H_1 : $\beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq 0$.

Pesaran et al. (2001) computed two sets of critical values with different levels of significance. A set of critical values assuming the variables have original level cointegration $I(0)$. The second set of values assumes that the variables have first order cointegration $I(1)$. The hypothesis H_0 is rejected when the F statistic value exceeds the upper limit and is not rejected when F is less than the lower limit. When the hypothesis H_0 is rejected, it means that the variables in the model have a cointegration or a long-term relationship. This result allows estimating the short-term relationship and finding the adjustment coefficient for the equilibrium point in the next step.

3.2. Estimate a Short-Term Relationship

Short-term relationships are determined through the Error Correction Model (ECM) vector model. The error correction equation is written as follows:

$$\begin{aligned} \Delta MI_t = & \alpha_0 + \sum_{i=0}^p \beta_{1i} \Delta MI_{t-1} + \sum_{i=1}^q \beta_{2i} \Delta IFI_{t-1} + \sum_{i=1}^r \beta_{3i} \Delta ES_{t-1} \\ & + \sum_{i=1}^s \beta_{4i} \Delta RES_{t-1} + \lambda ECM_{t-1} + \mu_t \end{aligned} \quad (3)$$

λ is the error correction coefficient obtained from the long-term relationship of the variables in the model, the magnitude of the coefficient indicates the rate of adjustment from short-term imbalance to long-term equilibrium.

4. Empirical Results

Figure 1 shows that Vietnam had an increasing level of financial integration (IFI), while the exchange rate

(ES) was kept relatively stable and quite high. Contrary to the increasing and steady trend of the two corners in the trilemma triangle, the monetary independence (MI) fluctuated. Although the foreign exchange reserve ratio (RES) tends to increase, it has significantly declined from 2009 to 2012. Tran and Le (2020) also indicate that the optimum reserves in Vietnam are always higher than the actual one in the period of 2005–2017. The quarterly decline of foreign exchange reserves seems to follow the quarters in which the reduction of monetary independence. However, with the increasing trend of foreign exchange reserves, the increase of monetary independence is not clear, but changed extremely fast and continuously.

The results of the unit root test showed that the variable MI is stationary at $I(0)$, the other variables FNI, ES, RES is stationary at $I(1)$. According to Pesaran and Shin (1997), the stationary variables at different levels, we can apply the ARDL method. The optimal lagged ARDL model is identified respectively with the variables MI IFI ES RES is (1, 1, 2, 0).

4.1. Results of Long-Term Relationship Estimation

The Bound test results in Table 2 found that the F -statistic is greater than the above critical value at all significance levels. Thus, the hypothesis H_0 can be rejected, meaning that there exists a cointegration relationship or long-term relationship between the variables in the model.

In the long term, financial integration has a negative impact on the monetary independence in Vietnam with a relatively low level, and not statistically significant at the 5% level (Table 3). The exchange rate stability also shows the negative effect with the monetary independence of 5% with the impact level (–) 1.7950. The impact coefficient shows that the stability of the exchange rate increases by 1 unit will reduce the monetary independence to 1.6302 units. The results also find that foreign exchange reserves have a positive impact on monetary independence in the long term, but it is not statistically significant. Research will examine the short-term effects between the variables.

4.2. Results of Short-Term Relationship Estimation

In Table 4, the results of estimating the short-term impact with the ECM model show that financial integration has a negative impact on monetary independence with a significance level of 5%. The impact coefficient of (–) 1.8649 shows that when financial integration increases by 1 unit, it will reduce the MI level of 1.8649 units in the first quarter. The level of stability of the exchange rate increases by 1 unit, reducing the MI in the first quarter by 0.5027.

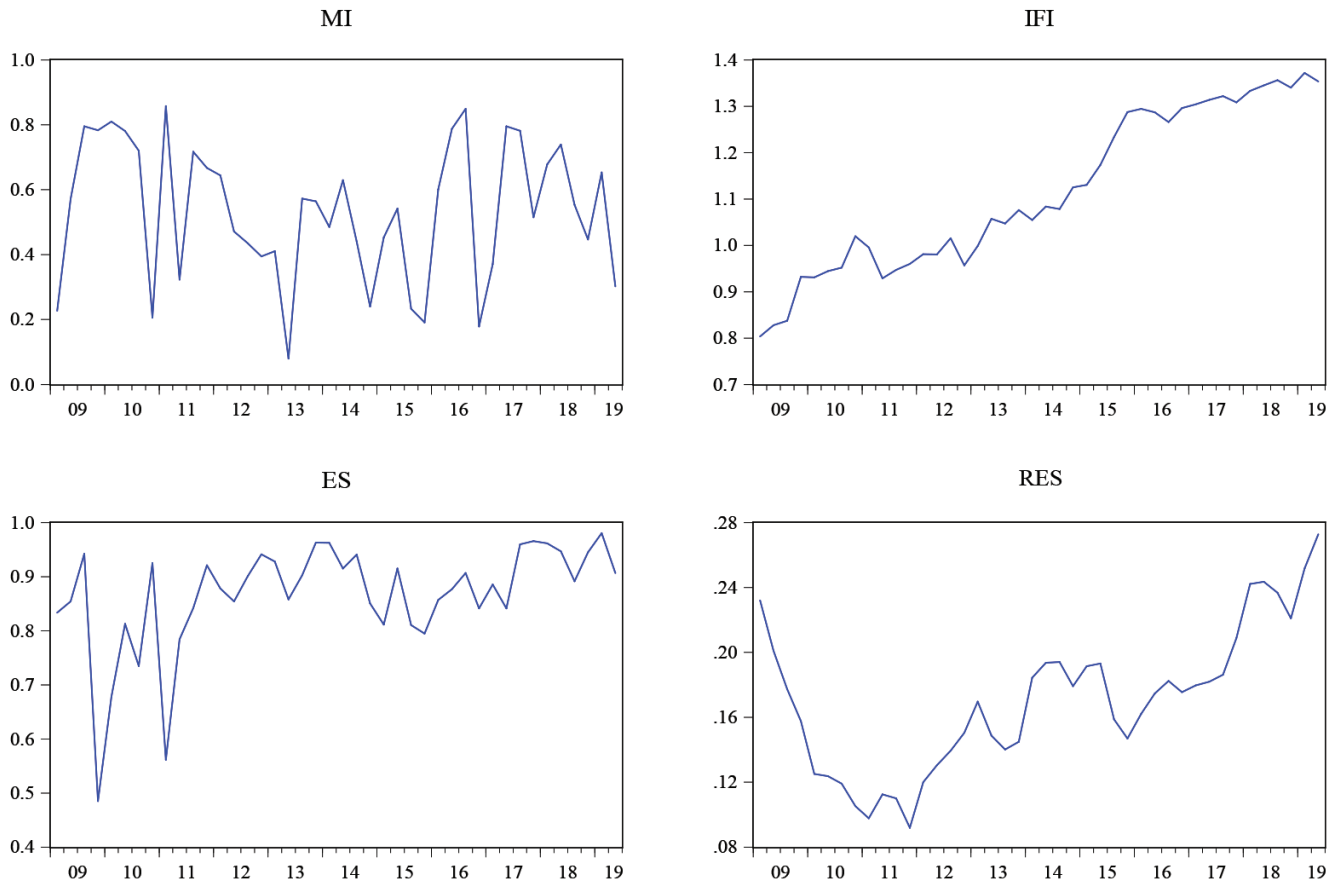


Figure 1: The monetary independence, financial integration, exchange rate stability and foreign exchange reserves in Vietnam

Table 2: Result of Bound test

Lag Length k	F-statistic F	Critical value Bound					
		90%		95%		99%	
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
3	7.293168	2.37	3.2	2.79	3.67	3.65	4.66

Table 3: Results of Long-Term Impact Estimation

Dependent Variable: MI			
Independent Variables	Coefficient	t-statistic	p-value
IFI	-0.256840	-0.811853	0.4229
ES	-1.630185**	-2.475733	0.0188
RES	2.392509	1.677934	0.1031
C	1.860792***	3.647884	0.0009

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

Table 4: Results of short-term impact estimation

Dependent variable: D(MI)			
Independent Variables	Coefficient	t-statistic	p-value
D(IFI)	-1.864860**	-2.047943	0.0488
D(ES)	-0.502710*	-1.744409	0.0907
D(ES(-1))	0.988383***	3.397848	0.0018
ECM	-0.935351***	-6.405003	0.0000
R ²	0.575173		
Adjusted R ²	0.539771		

Note: *, **, *** denote significance respectively at the 10%, 5% and 1%.

In particular, the stable exchange rate has an impact to increase the monetary independence after a quarter at a significant level of 1%, the impact coefficient is 0.9884. Because the optimal lag of the foreign exchange reserve variable, when combined with other variables in the model is 0, therefore, we could not investigate the short-term impact of foreign exchange reserves on monetary independence. The adjustment of the model toward the long-term equilibrium is quite fast (93.54%), it can be close to the long-term equilibrium in just one quarter. The model explains 54% of the determinants of monetary independence in Vietnam. The cumulative sum of recursive residuals test (CUSUM) and the cumulative sum of recursive residuals of square (CUSUMSQ) are in the range of standards corresponding to the significance level of 5%; hence the residuals of the model is stable and the model is stable. We conduct some tests for our estimation. For the autocorrelation test or Lagrange Multiplier (LM) test, the results show that the p -value is at $0.7782 > \alpha$ at all 3 significant levels 1%, 5%, 10%, therefore we can not reject the hypothesis H_0 . In conclusion, the residuals of the model have no correlation to the respective lag. The heteroskedasticity test results show that the p -value is $0.2162 > \alpha$ at all three significant levels 1%, 5%, 10%, so we can not reject the hypothesis H_0 . In summary, the model has no heteroskedasticity.

The descriptive statistics of variables indicates that Vietnam has an increasing level of financial integration, while the exchange rate is stable at a relatively high level. While these two policy variables in the Trilemma have increased steadily, the fluctuations of monetary independence are ambiguous. It increases rapidly and then decreases very vigorously. It should have been that, according to the Trilemma theory, the monetary independence had to show the decreasing trend as a trade-off for the other two rising corners, but the results from Vietnam are not consistent with Trilemma. The foreign reserves in the research period tended to increase, but it has a significant decline in a certain period. The decline of foreign reserves seems to follow the quarters where the decrease of monetary independence shows that foreign reserves can be used as a support for monetary policy independence as many studies have mentioned.

The results of the estimation by co-integrated technique and Autoregressive-Distributed Lag model (ARDL) confirm the long-term relationship between the variables in the model. The coefficients in the model have signs of impact as expected, but not statistically significant in the long term for variables financial integration and foreign exchange reserves. Taguchi et al. (2011) also found a negative impact from financial integration to monetary independence in emerging economies and the foreign exchange reserves have a positive effect on monetary independence for these economies. However, Law et al. (2019) found that the relationship

between financial integration and foreign exchange reserves has significance in the case of financial integration is above a certain threshold.

Although the impact of financial integration on monetary independence is not statistically significant in the long term, in the short term, financial integration has a statistically significant negative impact on the monetary independence in the first quarter with (-) 1.8649 in Vietnam. This may be because of the fact that the financial integration has increased rapidly during the study period, so it partly has an impact on monetary policy management when the exchange rate is still stable. However, when considered in the long term, FDI inflows are still the major flow into Vietnam. This capital flow has extremely low volatility and risk of capital flight. In recent years, this capital flow has grown quite stably, hence it does not put great pressure on the monetary policy management in Vietnam. FPI flows have a greater reversal risk than FDI, but this flow in Vietnam is still small. In addition, debt flows from other investments such as short-term, long-term foreign loans or foreign deposits with relatively high integration, but quite similar levels between inflows and outflows, and at the same time this capital flow is being managed very closely, the aggregate impact is that the process of private capital only makes it difficult to operate monetary policy in the short term and has no significance in the long term. The long-term non-statistically significant impact of the foreign exchange reserve variable may arise from the reason that the impact of foreign exchange reserves on the monetary independence is only significant in the short term or the reserve size is not large enough to regulate in the long term. The problem of ineffective neutralization intervention is also a problem that needs further consideration.

In addition to the long-term negative impact of keeping the exchange rate stable during the past time, it is quite interesting that the level of exchange rate stability can help increase the monetary independence in the next quarter with the impact coefficient is 1.0310. According to the Trilemma theory, the more stable the exchange rate, the more difficult for monetary policymakers to adjust interest rates in case of large-scale capital flow fluctuations, but in the case of Vietnam, the stable exchange rate after a quarter has a positive effect in another angle. This shows that exchange rate stability in Vietnam has the effect of increasing confidence in exchange rate management. Calvo and Reinhart (2002) indicate that if a country's currency lacks reliability, it will prevent that country from pursuing an independent monetary policy regardless of any exchange rate mechanism applied.

5. Conclusion and Policy Implications

Using the co-integrated technique and Autoregressive-Distributed Lag model (ARDL) model to measure the impact

of the financial integration on monetary independence in relation to exchange rate stability and foreign exchange reserves, the results show that (i) financial integration has not a statistically insignificant impact on monetary independence in the long term, but in the short term, an increase in the financial integration in Vietnam has a negative impact on the monetary independence in the first quarter with (–) 1.8649, (ii) foreign exchange reserves has a positive impact on monetary independence, but the result is not statistically significant in the long term, and (iii) besides the long-term negative impact from keeping the exchange rate stable during the past time, the level of stability of exchange rates can help to increase monetary independence in the next quarter.

Policymakers in Vietnam need to consider three following solutions. First, they should allow the exchange rate to be more flexible, but the degree of flexibility should be gradually widened to avoid losing the market's confidence in the SBV's commitment to operating monetary policy. Second, they have to increase the size of foreign exchange reserves for defense during periods of international capital flight, the appropriate level of foreign reserves should be calculated based on the cost of accumulating foreign reserves beyond necessary levels. Third, in the long run, they should continue to increase financial integration in the direction of stimulating capital flows with a high level of stability such as FDI, FPI and still need to open short-term capital flows together with the implementation of appropriate risk management. With the above policy implications, the article contributes how to maintain the monetary independence in Vietnam in the context that the financial integration still needs to increase as an inevitable trend of developing countries, which needs to increase capital and improve policy and market quality.

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